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: Contents:

From the Editor's Desk

Editorial

Forensic implications of aesthetic surgery

Originals and Papers

- **Estimation of age by morphological study of sternal end of fourth ribs in males**
  Yogesh Tyagi , Ajay Kumar, Anil Kohli & K.K. Banerjee
- **An in-depth study of criminal abortion in multidimensional perspective**
  Jawed Ahmad Usmani, Barakha Gupta, Munawwar Husain & Usama B. Ghaffar
- **Estimation of age from the fusion of mesosternum with manubrium and xiphisternum in Delhi: A comparative study**
  M. Wadhwan, A. Murari & G. Murli
- **Front wheel disc brake-A killer design for motorcyclist death**
  S.R. Kochar & Pooja Rastogi
- **Decomposition: Cast a shadow over the drowning deaths-A retrospective study**
  Akhilesh Pathak & H.M. Mangal
- **Suicides in Kolkata metro railway**
  U. B. Roychowdhury, M.Pal & B.Sukul
- **Fatal burns in Children**
  Vikram Palimar & Raghavendra Babu Y.P.
- **Trends of poisoning in Ahmedabad**
  Rohit C. Zariwala, Saumil P. Merchant, Tapan Mehta & Ravindra Bhise

Preliminary Report

- **Detection and identification of components of household mosquito repellant liquidator in autopsy material**
  Vinod Dhingra & Jyotsna Pandey

Case Reports

- **Complete suspense of strangulation**
  Ganesh Govekar, Gaurang Patel &Vinesh Shah
- **Simulation of sharp cuts on the skull bone as firearm injuries-A case report**
  P.S. Thakur , N.M. Unda & R.K. Singh

Cont…..

- **Interpretation of nature of injuries in a healed wound- some important reflections**
  S. P. Garg , D. K. Mishra & C. Jain
- **Dyadic death due to drowning**
  Prateek Rastogi & Vikram Palimar
- **Interesting findings in a case of sexual offence**
  Mandar P. Kantak , Siddhartha S. Banaulikar & E. J. Rodrigues
- **Battered baby syndrome:The extreme case**
  Parteek R. Patel & Digvijay Vaghela
- **Torture leading to suicide - A case report**
  Indrajit Khandekar, Vishwajeet Pawar , Bipinchandra Tirpude & Pankaj Murkey
- **Blunt trauma and petechiae**
  Vipul Namdeorao Ambade & Ashesh Gunwantrao Wankhede

Review Articles

- **Mass disaster management: Forensic aspect**
  Rahul Jain & (Col.) K.M. Rajoo
- **Medical negligence – Hospital's responsibility**
  Sweta S. Agarwal & Swapnil S. Agarwal
- **Retrieval of organs, body parts and tissue from the medicolegal postmortems for mounting and research purpose: Some legal and ethical aspects**
  Indrajit Khandekar, P. N. Murkey, & B. H. Tirpude

Book Review

- **Fundamentals of Forensic Medicine and Toxicology**

Supplements

- **The Bombay Anatomy Act, 1949**
- **Guidelines for Authors/ Contributors**

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From the Editor's Desk

It is my pleasure to present the second number of the present year very much in time and that to with higher ratio of "Originals and Papers" and " Case Reports". A little controversial review article has been accommodated in the current issue with theme on retrieval of human organs from a dead body, with intention of its wide circulation and hope that it will help all the concerned in streamlining an academic and bonafide exercise of museums. The Bombay Anatomy Act, 1949, having relevance to the issue in question has been exhaustively included in supplements in its original form. I wish, this shall clear ambiguities(if any!) with reference to such work.

Despite of my humble submission expressed in No.3, Vol.30 of JIAFM, the general Secretary-Dr. Sanjoy Das has not received significant number of contact details from learned members. May I, in the interest of IAFM, once again request the learned members to ease the uphill task of latest directory of IAFM.

C B Jani
Editor

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Editor

Editorial

Forensic Implications of aesthetic surgery

The ancient literatures like *"Vedas", "Charak Samhita " and "Shushrut Samhita"* have categorical and scientific citations of health ailments and their cures. Since then the medical profession has continued addressing human needs with reference to disease, debility and deformities. In the recent past a great advancement in modern medicine has been witnessed and the field of cosmetic /plastic or aesthetic surgery endeavors to address cosmetic needs during various stages of human life.

To begin with, the field of aesthetic surgery comprised of correction of deformities or contractures, which had a functional improvement aspect also. The out come of such surgeries was so significant that it casted a shadow over parameters of disability assessment and in turn the medical professional engaged in work of disability assessment were compelled to update the concept of disability.

Gradually, the field expanded its horizon to exclusively aesthetic procedures like hair implants, scar removal, mole removal and tattoo removal. Even recent standard textbooks of Forensic Medicine have started mentioning limitations of such traits with reference to identification of individual and biometrics. Lipo suction, lipo sculpture in females and ear piercing in males (traditionally in India, old scar at lobules was one of the feature suggesting female sex) and facial reconstructive surgery in both sexes, which were initially affordable only by a higher class of celebrity, is opted by many people of middle class now a days. The changing trends in society need a close observation and interpretation by Forensic Expert with reference to exercise of identification. However, the procedures of sex change or sex selection with better results are still considered expensive ones and hence does not pose a difficulty in cases of inter sex to a reasonable quantum in medicolegal exercises.

The western winds of reforms have reached this soil carrying various elements, some bad, and some good. One of such good changes is of feminine rights and awareness in females. Among the by-products of such mind set, redefining sexual life is eye catching for many. The breast enhancement and vaginal rejuvation surgeries seem to have attracted many females of literate and affluent class and plenty of centers have started rendering such services in India and overseas. As on date, google search engine shows 4,320,000 sites for liposuction, 8,180,000 for breast enhancement and 4,36,000 for vaginal rejuvation. Astonishingly, the metros like Ahmedabad have health care centers offering very competitive packages for such surgery. [Clitoris hood reduction- Rs.7000/-, G-spot enhancement- Rs.15000/-, labia reduction- Rs.15000/-, vaginal tightening- Rs.15000/- and all four together- Rs. 55,000/-(Times of India, Ahmedabad edition dated 24th November 2008)]. Such solicitation in lay press and web convey the interested class that they are at your doorstep with not very high cost. The scope of present article is not to discuss ethics, rational and complications consecutively and in turn to conclude that whether such modalities may be adopted or adieued by females of our society, but to illuminate its impact in medicolegal exercises pertaining to issues of virginity, pregnancy and delivery.

The testimonials and " before and after" pictures on such web sites indicate that modalities like hymeoplasty, labia reduction , clitoris hood reduction etc give a near virgin status to such female and if assessed on basis of parameters documented in standard text books of Forensic Medicine, the inference drawn may not be a scientific one in the eye of law as well as science.

Summarily, it is high time for the Forensic fraternity to update themselves in consonance with advancements in other branches of medicine, especially the field of aesthetic surgery and come forward with authentic words and actions in this regard.

C.B.Jani
Editor

Originals and Papers

Estimation of age by morphological study of sternal end of fourth ribs in males

Yogesh Tyagi, Ajay Kumar**, Anil Kohli *** & K. K. Banerjee *****

Abstract

A number of bones undergo various age related morphological changes but only a few have been studied for age determination. The existing method for age determination using sternal end of 4th rib was developed by Iscan et al for American white [1,2] population and later on applied by Oettle and Steyn [3]on South African blacks. Both sided sternal fourth ribs were collected at autopsy from 77 males, only 20 years and above because morphological changes were not observed until this age. Each rib was examined in relation to the pit depth (component –I), pit shape (component –II), and rim & wall configuration(component –III) .

The data was designed on a master chart, and analyzed statistically using SPSS programs CROSSTABS, BREAKDOWN and ONE WAY analysis of variance.

Key words: *Age estimation, morphology, sternal end of fourth rib*.

Introduction

In medico-legal practice a doctor is often required to give his expert opinion about the age of a person living or dead both in civil and criminal cases[4]. Age estimation of unidentified human remains is a considerable problem in Forensic Medicine. The relatives do the identification of the dead body or acquaintances of the dead person or from documents or possession found on the body[5]. In order to achieve our objective to establish identity from human skeletal remains, it is customary to start with what is called, the big four i.e. sex, stature, age at time of death and stock or race[6].

In adult population two methods are available for age estimation:

1. Microscopic [7].
2. Macroscopic

- In microscopic method, the estimation of age is based upon examination of cross section of long bones by counting the total number of osteons, lamellae per osteon and Haversian canal diameter [8]. But this method is expensive and requires more time, equipment and skill. It is therefore not practicable.
- The macroscopic methods are faster and do not involve destruction of the specimen. The principle macroscopic changes are metamorphosis of the pubic symphysis, closure of cranial sutures and degenerative changes in vertebral bodies and joints.
- Age determination by metamorphosis of sternal end of fourth rib is probably one of the best methods to estimate age at death by skeletal remains. It is relatively easy to apply, the method is not time consuming and results are quickly obtained. Another advantage is that the rib is not directly affected by the stress of pregnancy and parturition as in the pubic symphysis of female individuals [9]. This method for age determination is as good as if not better than symphysis pubic phase analysis in adult population.

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Aims And Objectives

1. To study the metamorpholgical changes in the sternal end of 4th ribs.
2. Estimation of age on the basis of metamorphological changes at the sternal end of 4th ribs.
3. To find out the bilateral metamorphological variation in the sternal end of 4th ribs.

Material And Method

Study material:

- The study was conducted in the Department of Forensic Medicine UCMS & GTB hospital, Delhi. The material for the present study was collected from the dead bodies brought for medico-legal autopsies in the mortuary of GTB Hospital, Delhi, during the period April 2003 to March 2004.
- The consent was taken from the relatives of the deceased before collecting the study materials. The specimens were collected only from the deceased of known age. The age of the deceased was verified from the documentary proof provided by the relatives. Cases with doubtful age were rejected.
- The study material, comprising of fourth rib from both sides of the rib cage, was obtained from the dead bodies of adult age group. Total of seventy seven specimens were obtained.

Methodology:

- Fourth ribs of both sides were removed by cutting them with bone cutters a few centimeters away from costo-condral junction. Specimens so collected were soaked in water in a container bearing identity tag for several weeks. All adherent soft tissues and costal cartilage were then easily removed. Each specimen was than gently boiled for 10-15 minutes in plain water to remove any remnant of soft tissue adhered to the ribs.
- Each rib was studied with special attention to three components where changes were most noticeable i.e. **pit depth, pit shape and rim and wall configurations.**
- The study material was scored on the pattern as described by Iscan et al. [1,2,9] The sternal rib end of fourth ribs were divided into three components. Each component was further divided into six metamorphic stages.
- **Component I (pit death):-** One of the most obvious ages related changes observed wasthe formation and deepening of cavity at the sternal end of the rib. The maximum depth of the pit was measured with a depth caliper calibrated to 0.1m.m. The measurement was taken where the distance between the base of the pit and the adjacent anterior or posterior wall was greatest. The caliper was held perpendicular to the base of the pit. Cranial or caudal ends were not used because of the presence in some specimen of long projections of bones. Component- I was divided into following six stages:
  1. Flat to slight billowy extremity with no indentation (pit) greater than 1.1mm.
  2. Definite pit formation with a depth ranging from 1.1 to 2.5mm.
  3. Pit depth ranging from 2.6 to 4.5mm.
  4. Pit depth ranging from 4.6 to 7mm.
  5. Pit depth of 7.1mm to10 mm.
     Pit depth of more than 10.1 mm
- **Component II (pit shape):-** As age progresses shape of pit changes. Initially it is only slight amorphous indentation, which in about one year of its first appearance, develops into V shaped structure. Anterior and posterior walls of the rib formed this V shape. Over the few years base of the V widens to become U shaped. As the age increases the walls of the ribs grow thinner forming a forming a progressive wider U.
  Component II was divided into following five stages:
  1. Flat surface no changes.
  2. A shallow amorphous indentation.
  3. Formation of V shaped pit with thick walls.
  4. The pit assumes a narrow U shape with fairly thick walls
  5. Wide U shaped pit with thin walls.

6. Pit is still wide U shaped, yet deeper, more brittle and poorer in texture with some disintegration of bone.

- **Component III (rim & wall configurations):** Rim and wall starts out as a smooth regular border around the pit that rapidly assumes a scalloped but still fairly regular shape. Eventually with increasing age the rim and wall become increasingly irregular, thinand sharp.Component III was divided into following 6 stages:
  1. Smooth regular rim and no wall formation.
  2. Beginning of walls with a thick, smooth regular rim.
  3. Definite visible walls that are thick and smooth with a scalloped or slightly wavy rim.
  4. The scalloped edges are disappearing and walls are thinning; yet the walls remain fairly sturdy without significant deterioration in the texture.
  5. The rim is becoming sharper and increasingly irregular with more frequent bony projections, often more pronounced at the cranial and caudal margins. The walls show further thinning and are less sturdy with noticeable deterioration in texture.
  6. Texture shows extreme friability and porosity. Rim is very sharp, brittle and highly irregular with long bony projections. Occasionally windows are formed in areas where the walls are not complete.

Observations and discussion

COMPONENT-1

Table- 1: Mean age, standard deviation, standard error, 95% confidence interval and age range for right fourth rib.

Score	N	Mean Age	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	7	25.86	7.2	2.72	19.2	32.51	22	42
2	52	31.62	7.88	1.09	29.4	33.79	20	48
3	16	36.25	6.88	1.72	32.58	39.92	23	45
4	2	42.50	3.54	2.5	37.50	47.50	40	45

Table -2: Mean age, standard deviation, standard error, 95% confidence interval and age range for left fourth rib.

Score	N	Mean Age	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	9	25.67	6.73	2.24	20.5	30.84	20	42
2	51	31.76	7.68	1.08	29.6	33.93	20	48
3	16	37.06	6.95	1.74	33.36	40.77	23	45

Table-3 :One way ANOVA right fourth rib.

	Sum of Squares	DF	Mean square	F Ratio	Significance
Between Groups	774.007	3	258.002	4.486	0.006
Within Groups	4198.876	73	25.7519		
Total	4972.883	76			

Table-4: One way ANOVA left fourth rib.

	Sum of Squares	DF	Mean square	F Ratio	Significance
Between Groups	934.769	3	311.59	5.633	0.002
Within Groups	4038.114	73	55.3 17		
Total	4972.883	76			

	Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement Kappa	0.74	0.077	8.826	0.000
No of Valid Cases	77			

COMPONENT -2

Table- 5: Mean age, standard deviation, standard error, 95% confidence interval and age range for right fourth rib.

Score	N	Mean Age	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	4	21.75	1.26	0.63	19.75	23.75	20	23
2	19	26.26	5.56	1.27	23.59	28.94	20	42
3	48	34.23	6.97	1.01	32.21	36.25	21	48
4	6	43.33	4.08	1.67	39.05	47.62	35	45

Table-6: Mean age, standard deviation, standard error, 95% confidence interval and age range for right left fourth rib.

Score	N	Mean Age	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	4	21.75	1.26	0.63	19.75	23.75	20	23
2	20	26.45	5.47	1.22	23.89	29.08	20	42
3	47	34.29	7.02	1.02	32.26	36.38	21	48
4	6	43.33	4.08	1.67	39.05	47.62	35	45

Table-7: One way ANOVA right fourth rib.

	Sum of Squares	DF	Mean square	F Ratio	Significance
Between Groups	2046.636	3	682.212	17.019	0.000
Within Groups	2926.247	73	40.086		
Total	4972.883	76			

Table -8: One way ANOVA left fourth rib.

	Sum of Squares	DF	Mean square	F Ratio	Significance
Between Groups	2051.637	3	683.879	17.09	0.000
Within Groups	2921.246	73	40.017		
Total	4972.883	76			

	Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement Kappa	0.976	0.024	11.865	0.000
No of Valid Cases	77			

For right component- II, mean age is gradually increasing for score 1 through 2 and markedly for score 3 through 4. It means metamorphological changes takes place slower during early twenties. 95% confidence interval shows gradual increment with score 1 through 3 and markedly for 3-4. F-ratio is 17.019, p-value less than 0.000. Above findings suggest that component II is more accurate for age estimation than component 1. Turkey test signifies that score of component 2 is more age dependent than component 1.

COMPONENT -3

For left component 2, table shows that mean age is gradually increasing for score 1 and 2 and markedly for score 3 and 4. It means metamorphotic changes takes place faster during early twenties. 95% confidence interval shows gradual increment with score 1 through 3 and markedly for 3-4. Table 18 shows F-ratio is 17.090 p-values less than 0.000. Above findings suggest test component is more accurate for age estimation than component 1. Turkey test signifies that score of component 2 is more age dependent than component 1.

Table- 9: Mean age, standard deviation, standard error, 95% confidence interval and age range for right fourth rib.

Score	N	Mean Age	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	12	23.42	3.12	0.9	21.44	25.4	20	30
2	28	29.11	5.89	1.11	26.82	31.39	21	45
3	31	36.23	6.45	1.16	33.86	38.59	24	48
4	6	45	0.00	0.00	45.00	45.00	45	45

Table -10: Mean age, standard deviation, standard error, 95% confidence interval and age range for right left fourth rib.

Score	N	Mean Age	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	12	23.42	3.12	0.9	21.44	25.4	20	30
2	27	29.00	5.97	1.15	26.64	31.36	21	45
3	32	36.41	6.58	1.16	34.03	38.77	24	48
4	6	43.33	4.08	1.67	39.05	47.62	35	45

Table-11: One way ANOVA left fourth rib.

	Sum of Squares	DF	Mean square	F Ratio	Significance
Between Groups	2510.914	3	836.971	24.817	0.000
Within Groups	2461.969	73	33.726		
Total	4972.883	76			

Table- 12: One way ANOVA right fourth rib.

	Sum of Squares	DF	Mean square	F Ratio	Significance
Between Groups	2677.869	3	892.623	28.393	0.000
Within Groups	2295.015	73	31.439		
Total	4972.883	76			

	Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement Kappa	0.942	0.033	12.654	0.000
No of Valid Cases	77			

For right component 3, table shows that mean age is gradually increasing for score 1 through 3 and markedly for score 3-4. 95% confidence interval shows gradual increment with score 1 through 3 and markedly for 3 and 4. It means metamorphotic changes takes place faster during early thirties. Table 32 shows F-ratio is 28.392, p-value is 0.000. This shows that component 3 is more accurate criteria for age estimation than component 1 & 2. Turkey test signifies that mean age for each score of component 3 is significantly different from each other.

For left component 3, table shows that mean age is gradually increasing for score 1 through 4.95% confidence interval shows gradual increment with score 1 through 4 . It means metamorphosis changes takes place faster during early thirties. Table shows F-ratio is 24.817, p-value is 0.000. This shows that component 3 is more accurate criteria for age estimation than component 1 & 2. Turkey test signifies that mean age for each score of component 3 is significantly different from each other.

TOTAL COMPONENT SCORE: I+ II+ III

Table-13: Mean age, standard deviation, standard error, 95% confidence interval and age range for right total fourth rib score.

Score	N	Mean Age	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
3	3	22.23	0.58	0.33	20.90	23.77	22	23
4	2	22.00	2.83	2.00	18.00	26.00	20	24
5	9	26.33	6.73	2.24	21.16	31.50	20	42
6	9	26.44	4.85	1.62	22.72	30.17	21	36
7	15	29.66	5.74	1.48	26.49	32.85	21	45
8	23	35.61	6.98	1.46	32.59	38.63	24	48
9	9	37.67	5.63	1.88	33.34	42.00	27	45
10	3	40.00	5.00	2.89	27.58	52.42	35	45
11	3	45.00	0.00	0.00	45.00	45.00	45	45

Table-14: Mean age standard deviation, standard error, 95% confidence interval and age range for left total fourth rib score.

Score	N	Mean Age	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
3	4	21.75	1.26	0.63	19.75	23.75	20	23
4	1	24.00					24	24
5	8	26.75	7.06	2.50	20.84	32.66	20	42
6	11	26.45	4.61	1.39	23.36	29.55	21	36
7	15	29.87	5.88	1.52	26.61	33.12	21	45
8	17	36.71	8.00	1.94	32.69	40.82	24	48
9	16	36.00	4.60	1.15	33.55	38.45	26	45
10	1	45.00					45	45
11	4	45.00	0.00	0.00	45.00	45.00	45	45

Table-15: One way ANOVA right total fourth rib.

	Sum of Squares	DF	Mean square	F Ratio	Significance
Between Groups	2577.183	9	286.354	8.008	0.000
Within Groups	2395.7	67	35.757		
Total	4972.883	76			

Table-16: One way ANOVA left total fourth rib.

	Sum of Squares	DF	Mean square	F Ratio	Significance
Between Groups	2580.643	8	322.58	9.169	0.000
Within Groups	2392.24	68	35.18		
Total	4972.883	76			

Paired T test for correlation between total right and left scores indicated that there is no significant difference between left and right rib scores with coefficient of correlation as high as 0.962 with p value 0.000

For right component total score, table – shows that mean age is gradually increasing for score 3 through 12. 95% confidence interval shows gradually increment with score 3 through 12 except for score 4. This means that total score is good criteria for age determination up to mean age of 45 years. Table shows F-ratio is 8.008, p-value less than 0.000. This signifies that total score is more accurate than component 1 but less accurate less than component 2 & 3 for age determination.

For left component total score, table – shows that mean age is gradually increasing for score 3 through 11. 95% confidence interval shows gradually increment with score 3 through 9. This means that total score is good criteria for age determination up to mean age of 45 years. Table shows F-ratio is 9.169, p-value less than 0.000. Turkey test cannot be performed. This signifies that total score is more accurate than component 1 but less accurate less than component 2 & 3 for age determination.

Conclusion

1. F- ratio and P value of all component scores give statistically significant results, which means morphological changes at sternal end of fourth ribs are age dependent.

2. Component study gives highest F ratio for component 3 (rim & wall configuration) followed by component 2(pit shape) and least for component 1 (pit depth).
3. This signifies that component 3 is most accurate criteria for age estimation followed by component 2.
4. F ratio of total score gives more accurate value than component -I.
5. Mean age for component –I shows that the age changes takes place rapidly upto the mean age of 30 years. Mean age for component 2 and 3 shows that the morphological age changes takes place rapidly upto the mean age of 35 years and takes longer duration after that.
6. There is no statistically significant difference between right and left component score.
7. Comparison between present study and study by Iscan et al [1,2,9] suggest that morphological changes are delayed in Indian population under study up to the age of 35 years. However old age changes develop faster in Indian population.

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Originals and Papers

An in-depth study of criminal abortion in multidimensional perspective

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Abstract

Criminal abortion is the rampantly practiced illegal procedure permeating the medical domain. Keeping this in view a comprehensive task was undertaken to study this phenomenon in different perspective collaborating with each other to define exactly the status of criminal abortion in India. The parameters selected were age, marital status of the woman, socio-economic status, literacy, parity, gestational age, and the devices utilized for inducing criminal abortion. Details of complications, modality of treatment, morbidity and mortality have come out of this study, which was done over a period of 2 years as part of MD thesis, the study being conducted at 1050-bedded teaching hospital. Details are provided in the paper for larger circulation.

Key words: *Criminal abortion, age and parity, surgical complication, morbidity and mortality*.

Introduction

Abortion is theoretically defined as termination of pregnancy before the foetus becomes viable, i.e., capable of living independently from the mother and this has been fixed administratively at 28 weeks when the foetus weighs approximately 1000 gm.[1] Abortion may be lawful, willful and criminal. Abortion can either be consenting or non-consenting. In India an estimated 6.7 million abortions are induced per year out of which 80-90% are illegal.[2, 3] Criminal abortions are always unsafe leading to massive maternal mortality or morbidity.[4]

Though Medical Termination Act 1971 (abridged MTP Act 1971) was enacted to curb rampant practice of criminal abortions and provide easy lawful outlet for safe induced abortions, this Act has not been utilized optimally by the general population for various reasons.

Keeping in view the above mentioned prevailing conditions in the country an attempt was made through this study to create a comprehensive profile of injuries occurring in failed or completed abortions leading to septicemia in the mother.

Primarily, septic abortion constitutes a large chunk of criminal abortion. This study shall endeavour to form a portrait of injuries that may lead to septicemia, and shall authoritatively identify the contributing components to maternal mortality and morbidity.

The following aims and objectives shall form the core purpose of the study:

(i) Pattern of unsafe abortion
(ii) Type of injuries inflicted by untrained abortionist.
(iii) Maternal mortality and morbidity associated with unsafe abortion.
(iv) End result in cases of septic abortion
(v) Suggestions proposed that would reduce incidences of septicemia due to unsafe abortion.

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The J.N. Medical College Hospital, Aligarh, was chosen for this study because of the following reasons:

(i) It is a 1050-bedded teaching hospital.
(ii) It has a big labour ward with all facilities and amenities.
(iii) Doctors having specialization in different medical specialties are easily available as referral consultants.
(iv) Diagnostic infrastructure involving high technology is available.
(v) Emergency services to combat any medical emergency are available.
(vi) The government's institutional delivery system is actively operating.

This study is further authenticated by reason that best medical services were available to the patients to face any eventuality posed by abortion induced septicemia. If this large hospital is unable to treat or control damage due to septic abortion, lesser equipped hospital – in terms of lack of personnel and equipment - would not be able to deal such emergency cases.

Material and method

This study is the direct culmination of MD thesis in forensic medicine conducted in conjunction with the Department of Obstetrics and Gynaecology, JN Medical College, Aligarh. A total of 100 cases of septic abortion referred to JNMCH were studied to find out the pattern of septic abortion. This study was done in between the period October 2000 to September 2002.

The patients were evaluated as per the standard protocol observed while examining the patients; namely, recording of medical history, recommending relevant laboratory investigations, profiling complications arising out of septic abortion, making right choice for surgical intervention, treatment being provided, and finally providing counseling for future reference and trust.

Observation and discussion

This study was undertaken with the view to study criminal abortion in different perspectives, so that a comprehensive analysis of illegal phenomenon could be formulated. The study focused on all related parameters. Interesting picture of criminal abortion in India has emerged which has given an insight about the contributions made by different ancillary factors involved.

Table- 1: Distribution of cases in different age group

Age (in years)	No. of cases	Mean age (year)	Percentage of cases
15-20	08	18.1 ± 2.2	8
21-25	07	23.5 ±2.1	7
26-30	37	28.6 ± 1.6	37
31-35	29	34.1 ±1.4	29
36-40	16	38.7 ±1.5	16
41-45	03	44.3 ± 1.1	3

Table-1 elucidates cases of septic abortion in different age groups. From the table it could be seen that maximum number of septic abortions took place in the age group 26-30 years; mean age 28.6±1.6 (n=37; 37%), and next in group 31-35 years; mean age 54.1±1.4 (n=29; 29%). The reason that could be attributed is that these subjects were well advanced in the reproductive period considered to be from 15-45 years. Hence it is expected that they already had satisfactory number of offsprings leading to increased demand on abortion and disinterest in further procreation. A study conducted by Pinto RY (1970) [5], and Ganguli et al (1978)[6] produced similar result.

Table-2: Relationship to marital status

Group	No. of cases	Percentage of cases
Unmarried	02	2
Married	97	97
Widow	01	1
Divorcee	None	0

Table-2 illustrates the marital status of women undergoing abortion. Obviously septic abortion cases scored high in married category (n=97; 97%). Reporting unmarried, widowed and divorcee cases remained mere pittance due to fear of social obstracization attached to illegitimate children and single motherhood. It is expected that much more cases occur under these categories than reported.

Table-3: Distribution of cases according to socio-economic status

Monthly income in Rs)	No. of cases	Percentage of cases
>1800	12	12
900-1799	15	15
420-899	23	23
180-419	40	40
<180	10	10

Table -3 focuses attention on association of economic status of women undergoing abortion. It is seen that in the range of income of Rs 180-419 per month, 40 cases were reported (n=100); income of Rs 420-899 per month 23 cases has been reported, these two figures projected high as compared to other income groups.

Table –4:Distribution of cases according to level of education

Literacy level	No. of cases	Percentage of cases
Illiterate	60	60
Literate upto 5th Class	25	25
Literate upto 10th Class	10	10
>10th class	05	05

Table -4 gives an idea about contribution of literacy to increased awareness in different spheres of life. This has been abundantly proved in literate women undergoing abortion. This segment constitutes only 5 cases (n=100)). The number of septic abortion cases in illiterate women arose up to 60 (n=100). Poor personal hygiene, poverty-induced stoicism, less awareness towards indicators of health etc., are the contributing factors provoking illegal unhealthy abortions.

Table-5: Correlation between parity and abortion

Parity of women	No. of cases	Mean parity	Percentage of cases
Primi	06	-	06
Multi G_2-G_4	41	3.2	41
Grand multipara G_5->G_5	53	5.8	53

Table-5 observes the correlation between parity and septic abortion in the subjects studied (n=100). It was found that multipara having 5 or > 5 children showed highest affinity between these two parameters as 53%, compared to those having 2-4 conceptions showing 41% of affinity. Primi had 6% which was the least. Ganguli etal (1978)[6] in a study has observed that 48.6% of patients were from multipara group having >5 children, 45% were between para 2-4 and 6.4% were primi. Our study strengthens the work done earlier in this aspect.

Table-6: Impact of gestational age on abortion

Gestational age	No. of cases	Percentage of cases
1st trimester	86	86
2nd trimester	14	14

Table-6 elaborates the impact of gestational age on septic abortion in which it was determined that in 1st trimester the subjects were more inclined towards abortion to the tune of 86 cases (n=100; 86%) whereas in 2nd trimester there were 14 cases (n=100; 14%). The findings strongly collaborates with studies done earlier in India.[7, 8]

Table –7:Knowledge of MTP Act 1971 (liberalizing abortion and expanding the provisions)

Location	Total No. Of Cases	Knowledge of MTP Act			
		Yes	%	No	%
Rural	78	08	10.2	70	89.7
Urban	22	20	90.9	02	09

Table-7 carries maximum relevance as it tried to unearth fundamental right to health available to the Indian nationals as given by the state. Knowledge of MTP Act 1971 was important for the citizens to utilize the beneficial provisions enshrined in the Act. The authors were disappointed to find out that rural population had no knowledge about the basis and basics of MTP Act (n=78; 89.7%) where as in contrast the urban population (n=22; 9%) were fully aware of the impact of MTP on their lives.

Table –8: Devices used for procuring abortion

Group	No. of cases
Instrumentation	51
Laminaria tent	23
Abortion stick	12
Laminaria tent with instrumentation	03
Thin rod	03
Cycle spoke	02
Crude suction applied	02
Broom stick	01
Abortion stick with abortificient	01
Potassium permanganate	01
Not clear	01

Table -8 constitutes the bull work of the study undertaken. Criminal abortion was done largely by mechanical means out of which instrumentation was the widely used method (n=51; 51%) followed by laminaria tent (n=23; 23%). Lesser methods adopted were abortion stick (n=12; 12%), thin rod, cycle spoke, broom stick etc.

Most of the time criminal abortion was done by untrained "*Dias*" (They are minimally trained persons, mostly women in the art of baby delivery procedures and are recognized and empowered by the government to conduct deliveries under conducive environment.) in 65% cases, staff nurse/paramedical staff in 30%, and qualified medical practioner in 5% of cases(Table-9). This obviously illustrates that though criminal abortion is itself an abuse of medical procedure, performing such a procedure by untrained person amounts to grave criminality of the act. This is a flagrant violation of human right and constitutes a grave threat to loss of life in many cases. This study collaborated well with other studies [6, 9] where a history of instrumentation was found in high number of cases.

Table –9: Type of person conducting abortion

Person conducting abortion	No. of cases
Dias	65
Sister/ paramedical staff	30
General practitioner	05

Table-10: The intervening admission interval

Time period	No of cases	% of cases	Outcome			
			Improved		Died	
			No.	%	No.	%
Within 48 hrs	15	15	13	86.7	02	13.3
2-8 days	38	38	37	97.4	01	2.6
9-14 days	22	22	24	62	08	38
>14 days	25	25	24	96	01	04

Table -10 shed light on the relationship of intervening period on which criminal abortion was done and admission to hospital was sought. This has a direct bearing on subsequent aggravated medical complication due to delay in admission and affecting the dual arena, namely, surgical complications and enhancement of bacterial proliferation (Table-11 & 12). To form a bench mark Table-12 displays the medical complications including involvement of various viscera.

Table –11: Surgical complications

Complication	No. of cases	% of cases
1. Uterine perforation	47	49.5
2. Retained products of conception	26	27.3
3. Peritonitis	06	6.3
4. Pyoperitonitis	04	4.2
5. Intestinal perforation with peritonitis	03	3.2
6. Uterine haematoma	02	2.1
7. Pyometra	03	3.2
8. Pelvic abscess	02	2.1
9. Pelvic abscess with subacute intestinal obstruction	01	1.0
10. Rectovaginal fistula	01	1.0

Finally, Table-14, 15 and 16 show the modality of surgical treatment and associated morbidity in the form of specific organ related complication, and mortality respectively.

Table-12: Medical complication at the time of admission

Medical disorder	No. of cases	% of cases	Outcome			
			Improved		Died	
			No.	%	No.	%
Liver involvement	11	01	06	54.5	05	45.5
Renal involvement	32	32	21	65.6	11	34.3
Coagulation disorder	05	05	03	60	02	40
Tetanus	01	01	00	00	01	100
Septiceamia	20	20	08	40	12	60

Table –13: Bacterial profile of cases

Name of bacteria	No. of cases	Mortality	Total mortality (n=12)
E. coli	47	10.6% (5 cases)	41.6%
E. coli+ streptococcus faecalis	04	25% (1case)	8.3%
E. coli+ Proteus vulgaris	02		
E. coli+ staphylococcus	01		
E. coli+ klebsiella	01		
Streptococcus faecalis	22	18.1% (4 case)	33.3%
Coagulase negative staphylococci	07	14.3% 1 case)	8.3%
Coagulase negative staphylococci with suspected case of tetanus	01	100% (1 case)	8.3%
Klebsiella	03	0	0
Pseudomonas	02	0	0
No pathogen found	09	0	0

Table-14: Modality of treatment and morbidity

Treatment	No. of cases	Percentage of cases
Surgical Intervention	86	86 (n=100)
(a) Laparotomy	60	69.7 (n=86)
(b) Dilatation and Evacuation	25	29(n=86)
(c)Colpotomy	01	1.2 (n=86)
Conservative	14	14(n=100)

Table –15: Post operative complications in surgically treated patients

Medical Disorder	No. of cases	Percentage of cases	Outcome			
			Improved		Died	
			No.	%	No.	%
Renal failure	17	19.7	11	64	06	36
Re laparotomy						
Once	05	5.8	05	100	00	00
Twice	01	1.2	01	100	00	00
Septiceamia	05	5.8	00	00	05	100
Septiceamia with pulmonary embolism	01	1.2	00	00	01	100

Table-16: Causes of mortality

Complication	Treatment given		Cause of death	No. of cases
	Operative	Conservative		
1. Retained products of conception with acute renal failure with hepatic failure with septiceamia	Dilatation and evacuation done		Acute renal failure with hepatic failure with septiceamia with cardiac arrest	1
2. Uterine perforation with peritonitis with shock with septiceamia	Operative intervention could not be done due to low general condition	Resuscitation started	Cardiac arrest with septicaemia	1
3. Acute renal failure with jaundice with bleeding per vagina with shock with septiceamia	Operative intervention could not be done due to low general condition	Resuscitation started	Acute renal failure with hepatic failure with septiceamia with cardiac arrest	1
4. Acute renal failure with retained products of conception with pyoperitoneum with septiceamia	Dilatation and evacuation done		Acute renal failure with hepatic failure with septiceamia with cardiac arrest	1
5. Acute renal failure with hepatic failure with retained products of conception with severe aneamia with septiceamia	Dilatation and evacuation done		Acute renal failure with septiceamia with per operative cardiac arrest	1
6. Acute renal failure with severe aneamia with tetanus with shock with septiceamia	Operative intervention could not be done due to low general condition		Acute renal failure with septiceamia with cardiac arrest	1
7. Acute renal failure with jaundice with metabolic encephalopathy with uterine perforation with peritonitis with septiceamia	Laprotomy with subtotal abdominal hysterectomy done		Acute renal failure with hepatic failure with septiceamia with cardiac arrest	1
8. Uterine perforation with heamatoma with peritonitis with acute renal failure with DIC with septiceamia	Operative intervention could not be done due to low general condition			1

9. Acute renal failure with uterine perforation with gangrenous uterus with peritonitis with septiceamia			Septiceamia shock with cardiac arrest with renal failure	1
10. Acute renal failure with jaundice with retained products of conception with shock with septiceamia	Operative intervention could not be done due to low general condition		Acute renal failure with hepatic failure with septiceamia with cardiac arrest	1
11. Acute renal failure with peritonitis with uterine perforation with septiceamia	Laprotomy with bilateral tubal ligation		Acute renal failure with pulmonary embolism with septiceamia	1
12. Uterine perforation with intestinal perforation with peritonitis with DIC with septiceamia	Laprotomy with bilateral tubal ligation with bowel repair		DIC with cardiac arrest with septiceamia with acute renal failure	1

From Table-16 it could be seen that surgical intervention was done in 86% of cases (n=100) out of which laparotomy consisted 69.6%, D&E in 29% cases, colpotomy in 1.16% of cases, and conservative management in 14% of cases. The post operative complication manifested mainly in the form of renal failure n=100 (19.76%), septicemia 5.8%, and septicemia with pulmonary embolism 1.16%. Mortality was 6 (n=17) in cases of renal failure, whereas in septicemia it was 5 (n=5) and in septicemia with pulmonary embolism the mortality was 1 (n=1). None of the cases of septicemia could survive. It could be seen that mortality was significantly high approaching 52.2% in cases of septic abortion. Various studies have pointed out the regular occurrence of surgical and medical complications in criminal abortion like uterine perforation, peritonitis, intestinal perforation, pelvic abscess, haematoma, pyometra, generalized septicemia, renal damage and pulmonary embolism. This finding has further been substantiated in other studies. [5, 8]

Table-10 focuses on the average stay of the patient in the hospital. It is seen that the number of cases observed were n=12. Out of this figure 6 (50%) died within 24 hrs of admission, 2 (16.6%) died within 48 hrs, 3(25%) died in between 2-8 days of admission and 1 (8.33%) died in between 1st and 2nd week of hospital stay. The ignorance was thrashed at two levels; one, at the time the patient opted for criminal / illegal abortion and second, the long time it took the patient to seek expert advice. During the intervening period the patient was managed by the same untrained hands that performed abortion in the first instance without proper training and no supporting infrastructure.

Finally, the study concluded in exploring the deviousness of the ill-begotten methodology and devices employed for criminal abortion mostly crude instruments which could be anything from stick, pin, broomstick, thin rod, abortion stick, cycle spoke, crude suction device, etc. In our study instrumentation was used in 51 cases (n=100) and it carried 75% of mortality figure out of total of n=12 deaths. Other illegal procedures like laminaria tent, abortion stick and cycle spoke carried a mortality of n=1 in each case, respectively.

Conclusion

Following suggestions are proposed on the basis of observations and scientific deductions of the present study:

1. Information about the dangers of criminal abortion accruing out of illegal procedure by untrained persons must be disseminated to all as part of national program.
2. Benefits of MTP Act must be brought to the notice of general public by way of mass education.
3. Focus should be on rural population because this segment is gullible and easily enticed.
4. Primary Health Centres and sub centers must be equipped with adequate abortion services.
5. The introduction of institutional delivery with monitory incentive by the government is laudable. However this measure needs to be strengthened and stream lined.
6. Laws against criminal abortion exists; what is required is its proper implementation and quick trial of persons held under these provisions.
7. Like other national disease eradication programs, criminal abortion eradication program must be instituted by the government in a time bound manner.

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Originals and Papers

Estimation of age from the fusion of mesosternum with manubrium and xiphisternum in Delhi: A comparative study

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Abstract

The relationship between age and degree of fusion between manubrium and mesosternurm & xiphoid process and mesosternum was studied in 100 subjects in Delhi. Mean age for onset of fusion of manubriomesosternal joint in males was 42.6±4.33 years and in females was 42.12±3.27 years and for complete fusion in males was 65.81±10.68 years and in females was 58.36±5.00 years. Mean age for onset of fusion of xiphoid process with mesosternum in males was 35.12±0.64years and in females was 35.83±1.47 years and for complete fusion in males was 58±12.48 years and in females was 53.10±7.27 years.

Key words: *Age, fusion ,mesosternum, manubrium, xiphisternum.*

Introduction

Estimation of age from skeletal remains is often required in medicolegal practice. In individuals less than 21-22 years many landmark reference are available which help in estimation of age with close approximation. However, after the epiphysis of long bones and clavicle have fused with their metaphysis, the task of age estimation becomes very difficult.Sternum has been studied by some workers regarding its utility for estimation of age.However , reports in this regard are conflicting because of variable results of these studies. Various textbooks on forensic medicine[1,2] describe fusion of xiphoid process with mesosternum at about 40 years of age and that of manubrium with mesosternum at "Very old age" ie. 55-60 years. Forensic experts usually base their opinion on these observations. However, results of studies [3,4,5] have disagreed with these assumptions. In view of such conflicting and diverse opinions, a study as a postgraduate thesis work was carried out by the first author under the guidance of second author in population of Delhi to assess their utility for estimating age . Present study is also an effort to compile the observations made by various authors in different parts of the country.

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Methods and materials

The present study was carried out on 100 normal subjects above the age of 18 years (50males and 50 females) brought for post mortem examination in the Department of Forensic Medicine Hardinge Medical College, Delhi. Method followed was as described by Jit & Bakshi [3] and further elaborated by Singh *et al.* [4] The data was statistically analyzed.

Results

In present study, it was observed that mean age for onset of fusion of manubriomesosternal joint in males(Table-1) was 42.6±4.33 years and in females(Table-2) was 42.12±3.27 years and for complete fusion in males (table1) was 65.81±10.68 years and in females(table2) was 58.36±5.00 years. Mean age for onset of fusion of xiphoid process with mesosternum in males(Table-3) was 35.12±0.64 years and in females(Table-4) was 35.83±1.47 years and for complete fusion in males(Table-3) was 58±12.48 years and in females(Table-4) was 53.10±7.27 years.

STATISTICAL ANALYSIS

On applying T-test, it was found that average age of fusion of sternal joints was significantly higher in males than in females (p value = 0.021).

On applying Chi-square test, it was found that occurrence of either grade of degree of fusion between manubrium and mesosternum & between xiphisternum and mesosternum was independent of sex.

The data was statistically analysed and from the relationship between fusion of sternal joints and age, following regression equation were obtained.

1. Males :

a) Regression equation for age from grade of fusion between manubrium and mesosternum (Grade M). Age = 31.6111 + 11.097 Grade M, R^2 = 80% (significant)
b) Regression equation for age from grade of fusion between xiphisternum and mesosternum (Grade X). Age = 25.191 + 10.645 Grade X,R^2 = 64.2% (significant)
c) Regression equation for age from grade of fusion between manubrium and mesosternum (Grade M) & between xiphisternum and mesosternum (Grade X).
d) Age = 28.151 + 8.599 Grade M + 3.403 Grade X,R^2 = 82.5% (significant)

2. Females :

a) Regression equation for age from grade of fusion between manubrium and mesosternum (Grade M). Age = 28.877 + 9.928 Grade M,R^2 = 81.4% (significant)
b) Regression equation for age from grade of fusion between xiphisternum and mesosternum (Grade X). Age = 24.990 + 9.237 Grade X,R^2 = 83.2% (significant)
c) Regression equation for age from grade of fusion between manubrium and mesosternum (Grade M) & between xiphisternum and mesosternum (Grade X).
d) Age = 25.816 + 5.021 Grade M + 5.296 Grade X,R^2 = 88.9% (significant)

3. For both sexes :

a) Regression equation for age from grade of fusion between manubrium and mesosternum (Grade M) & between xiphisternum and mesosternum (Grade X).
b) Age = 26.710 + 7.170 Grade M + 4.284 Grade X, R^2 = 83.9% (significant)

Discussion

Sternum has been studied by various workers in different parts of the country regarding its utility for estimation of age and given variable results. Jit and Bakshi [3] in their study from subjects from Punjab , Haryana and Himachal Pradesh have reported that the complete fusion of manubriosternal joint does not take place before 21 years of age, in both the sexes. Singh *et al* [5] in their study on Manipuri subjects have found that the earliest age at which fusion may start is 26 years in males and 31 years in females. According to them, the complete fusion of joint does not take place before the age of 50 years in both the sexes and usually takes place at very old age. Gautam *et al* [6] in their study in Ahmedabad found that fusion of manubrium with body of sternum begins after age of 40 years and complete fusion occurs after the age of 50 years. In present study, commencement of fusion of manubriomesosternal joint in males was between the age of 41-45 years and complete fusion was observed in subjects above 56 years of age whereas in females, it was between age of 36-45 years and 51 years respectively. Mean age for onset of fusion at this joint in males was 42.6±4.3359 years and for complete fusion was 65.8125±10.6847 years and in females it was 42.125±3.2705 years and 58.3636±5.0055 years respectively. Onset and completion of fusion was seen to occur earlier in females as compared to males. This is not in agreement with study of Singh *et al* [5] in Manipuri subjects where they have reported that fusion occurred earlier in males than in females.

The regression equation from grade of fusion between manubrium and mesosternum in males was : Age = 31.6111 + 11.097 (grade of fusion).

In females, regression equation from grade of fusion between manubrium and mesosternum was :Age = 28.877 + 9.928 (grade of fusion).

The regression equation by Singh *et al* [4] was: Age = 29 + 10 (grade of fusion) for males and Age = 30 + 12 (grade of fusion) for females.

Jit and Bakshi[3] have reported that the xiphoid process did not fuse with body of sternum in males below 18 years of age and in females below 21 years. In their study on 772 male and 228 female sterna, they also reported that non-fusion was seen in 11.4% of males above 66 years and 37.5% of females above 40 years. According to Singh et al[4] study on 524 male and 228 female sterna from subjects from Punjab, Haryana and Himachal Pradesh, commencement of fusion between mesosternum and xiphoid process was seen to start in age group 18-20 years in both sexes and complete fusion was seen in age group 21-26 years (6.45% males and 2.2% females). Incidence of complete fusion increased with advancing age reaching a maximum of 60% in age group more than 66 years in males and 26.08% in females in age group 41-45 years. Gautam et al[6] studied the time of fusion of mesosternum with xiphisternum on 100 sterna from cadavers brought for medicolegal examination in Ahmedabad. According to them, fusion of mesosternum with xiphisternum starts after 30 years and in most cases, fusion is complete after the age of 50 years. Das[7] in his study in the population of West Bengal found that if there is fusion at manubriocorporal junction, age is above 28 years ;fusion at corporo-xiphisternal junction , age may be above 32 years and fusion at both the sites means age above 36 years. No opinion is possible from the incidence of "No Fusion". In our study of fusion between mesosternum and xiphoid process in males, it was observed that fusion was seen to start between age of 31-35 years and complete fusion was observed in subjects greater than 41 years of age. In females, it was observed that fusion was seen to start between age group of 31-35 years and complete fusion was observed in subjects greater than 41 years of age. Thus, our findings are more or less in agreement with the findings of Gautam et al[6] .In our study, we found that mean age for onset of fusion in males was 35.1250±0.6409 years of age and for complete fusion was 58±12.4811 years. In females, mean age for onset of fusion was 35.8333±1.4720 years and for complete fusion was 53.10±7.2758 years. There was negligible difference in age of onset of fusion in males and females but complete fusion occured earlier in females.

In males, Regression equation for age from grade of fusion between manubrium and mesosternum (Grade M) & between xiphisternum and mesosternum (Grade X) was Age = 28.151 + 8.599 Grade M + 3.403 Grade X in females, regression equation for age from grade of fusion between manubrium and mesosternum (Grade M) & between xiphisternum and mesosternum (Grade X) was Age = 25.816 + 5.021 Grade M + 5.296 Grade

X,R^2 = 88.9% (significant).

For both sexes, regression equation for age from grade of fusion between manubrium and mesosternum (Grade M) & between xiphisternum and mesosternum (Grade X) was Age = 26.710 + 7.170 Grade M + 4.284 Grade X.

No other author except Singh *et al* [5] has tried to obtain regression equation from the relationship between known age and grade of fusion.

Conclusion

In our study, we found that the study of fusion of manubriomesosternal joint and xiphiod process with mesosternum can help in estimating the approximate age of the individual. Present study has also highlighted the considerable variation in age of fusion of sternal joints in different parts of the country. No single criterion as given by various textbooks for age estimation can be used for every zone. Hence it is suggested that every zone should have its own criterion.

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Table -1 : Age and grades of fusion between manubrium and mesosternum in males (Grade- M)

Age (years)	Grade M				No.
	0.00	1.00	2.00	3.00	
18 – 25	5	-	-	-	5
26 – 30	3	-	-	-	3
31 – 35	8	1	-	-	9
36 – 40	5	-	-	-	5
41 – 45	1	4	-	-	5
46 – 50	-	-	4	2	6
51 – 55	-	-	3	-	3
56 – 60	-	-	-	5	5
> 61	-	-	-	9	9
Total	**22**	**5**	**7**	**16**	**50**

Table -2 :Age and grades of fusion between manubrium and mesosternum in females (Grade M)

Age (years)	Grade M				No.
	0.00	1.00	2.00	3.00	
18 – 25	10	-	-	-	10
26 – 30	6	-	-	-	6
31 – 35	5	-	-	-	5
36 – 40	3	3	1	-	7
41 – 45	1	5	-	-	6
46 – 50	-	-	4	-	4
51 – 55	-	-	1	4	5
56 – 60	-	-	-	4	4
> 61	-	-	-	3	3
Total	**25**	**8**	**6**	**11**	**50**

Table –3: Age and grades of fusion between mesosternum and xiphoid process in males (Grade X)

Age (years)	Grade X				No.
	0.00	1.00	2.00	3.00	
18 – 25	5	-	-	-	5
26 – 30	3	-	-	-	3
31 – 35	2	6	1	-	9
36 – 40	-	2	2	1	5
41 – 45	-	-	1	4	5
46 – 50	-	-	-	6	6
51 – 55	-	-	-	3	3
56 – 60	-	-	-	5	5
> 61	-	-	-	9	9
Total	**10**	**8**	**4**	**28**	**50**

Table –4: Age and grades of fusion between mesosternum and xiphoid process in females (Grade X)

Age (years)	Grade X				No.
	0.00	1.00	2.00	3.00	
18 – 25	10	-	-	-	10
26 – 30	6	-	-	-	6
31 – 35	2	3	-	-	5
36 – 40	-	3	4	-	7
41 – 45	-	-	2	4	6
46 – 50	-	-	-	4	4
51 – 55	-	-	-	5	5
56 – 60	-	-	-	4	4
> 61	-	-	-	3	3
Total	**18**	**6**	**6**	**20**	**50**

Originals and Papers

Front wheel disc brake-A killer design for motorcyclist death

*S.R. Kochar * & Pooja Rastogi***

Abstract

Death is an inevitable phenomenon. It can occur naturally as per the expectancy of life or can be unexpected, caused either by incidents, accidents or suicides. Among this unexpected death, trauma due to road traffic accidents(RTA) is the leading cause. It also accounts for short and long term disability and possess major epidemiological and medico-legal problems.

After USA, India has largest road network. Total length of the roads is about 33, 40,000 Kms, out of this national highways occupy only 2% of the total road length. Where as, they bear the 20% of the traffic load. According to Kendriya Sadak Parivahan Sansthan survey, "Delhi is the Number one and Kolkata is the second biggest city in terms of the traffic load". Present study highlights the contribution of front disc brake in motorcycle crash.

Key words: *Disc Brakes, RTA, motorcycle accidents, mortality.*

Introduction

Jaipur is the state capital of Rajasthan and one of the fastest developing cities in India. A Number of National Highways (**NH8, NH11 and NH 12**) connecting it to various states of the country.

In the present race of the development of the cities Hyderabad, Bangalore, Surat, Jaipur and Indore etc. are rapidly becoming overcrowded with the vehicles. One of the main reasons of overcrowding of the roads is the excessive increase in number of vehicles i.e. numbers of vehicles on the roads of India has increased more than 11 times from 1970 to 1990.In 1970 total number of vehicles were about 19 lakhs whereas in 20 years it reached up to 2 crore 10 lakhs.

Due to increased distances from residence to work place, teaching institutes, and inspiration from movies there is necessity as well as craving to possess a motor bike rather than scooter. This has contributed to increase in density of two wheelers, that constitute up to two third of the total vehicle density.

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India is attaining a dubious distinction of registering the highest number of road traffic accident fatalities, second only to China. As many as 92,618 people lost their lives in road traffic accident in India in 2004 and (6477,(7154 in2006)in Rajasthan, and 680 person died due to road traffic accident in Jaipur city only) as compared to 10,777 people killed in china in the same year.

The US reported the third highest number of road causality as 42636 lives being lost during the same year. Singapore recorded the lowest fatalities i.e. 193 in 2004.other countries like UK and Germany have a higher number of road traffic accident but have relatively lower fatalities putting a question mark on issues of road safety. For instance Germany recorded 139310 accidents. The numbers of people killed were 5182. In UK while the numbers of road traffic accident were 207410, but death toll was much lower as 3221.

Therefore in this era of speed and pace certain structural and design changes in the vehicles have been recently introduced, especially in the motorcycles i.e. the **Front Disc Brakes.** Motorcycle accidents constitute a big part of vehicular accidents. Injuries to the rider involve not only one but multi organ system and are usually more extensive and severe than those sustained by victims in other vehicular accidents.

Material And Method

A prospective study has been planned and conducted from January 2006 to December 2006 and cases included are those cases of RTA in which a motorized two wheeler is involved. The demographic data including age and gender vise distribution of cases, interval between traumatic event and death, associated injuries and complication, type of offending vehicles, type of victim and manner of accidents are analyzed.

Specialized questionnaire was prepared to know:-

- The date, time and place of accident.
- The type of two-wheeler involved i.e. Motorcycle, Scooter, Moped etc.
- Whether the two-wheeler has DISC BRAKES or not.
- How the driver has applied the brakes at the actual time of accident.
- Whether he was wearing a crash helmet or not. If wearing, was it of ISI Standard?

The cases that sustained the injury leading to death were also analyzed regarding the type of injuries, distribution and their survival time.

The abovementioned information was gathered from relatives, police personnel and deceased himself when alive and undergoing treatment at emergency or at time of postmortem examination.

Observations

The main emphasis is on the cases of RTA involving a two-wheeler. Total **757** accidents were reported during one year out of which in **176** death involved two wheelers .On compilation of available data it is revealed that total number of cases of death due to motor cycle accidents are -**110,** Out of these cases death due to motorcycle accidents having disc brakes are identified.

Number of cases of mortality as well as Morbidity is high in age group of 16-25 years with highest nos.(63) in 21-25 years of age group and it constitute about 50% of accidents of motorcycles.

Male outnumbered the females in term of number of cases and fatalities. In our study of Motorcycle accidents none of the female victim was found. This can be attributed firstly that most of the females are driving a moped, or scooter rather than a motorcycle, although the authors have seen the female driving the motorcycles occasionally on the roads of Jaipur city. Secondly the females are still confined to homes instead of going outside.

The morbidity and mortality of the person sitting as pillion rider has been excluded from this study. Mostly female remained as pillion riders.Number of cases of mortality was highest in the period of Jan-Feb (55) and in Nov-Dec. (49), which can be attributed to cold and foggy weather.

The time of occurrence of two wheelers road traffic accidents for the ease of study we have divided the time into six slabs as depicted in Table No. 4. The number of cases of mortality were maximum during 4:00 P.M.-8:00 P.M. (68), followed by 8:00 A.M. to 12:00 P.M. (59).

The period of survival after sustaining injuries varies in different victims of two wheeler accidents. It depends upon the type of injury such as Head Injuries, Spinal Injuries, Thoraco-Abdominal Injuries or major Vascular Injuries. It also depends on area and depth of involvement but has individual variation from person to person also. The age factor in survival period has already been evaluated which is also one of the subject matter of the study.

Out of 228 cases of Motor Cycle accidents, 110 cases succumb to death. Among these 228 cases, in 139 cases the motorcycle having disc breaks and in 89 cases the motorcycles are devoid of disc brake system.

Motorcycles with disc brake systems contributed to highest number of death toll in our study i.e. 61%.(78).

Slipping of the motorcycles (97) was the commonest cause followed by overtaking a four-wheeler from the wrong side (43).

Head injury is the commonest cause of the mortality followed by multiple organ involvement as a cause of death due to motorcycle accidents.

In our study, 72% of the motorcycle riders were using non ISI Helmet, whereas 13% of the cases were not wearing the helmet. At the time of accident they were having helmets on their arms or on other parts of Motorcycle like handle bars.

Table –1: Age wise distribution of cases of motorcycle accidents

Age (Years)	Fatal outcome (%)	Total.(%)
11-15	5(4.55)	9(3.95)
16-20	29(26.36)	51(22.37)
21-25	36(32.73)	63(27.63)
26-30	17(15.45)	40(17.54)
31-35	11(10.00)	31(13.60)
36-40	5(4.55)	14(6.14)
41-45	4(3.64)	11(4.82)
46-50	3(2.73)	9(3.95)
Total	**110(100.00)**	**228(100.00)**

Table –2:Age wise fatility due to Motor Cycle accidents having Disc Brakes

Age Group	Total No.	Percentage
11-15	3	3.85
16-20	22	28.21
21-25	27	34.62
26-30	11	14.10
31-35	7	8.97
36-40	3	3.85
41-45	3	3.85
46-50	2	2.56
Total	78	100.00

Table –3: Numbers of Accident in different months of a year

Period	No. of Accidents	Percentage
Jan-Feb	55	24.12
March-April	35	15.35
May-June	27	11.84
July-August	39	17.11
Sept.-Oct.	23	10.09
Nov.-Dec.	49	21.49
Total	**228**	**100.00**

Table –4: Numbers of Accident in different Hours of the day

Hrs	No. of Accidents	Percentage
12.00AM-4.00AM	11	4.82
4.00AM-8.00AM	17	7.46
8.00AM-12.00PM	59	25.88
12.00PM-4.00PM	36	15.79
4.00PM-8.00PM	68	29.82
8.00PM-12.00AM	37	16.23
Total	**228**	**100.00**

Table –5: Period of Survival in Motor Cycle Accidents

Spot Death	32(29.09)
With in 1 Hrs.	25(22.73)
1- 2 Hrs	18(16.36)
2-6Hrs	13(11.82)
6-12Hrs	11(10.00)
12-24 Hrs	4(3.64)
24-36 hrs	3(2.73)
36-48 Hrs	2(1.82)
After 2 days	2(1.82)
Total	**110(100)**

Table –6: Type of Braking System in Motorcycle Accidents

Type of break	No	%
Motor Cycle with Disc Brakes (Front wheel)	139	60.96
Motor Cycle without Disc Brakes	89	39.04
Total	**228**	**100.00**

Table-7 : Number of Cases depending upon type of Accidents

Type of Accident	No.	%
Slipping of Bikes	97	42.54
Collision with other Vehicle from front	21	9.21
Collision with other vehicle from back	29	12.72
Overtaking a fourwheeler from wrong side	43	18.86
More than one type of above	38	16.67
Total	**228**	**100.00**

Table –8: Type of injuries in Motorcycle accidents (out of 110 Cases)

Body part involved	No.	%
Head Injury	85	77.27
Bony Injury	61	55.45
Visceral Injury	47	42.73
Multiple Injuries	103	93.64

Table –9: Type of Helmet used in Motorcycle Accidents Cases

Safety Measure	No.	%
ISI Helmet	33	14.47
Non ISI Helmet	165	72.37
Without Helmet	30	13.16
Total	**228**	**100.00**

Discussion

Lack of adequate public transport system has forced people in the fast development cities like Jaipur to use risky personalized modes like Motorized Two Wheelers, thereby adding to the already existed road safety problems. Motorized two wheelers which form nearly 2/3- 3/4 of the total vehicular population are 5 times more dangerous than four wheelers road users leading to a sharp increase in mortality from road traffic accidents.

In this study we have found that only young males who are in the most productive years of their lives i.e. age group 16-25 years get inspired from movies and become crazy to possess a front wheel disc brake motorcycle , loosing their precious lives.

The driving of the motorcycle is usually learnt from a friend or elder members of the family like brother, uncle or father. None of the driving school imparts training for driving of the motor cycle; therefore the youngsters who jumps from bicycling to motorcycling feel thrill and paying less attention to the traffic rules. For example we have studied that 18% of the cases met accidents due to wrong side overtaking of four wheelers.

The use of applying the braking system, especially the disc brake system is not demonstrated in none of the motorcycle showroom at the time of selling or marketing campaign of motorcycle manufacturing companies in India.

The inclusion of this disc brake system in front wheels of the modern cars is understandable because most of these cars are front wheel driven, therefore 60-90% of the vehicle stopping power is used on front wheel and the rear wheels are provide with drum brake system. In case of the motor cycles that are propelled by the transmission of the engine power through the chain drive to the rear wheel. The two-wheeler has a very low ratio of ground stability, which is further decreased by providing a stearing mechanism mounted on the front wheels. The front wheel that receives momentum from the rear wheel, if provided with a disc brake system with highest efficiency and certainty to stop the moving front wheel in comparison of the rear wheel which is provided with a drum brake will act as a huge obstacle in the path of the running motorcycle, which results in loss of the kinetic velocity of the front wheel mostly at a tangent or at an angle, again adding to the rear wheel leading to throwing of the bike, the motorcyclist (as per the third law of motion). Therefore the motorcycle is bound to slip and the rider has to sustained injuries.

Disc brake is the best system and is used to stop every thing from cars to locomotives and jumbo jets. Disc brake system wear longer, less affected by water, self adjusting, self cleaning , less prone to grabbing or pulling and stop better than any other brake system.

Recommendations

Road accident fatalities are caused due to number of well recognized factors such as driver fault, fault of pedestrian, bad roads and bad weather. Most of the studies support the above findings but none of the scholar has focused his attention to the design factor of the vehicle, which is contributing to the high number of fatalities due to RTA.

Our study has critically analyzed the type of vehicle involved in road traffic fatalities with various other denominators and it strongly points out that the design factor of the vehicle like SUV (bumper less),two wheelers specially MOTORCYCLE (front wheel disc brake device) significantly contributing to high fatalities. None of the other study has so far concentrate upon this.

The study highlights the consequences of installing disc brake system in the front wheel of a motor cycle, therefore recommends that:-

1. Disc brake system in motorcycle should be installed in the rear wheel after consulting with the concerned subject technocrats.
2. The manufacturing and sale of front wheel disc brake motorcycles should be immediately stopped.
3. The rider should be trained by demonstrating the methodology of using disc brake system to stop the vehicle by a trainer or by a movie may be an animated one.

Nationwide campaign and certain measures for education of public at large must be called for against rash driving, unawareness of traffic rules, bad conditions of roads, talking on cellular phones while driving, consumption of alcoholic beverages and use of ISI standard crash helmets etc.

Government of India has also taken this matter seriously and made a high level **Sunder committee,** who recommended that-

The demand of the time is that Government should respond immediately to prevent loss of valuable lives and vehicles by way of creation of a national road safety and traffic management board, an apex body at the national level to promote road safety and traffic management in the country.

The agency must include members and experts drawn from various fields, including road engineering, automobile engineering, traffic laws and medical care. The board must have regulatory powers over standards and designs for motor vehicles and national highways and will advise the Government on various road safety aspects which has mandatory values and also promote road safety research, road users' behaviour strategies and lay guidelines for establishing medical care and rehabilitations with allocation of adequate funds.

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Originals and Papers

Decomposition: Cast a shadow over the drowning deaths

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Abstract

Drowning is a form of asphyxia due to aspiration of fluid into air-passages, caused by submersion in water or any other fluid. It is one of the most difficult modes of death to prove at postmortem, especially when the body is not examined in a fresh condition. When the body has sunk into the water, it remains at the bottom until putrefactive gas formation decreases the specific gravity of the body and creates sufficient buoyancy to allow it to rise to the surface and float. And once the decomposition has started, it becomes more difficult to prove the mode of death as a result of drowning during autopsy, as the reliable signs of drowning are often minimal, obscure or completely absent. Moreover, these changes of decomposition advance so rapidly after removal of body from the water that even a short delay in conducting a post-mortem examination is likely to obliterate the valuable signs up to a great extent. To diagnose the cause of death in all such cases, comparative study of diatoms in body tissues and water sample is the only reliable finding, which can be used with other supportive evidences to prove the death due to drowning, as well as to determine the site of drowning. This retrospective study was conducted during the period of 3 years from 1st January 2005 to 31st December 2007 with the aim to know that how the changes of decomposition cast a shadow over the typical signs of drowning and weather the comparative study of diatom test is reliable in such cases or not?

Key words: *Drowning, decomposition & diatoms.*

Introduction

Drowning literally means, 'suffer death by submersion in water or any other liquid' or 'suffocate by submersion in water or any other liquid because of being unable to breath'. Where as, 'submersion' or 'immersion' means putting the person under water. Differentiation is obvious, i.e. 'drowning' denotes a confined concept where death is suffered due to submersion in water or any other liquid and the word immersion/submersion conveys a broader concept where death might have been due to drowning or some other cause, though the body had been recovered from water. Therefore, during autopsy, one must focus one's attention to distinguish between changes which are due to drowning and those which are otherwise, i.e. those which occur in bodies immersed/ submerged/ disposed in water after death from causes other than drowning.[1] Accidental drowning occurs often in India, nearly 40,000 Indians die annually from drowning. It occurs occasionally among swimmers due to their rashness in swimming, but it occurs mostly in non-swimmers who venture to go beyond their depth in the sea, rivers, canals and lakes. Many lives are lost during floods, which are so frequent. It also occurs among persons at bathing places while bathing in deep water. Females may fall accidentally into a well while drawing water from it. Children may also accidentally fall into ponds or lakes while playing near their banks. They may even fall accidentally into domestic vessels of water, such as water tanks, bathtubs and buckets. Accidental drowning in shallow water is very rare, except when the individual happens to be intoxicated, insane or epileptic.[2]

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In Medicolegal practice during the examination of decomposed bodies it is often difficult to ascertain post mortem interval as well as ante-mortem drowning factor in the cases which are being recovered with advance putrefaction. No doubt this exercise becomes more difficult when the deceased person is reported to be unknown and no last alive & other history is available. The analysis of diatoms in putrefied corpses may reveal to draw a fairly sound conclusion relate to drowning, as a mode of death. [3]

In Government Medical College, Rajkot (Gujarat) most of the cases of drowning deaths are referred by the medical officers from the periphery with the reason that-They are unable to find out the cause of death in bodies recovered from the water as the typical signs of drowning are not present due to the changes of decomposition. We undertook this study with the aim, that are we getting the same problems as others [1,2,3,6,7,10,11] in determining the death due to drowning in these decomposed corpses and can the diatom-test help us in some way in these tough conditions? We have also made an attempt to find out that in many cases the cause of death was not drowning in the bodies recovered from water, as the victims were throne in to the water after killing them by some other means.

Material & Method

Rajkot is a center of Saurashtra region in Gujarat state, with a population of 10 lakhs as per 1991 census in an area of 13,582 sq. kms. We have conducted a retrospective study in the Department of Forensic Medicine, P.D.U. Medical College Rajkot, during the period of 3 years from 1st January 2005 to 31st December 2007. All the cases of drowning deaths with decomposition changes (Total 86 cases) were selected for the present study. Information about age, gender, religion and place of drowning were duly recorded after getting the detailed history from relatives and accompanying police personals. Detailed and complete post mortem examination of the corpses was done and the routine viscera were preserved for chemical analysis. Intact sternum and two-liter control sample of water from the site of drowning was also preserved for comparative study with adequate precautions to prevent any contamination and sent to the FSL, Junagadh for the diatom test. All the data were reduced to tables and subsequently subjected to computer aided statistically analysis.

Results

Total 5630 autopsies were conducted during the period of 3 years from 31st December 2007 to 1st January 2005. During this period total 96 corpses (1.7% cases) were recovered from the water in a state of decomposition. Out of these 96 corpses, drowning was concluded as a cause of death in 86 cases (89.58%) while in rest 10.42% cases the victim was died either due to blunt injury over head (4.17%) or by ligature strangulation (3.12%) or by poisoning (1.05%) or by cut throat injury (2.08%)(Table-1). Age wise distribution of the drowning deaths is shown in Table-2. The youngest victim in the study was a girl of 3 years age who drowned accidentally in a water tank at home, while the oldest victim being a 70 year old who committed suicide in a pond. Incidence of drowning was more in third (34.88%) and fourth (24.41%) decade as compared to both extremes of life. Males were more prone to death by drowning (81.39%) as compare to females (18.61%). Incidences of drowning were more in Hindu people (90.69%) as compared to Muslims (6.98%) and Sikhs (2.33%)(Table-3). Months wise distribution of the drowning death show that the majority of the victims died during the months of monsoon which exists from June to October (61.63%) in Saurashtra region of Gujarat (Table-4). In most of the cases body was recovered either from the pond (54.65%) or from a well (29.07%)(Table-5). Majority of corpses recovered from the water were showing decomposition changes consisting with time since death either about 1-3 days (61.63%) or about 3-7 days (30.23%). Very few cases were recovered with decomposition changes consisting with 7-30 days (4.65%) or in a state of skeletanization (3.49%)(Table-6). In all cases routine viscera were preserved for chemical analysis and intact sternum bone was preserved for the diatom-test. The police personal was asked to send 2-liter control sample of water from the site of drowning

for the purpose of comparative study of diatoms. After going through the chemical analyzer's reports, no case was found positive for the poisoning, while in 80 cases (93.03%) diatom-test was found positive (Table-7). In all cases the diatoms present in bone marrow were showing similarity with the diatoms present in control sample of water. In 3.49% cases diatoms were present only in water and absent in bone marrow, while in rest 3.49% cases diatoms were absent in water and bone marrow both (Table-8).

Discussion

Dead bodies are commonly found immersed in water and other fluids in all manner, places and circumstances. Such cases prove the most difficult medico-legal problems. In Northern India, it is common custom to throw dead bodies into running streams, and the fact of finding a dead body in water does not, therefore, lead one to presume that drowning caused death. Again, victims are often murdered or poisoned first and then their bodies are thrown into water to avoid the detection of crime. We have also found the similar findings in our study, in which total 10.42% of the victims were throne in to the water after killing them either by inflicting injuries in 6.25% cases or by ligature strangulation in 3.12% cases or by poisoning in 1.05% cases. Therefore, when the body recovers from the water, it is very essential to examine the body not only for the evidence of external and internal injuries with their antemortem or postmortem nature but also for the signs of poisoning.

When the body is decomposed the diatom test is the only reliable finding, which can provide supportive evidence for the diagnosis of antemortem drowning. Though the diatom test has certain limitations, like diatoms could have been inhaled or ingested with material containing diatoms before death or contamination of the glassware and reagents that are used to detect diatoms. Yet, the quantitative and qualitative identification of diatoms in experienced hands provides the most reliable proof of drowning.[4] Since last years, there is a significant increase in the cases in which the body is recovered from the water in a state of decomposition with an alleged history of drowning. In our study the incidence of such drowning cases was higher in third decade of life in Hindu males, which is similar to most of the other studies by various authors [5,6,7,8]. It can also be explained by the fact that major population of the India belongs to the Hindu community. Most of the deaths due to drowning were noticed during the months of monsoon e.g. from June to October in Rajkot, as compared to other months of the year, similar to other studies [5,7,8,9]. Most of the corpses of drowning death were recovered either from pond or from a well, as these are the major water sources in Saurashtra region of Gujarat. Maximum corpses recovered were having the decomposition changes consisting with time since death either about 1-3 days (61.63%) or about 3-7 days (30.23%). In our study no case was detected with changes suggesting the time since death less than 24 hours. It might be because most of the bodies in drowning death are noticed after they float on to the surface, which usually occurs after 24 hours in India. Once the decomposition settles down decomposition goes with a faster speed in the body recovered from the water, as the tissues have absorbed much water and even refrigeration is not likely to halt this putrefaction process [10,13]. We have noticed such cases in which the maggots were found alive even after the whole night refrigeration of the body at 4^0 temperatures. In all cases no signs of antemortem drowning were noticed during the post-mortem examination, so viscera were preserved for chemical analysis and intact sternum was preserved for the diatom-test. The diatom-test was positive in 93.03% cases and the diatoms found in bone marrow were showing similarity with the diatoms present in control sample of water, which is also noticed by other authors [1,2,3,4,10,11,12]. In 3.49% case diatoms were present only in water and absent in bone marrow, which may be because of death either due to Dry-drowning or due to Emerson-syndrome. From the present study we could be able to prove scientifically that the positive diatom test and similarity of diatoms in test sample of bone marrow and control sample of water is the only strong evidence of antemortem drowning

especially in decomposed corpses, where no other signs of ante mortem drowning are present.

Conclusion

Considering the status of diatom test, British and American forensic pathologists have divergent opinion about the value of diatoms in drowning. Perhaps one of the reasons of this "Great Divide" is that the diatom test originated on the British Continent. There is hardly a medico legal journal that has not taken part in the "war of diatoms" in one way or another. And Forensic Pathology community has been, historically, polarized in its general acceptance of the diatom test as a definitive diagnostic test for drowning.[13] Though the diagnosis of drowning in decomposed corpses is based on the exclusion basis but we suggest that diatom analysis in decomposed corpses can be used as a criterion for the positive diagnosis of drowning death when no gross mutilation of the body is there. Diatom test is very reliable in ascertaining ante-mortem or post-mortem drowning if proper care is taken to avoid every sort of contamination and by knowing all necessary specification of the diatom test. We have also observed the same in our study that analysis of diatoms in test sample of bone marrow and control sample of water in immersion cases supported the diagnosis of death by drowning in 96.52% of the putrefied cases, studied.

The other conclusion of our study is that once the decomposition starts in the corpses immersed in water it goes with a faster speed as the tissues have absorbed the much water and even the refrigeration is not likely to halt the putrefaction process to the extent that autopsy and postmortem of toxicological specimens better be done without delay. So it is not wise to delay the postmortem in these cases as the findings may further get obliterated and distorted.

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Table– 1: Cause of death in body recovered from water

Cause of death	Number of Cases	Percentage
Drowning	86	89.58
Head Injury	04	04.17
Strangulation	03	03.12
Poisoning	01	01.05
Cut Throat Injury	02	02.08
Total	**96**	**100**

Table – 2: Age and gender wise distribution of drowning cases

Age Group (In Years)	Male	Female	Total Cases
0 – 10	00	03	03
11 – 20	11	04	15
21 – 30	27	03	30
31 – 40	17	04	21
41 – 50	08	01	09
51 – 60	05	01	06
61 – 70	02	00	02
Total	**70**	**16**	**86**

Table – 3: Religion wise distribution of drowning cases

Religion	Number of cases	Percentage
Hindu	78	90.69
Muslim	06	6.98
Sikh	02	2.33
Isai	00	00
Total	**86**	**100**

Table – 4: Month wise distribution of drowning cases

Month	Number of cases	Percentage
January	04	04.65
February	06	06.97
March	06	06.97
April	04	04.65
May	04	04.65
June	12	13.95
July	03	03.49
August	14	16.29
September	13	15.12
October	11	12.80
November	07	08.14
December	02	02.32
Total	**86**	**100**

Table –5: Distribution of cases according to place of drowning

Place of Drowning	Number of cases	Percentage
Pond	47	54.65
Well	25	29.07
River	07	8.15
Water pit	05	5.81
Water Tank	02	2.32
Total	**86**	**100**

Table – 6: Distribution of cases according to time since death

Time Since Death	Number of cases	Percentage
1-3 Days	53	61.63
3-7 Days	26	30.23
7-30 Days	04	4.65
30-90 Days	03	3.49
Total	**86**	**100**

Table – 7: Distribution of cases according to chemical analysis & diatom-test report

Material preserved	Number of cases	Positive Report	Negative Report
Viscera for Chemical analysis	86	00	86
Sternum for Diatom-test	86	80	06

Table – 8: Distribution of drowning cases according to diatom-test

Results of Drowning-Test	Number of cases	Percentage
Diatoms present in Sternum & Water both	80	93.02
Diatoms present in Water only	03	03.49
Diatoms present in Bone only	00	00.00
Diatoms absent in Sternum & water both	03	03.49
Total	**86**	**100**

J Indian Acad Forensic Med, 31(2)

Originals and Papers

Suicides in Kolkata metro railway

U.B.Roychowdhury, M.Pal** & B. Sukul****

Abstract

To understand the characteristics of persons who commit suicide in Kolkata Metro Railway and the nature of events leading to their suicide, a retrospective study was conducted on the victims of suicide in Kolkata Metro Railway.Highest incidence was found in the age group of 35-40 yrs(13 deaths).Office workers constituted 27.5% of all suicides and mental illness was found in 8.6% of the victims.Possible prevention strategies include modification of Metro environment and changing public conceptions of Metro suicides.

Key words: *Suicide & metro railway*

Introduction

Kolkata Metro Railway is the first underground Metro Railway in India. A brainchild of Dr.B.C.Roy, former Chief Minister of West Bengal, it started to function from 1984 in a limited way between Esplanade and Bhowanipur. Later from 1995, it started to run along its full route starting from Dum-Dum to Tollygunge with 17 stations en route situated at about 1km apart. Total length of the railway track is 16.45km which runs through the heart of the city of kolkata. Metro service is available between 7am. and 9.45pm.The doors of the carriages remain closed throughout the journey except when the train stops at a station.

The saddest shortcoming of this unique transport system of the 'City of joy' is that it is used frequently as a suicide point. There have been many cases where people jumped in front of the running trains in their suicidal attempt while the trains were entering the platforms. The method of current collection of Kolkata Metro is from the 'Third Rail' which runs all along the railway track and which becomes 'live' whenever a train approaches the station. Though it runs beyond the railway lines and lies farthest from the passengers waiting on the platform, the 'third rail' has increased manifold the opportunity of committing suicide by jumping on the railway tracks. This is proved by the fact that even in those cases where brake of the trains were applied effectively, the victims died due to electrocution. Moreover, during Postmortem examination, many of them showed evidence of electrocution in addition to the mechanical injuries caused by the speeding trains.

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Material And Method

We studied all the PM report of the Kolkata Metro victims(total 58 cases) during the period of January1987 to October 2008. The PM reports along with the Police inquests were available at Kolkata Police Morgue, N.R.S.Hospital Morgue and Mominpur Morgue. We also collected some relevant informations and datas from the Kolkata Metro authority. The data were entered in a standard proforma used for this study and after their meticulous scrutiny and evaluation were recorded.

Results

1. Manner of death- From its inception till

Oct,2008, 58 deaths were recorded in Kolkata Metro Railway and as per police inquests all of them were suicidal in nature.The victims jumped in front of the running trains from the platforms as the trains were entering the stations. As against 58 deaths, 22 futile suicidal attempts were recorded by the Metro authority. Those who survived as they were judged to be suicidal were intercepted by Metro security personnel and fellow passengers before a successful suicidal death occurred. 7 persons recovered after sustaining minor injuries.

2. Time of death- 17 persons were brought dead at the hospital. 2 survived for 6hrs and 18hrs. others(67.2%) died instantaneously.
3. Age- Almost all age groups were represented; ages of the victims ranged from 18 to 59 yrs.Highest incidence(22.4%) was recorded in the age group of 35-40 yrs and lowest in 50-55 yrs(5.1%).
4. Sex- Of the 58 suicide victims, 47(81%) were men and 11(19%) were women.
5. Occupation- Office workers and students formed 46% of all suicides. This includes a student of Medical College, Kolkata who committed suicide at Metro in Sept.,2008.
6. Yearwise incidence- For some unknown reason, not a single case of suicide was reported during the initial 3 yrs of Metro service. Apart from its peak in 2002(7deaths), there appeared to be no consistent pattern. Lowest incidence(2 cases) was observed in 1989.
7. Month of the year- Largest number of deaths occurred in Jan. and Feb.(17.2% each) and October had the fewest completed suicides(2 deaths).
8. Time of the day- 79.3% of suicides occurred during busy hours of the railway service(between 9am and 5pm).Only 9 suicidal deaths took place after 5pm till the closing of service. Incidence during early hours(between 7-9am) was also low(3 cases).
9. Metro station- There appeared to be no consistent pattern of preference for any particular Metro station for committing suicide, although reliable analysis of frequency differences by station was impossible because of the low number of suicides under the present study. However, Kalighat and Netaji Bhawan appeared to be most vulnerable with 12 and 9 deaths occurring in them respectively followed closely by Rabindra Sarovar(8 deaths).
10. Antecedent factors-
    i) Mental illness- Out of 58 suicides, a previously diagnosed mental illness(depression) was identified in only 5(8.6%), for which they were having psychiatric treatment, though irregularly.
    ii) Suicidal ideation with previous history of suicidal attempt was found in 3 subjects(5.1%).
    iii) Precipitating events shortly before fatal suicidal attempt were identified in 17 cases(29.3%). The most frequent categories were financial problems, loss of a job, problems at work, family difficulties, physical illness etc.
    iv) Only 6 of the 58 victims left a suicide note.

Discussion

Almost all underground public transportation systems of the world report numerous suicidal deaths. The only subway systems where suicides do not occur physically limit passengers from access to the trains as well as tracks with a system of doors that open only when the train has stopped e.g., in Singapore [1].

The present study revealed that 71.6% of the suicide attempters actually died. This result differs significantly from that of similar other studies carried out in different parts of the world. For example, in London underground system, 43% of the attempters died [2],compared to 48% death rate in the Toronto subway [3] and only 42% in Hong Kong [1].*O'Donnell et al* [4] compared suicide data in 23 different underground railway systems throughout the world. Their review indicated that there were more male victims than females, most were younger than 41 yrs and most

deaths occurred between 10am to 4pm.

Several investigators have found a high incidence of diagnosed mental illness in individuals who kill themselves in public transportation systems. A Danish study revealed a high incidence of mental illness among railway suicides [5]. Symonds in a study of railway fatalities in England and Wales found a high incidence of depression (34 out of 77 cases) among the suicides [6].

Besides physically limiting access to tracks and trains with barriers, several methods have been used to help reduce subway suicides in many countries. In London, 'Suicide Pits'(areas with suspended rails; the train can pass over a person who has fallen) have been installed in several stations to reduce the risk of injury from being hit by a train [7]. It was found that fewer persons who attempted suicide died in stations with suicidal pits. In Nuremberg, when a passenger steps over a line on the platform, a guard viewing this on the video surveillance system tells the person over a loudspeaker to step back [8].

Several precautionary measures have been taken by the Kolkata Metro authority to reduce the high incidence of Metro suicides. From July,2001, in order to dissuade the depressed from hurting themselves before speeding trains, the Kolkata Metro authority has decided to play classical music on stations to soothe the depressed souls. To prevent suicidal attempts as well as for security purposes, CCTV-s have been installed in every station. Passengers are prohibited from crossing a white line marked at a distance of 21/2 ft. from the edge of the platform before the train arrives. Moreover, idling or sitting on the steps in the platform premises has been barred and security is alerted if anyone in particular lurks around a platform too long. The authority has allowed NGO-s e.g., *"Anubhav",* Calcutta Samaritans and Lifeline Foundation to put up glow signs at the stations displaying their phone numbers and requests to the commuters to contact them if they are in stress. In addition, they are holding public awareness camps from time to time.

Conclusion

We conclude with some suggestions for prevention of suicides in the Kolkata Metro, based on the results of the present study in addition to the measures already taken up by the Metro authority :-

1. Intervention in the Metro physical environment - Research elsewhere indicates that if it is possible to limit access to the rails and trains until the train has safely stopped in the station, suicides in metro are virtually impossible. This requires building up of wall(or fence) along the edge of the platforms with exits which exactly fit with the doors of the compartments as the train stops at a station. These exits should remain closed in between the arrivals of trains and open only when the trains stop. Reducing the speed of trains while entering the station may also be effective.
2. Increased involvement of Metro security forces in suicide prevention.
3. Publicising the availability of help in Metro stations - Increased publicity about the availability of help by NGO-s and direct access to suicide hotlines from the metro telephones would have a preventive effect.
4. Changing impressions of the Metro as an easy place to kill oneself – It should be widely publicised that a suicide attempt is not certain to result in death and metro suicidal deaths are often neither instantaneous nor painless.

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Table-1 : Age distribution of Metro victims

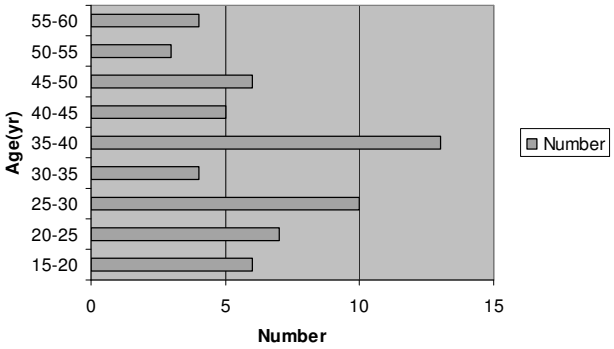

Table-2 : Occupation of Metro victims

Occupation	Number	Percentage
Office worker	16	27.5
Student	11	18.9
Small businessman	8	13.7
Manual laborer	1	1.7
Rickshaw puller	1	1.7
Shopkeeper	4	6.8
Unknown job	10	17.2
Jobless	7	12

Table-3 : Time distribution of Metro suicide

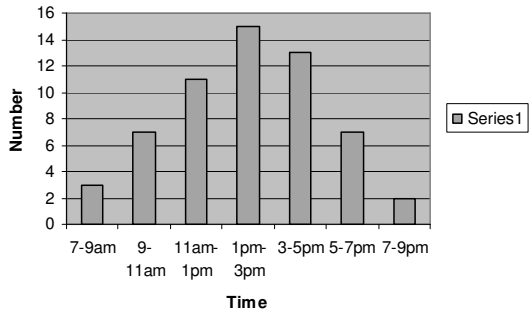

Figure : A Metro suicide victim

Originals and Papers

Fatal burns in children

Vikram Palimar & Raghavendra Babu Y.P.***

Abstract

The present study is a retrospective study undertaken at the mortuary of Kasturba Hospital, Manipal, India during the span of 14 years (1992-2005). Forty two (42) cases were pediatric fatalities due to burns. Age group commonly involved was 13-18 years. Females predominated. Majority of the cases were accidental in nature. Accelerant was used in only 3 cases. The burns were superficial in 52.4% of the victims. Injuries were due to dry heat in 73.8%. Majority of the victims had more than 60% burns. The main objective of the study is to gather epidemiological information and mechanism of causation of burns in children so as to suggest preventive measures that could probably help to prevent or reduce these deaths.

Key words: *Burns, children & fatalities*

Introduction

Pediatric burns invariably cause high mortality and crippling deformities among children, reportedly in the age ranging between 0 and 18 years. Though, better burn management over the past few decades has significantly contributed to a decrease in burn-deaths, yet burns mortality still remains rampant.

In order to suggest means of preventing this unnecessary loss of life in children due to burns, it is imperative to understand the specific mechanisms involved in their causation. With this knowledge, improvement in the treatment and reduction in morbidity and mortality can be achieved.

There exists inadequate data regarding the pediatric fatalities due to burns in this part of the country and the present study tries to address this problem. The main purpose of this study is to gather epidemiological information and mechanism of causation of burns in children so as to formulate recommendations that could probably help to prevent or reduce these deaths.

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Material and Method

The present study is a retrospective research undertaken to study the fatal cases of burns in children at the mortuary of Kasturba Hospital, Manipal, which is a tertiary care teaching hospital situated in Coastal Karnataka, South India. The duration of the study was 14 years (1992-2005). The necessary information regarding age and sex of the victims, manner of sustaining injuries, type of heat, depth of burns, type of accelerant used and total body surface area involved was obtained by studying the autopsy files from the Department of Forensic Medicine, Kasturba Medical College, Manipal and from the hospital case sheet obtained from the Medical Records Department, Kasturba Hospital, Manipal. Victims less than 18 years of age formed the material for the study. The data obtained was tabulated and analysed using SPSS software.

Results

During the 14 year period (1992-2005), two thousand and ninety three (2093) cases were autopsied at the mortuary of Kasturba Hospital, Manipal, out of which one hundred and seventy eight (178) cases were pediatric fatalities (8.5%) and forty two (42) children died due to burns (23.6%). Majority of the cases were accidental in

nature (Table-1).The commonest age group affected was 13-18 years (Table-2). Males were the victims in 16 cases (38.1%) and females were affected in 26 cases (61.9%). Accelerant was not used in 30 cases (Table-3). Injuries were due to dry heat in 73.8% (Fig.1). The burns were superficial in more than half of the victims (Fig.2). Majority of the victims had more than 60% burns (Table-4).

Discussion

Smoke inhalation, severe burns and residential fires are devastating events, most of which are preventable [1] . Present study was undertaken at the Department of Forensic Medicine, Kasturba Medical College, Manipal to seek means to improve the treatment and the prevention of childhood burn fatalities in this part of the country.

In the present series, the manner of sustaining burns was accidental in overwhelming majority. Similar observation was reported in other work [2]. The factors responsible for fire accidents was due to overcrowding and floor level cooking coupled with malfunctioning kerosene stoves. The overcrowded conditions cause children to play near the vicinity of a fire thereby exposing them to the danger.

Two cases of suicide and a case of homicidal burns were noted. The age group commonly affected was 13-18 years. Our findings are in contrast to other reported works which indicate majority of deaths under 5 years of age [2-6]. Female victims predominated in our study. As per the prevailing customs the female child especially in her teens helps her mother in cooking food and other household chores. So there is a possibility of her sustaining burns.

In majority of the cases the burns were produced due to dry heat (flame). Younger children (0-4 years) sustain scald injuries more frequently [7]. Similar findings were observed in the present series. The over crowded conditions cause young children to play near the cooking area leading to scald injuries due to spilling of hot water or fluids.

Kerosene was the accelerant used in less than 10% of the cases. The burn injuries were of varying depths from superficial to deep. Total body surface area (TBSA) involved was more than 60% in more than half of the victims. It is generally considered that 30-50% involvement of the total body surface is incompatible with survival [8,9]. The mortality increases with rise in TBSA[10]. Burns smaller than 30% TBSA occasionally are lethal in infants and small children despite modern therapy [4].

It is suggested that increase in alertness to the burns, strict vigil on the activity of the children in the areas where the risk of sustaining burn injuries exists, keeping cooking appliances and other thermal equipments beyond the reach of the children may be helpful in decreasing the incidence of burns in children.

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Table- 1: Manner of sustaining burns

Manner	No of cases	Percentage
Accidental	39	92.8
Suicidal	2	4.8
Homicidal	1	2.4
Total	**42**	**100**

Table -2: Age profile of the victims

Age in years	No of cases	Percentage
0-6	12	28.6
7-12	12	28.6
13-18	18	42.8
Total	**42**	**100**

Table –3: Usage of accelerant

Accelerant	No of cases	Percentage
Used	03	7.1
Not used	31	73.8
Not Known	08	19.1
Total	**42**	**100**

Table –4:Total body surface area involved

TBSA (in percent)	No of Cases	Percentage
0-20	03	7.1
21-40	03	7.1
41-60	13	30.9
>60	23	54.9
Total	**42**	**100**

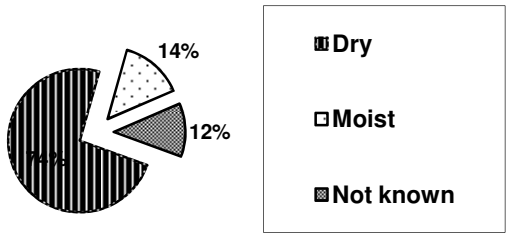

Figure- 1 :Type of heat

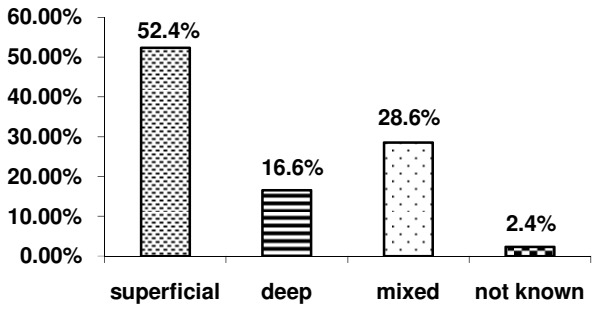

Figure- 2: Depth of burns

Originals & Papers

Trends of poisoning in Ahmedabad

Rohit C. Zariwala, Saumil P. Merchant**, Tapan Mehta*** & Ravindra Bhise****

Abstract

Since time immemorial poisonous substances have been reported to be adversely affecting human life, both in terms of morbidity and mortality. Evolution of newer molecules in fields like pharmacy, industry and agriculture etc has made wide and easy availability of various biological and chemical substances. The present study of five year's duration has been presented herewith-reflecting trends of poisoning in a metro of Ahmedabad.

Key words: *Poisoning, trends , epidemiology.*

Introduction

Due to rapid development in the field of science and technology coupled with vast growth in agriculture and industrial sectors, availability of toxic substance is becoming a global phenomena. World Health Organization(WHO) conservatively estimates about 3 million cases of poisoning occur every year in the world, of which 99% of fatal poisoning occurs in developing nations. Medical fraternity has perceived its concern in literature and even establishment of Modern Toxicology Laboratory has been suggested including finer aspects of planning and design.[1] We believe that basis of such set up shall be as per pattern of trends of poisoning in a catchment area of a health center in question as cases of suicidal, accidental and even homicidal poisoning by various chemical compounds are being reported very frequently from all parts of India and other countries.

Due to rapid development in the field of science and technology coupled with vast growth in agriculture and industrial sectors, availability of toxic substance is becoming a global phenomena. World Health Organization(WHO) conservatively estimates about 3 million cases of poisoning occur every year in the world, of which 99% of fatal poisoning occurs in developing nations. Medical fraternity has perceived its concern in literature and even establishment of Modern Toxicology Laboratory has been suggested including finer aspects of planning and design.[1] We believe that basis of such set up shall be as per pattern of trends of poisoning in a catchment area of a health center in question as cases of suicidal, accidental and even homicidal poisoning by various chemical compounds are being reported very frequently from all parts of India and other countries.

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Aims And Objectives

The present study was carried out at F.M. Department of Smt. N.H.L. Municipal Medical College and Sheth V.S. Gen. Hospital, Ahmedabad with the following aims and objectives:

1. To study trends , type and epidemiological aspects of poisoning cases.
2. To study common routes of exposure of poisoning cases.
3. To study relation between mortality due to poisoning and time taken for hospitalization after exposure.
4. To study characteristic finding of poisoning cases on autopsy & treatment in such poisoning cases.

Material And Method

The postmortem centre of Sheth V.S. General Hospital and Sheth K.M School of Post-graduate & Research , Ahmedabad – 6, is under the Department of Forensic Medicine and caters the need of Ahmedabad City and surrounding rural areas.

All the poisoning deaths coming for the postmortem examination to this centre are studies, the study being retrospective for 1995 to 1999(remote duration is opted as there is a reasonable delay in receipt of chemical analysis report, without which the deductions of present study may be not complete and accurate ones.).

During the study period of five years (1995-1999) , the total numbers of autopsied conducted were 759 in 1995, 900 in 1996, 904 in 1997, 894 in 1998 and 935 in 1999,

Amongst them, total 93 in 1995, 109 in 1996, 121 in 1997, 112 in 1998 and 121 in 1999 case were examined as poisoning deaths.

All the date has been taken in a prepared proforma and the analysis made from the date is analysed in various tables.

Observations

A retrospective study of 556 cases of poisoning was done at Smt. NHL Municipal Medical College & Sheth V.S.General Hospital, Forensic Medicine department, Ahmedabad from 1995 to 1999.

Table- 1: Year-wise distribution of poisoning deaths in relation with total postmortem of deaths.

Year	Poisoning cases	%	Total cases
1995	93	12.25	759
1996	109	12.11	900
1997	121	13.38	904
1998	112	12.52	894
1999	121	12.94	935
Total	**556**	**12.65**	**4392**

It was found that there was no apparent increase in proportion of poisoning cases during last five years.

Table- 2: Age and sex wise distribution of poisoning deaths.

Age group	Sex		Total
	F	M	
0 to 4	4	5	9
	44.4 %	55.6 %	1.6 %
5 to 9	3	2	5
	60.0 %	40.0 %	0.9 %
10 to 14	11	9	20
	55.0 %	45.0 %	3.6 %
15 to 19	54	39	93
	58.1 %	41.9 %	16.7 %
20 to 24	44	84	128
	34.4 %	65.6%	23.0%
25 to 29	35	61	96
	36.5 %	63.5 %	17.3 %
30 to 34	19	39	58
	32.8 %	67.2 %	10.4 %
35 to 39	17	21	38
	44.7 %	55.3%	6.8 %
40 to 44	9	34	43
	20.9 %	79.1 %	7.7 %
45 to 49	10	20	30
	33.3 %	66.7%	5.4 %
50 to 54	1	11	12
	8.3 %	91.7%	2.2 %
55 to 59	3	9	12
	25.0 %	75.0%	2.2 %
60 to 64	2	3	5
	40.0 %	60.0%	0.9%
65 to 69	1	2	3
	33.3%	66.7%	0.5%
70 to 74	1	0	1
	100.0%	0.0%	0.2 %
75 to 79	0	1	1
	0.0%	100.0%	0.2 %
80 to 84	0	2	2
	0.0%	100.0%	0.4 %

Higher incidence was found in 3rd decade of life. Incidence of poisoning was observed highest in age group of 20 to 24 years i.e. 128(23.0 %) cases with more males followed by age group of 25 to 29 years i.e. 96 (17.3%) cases with more males.

Table – 3: Residence wise distribution of poisoning deaths.

Year	Rural	Urban	Total
95	32	61	93
	34.4%	65.6%	16.7%
96	44	65	109
	40.4%	59..6%	19.6%
97	47	74	121
	38.8%	61.2%	21.8%
98	33	79	112
	29.5%	70.5%	20.1%
99	46	75	121
	38.0%	62.0%	21.8%
Total	**202**	**354**	**556**
	36.3%	**63.7%**	**100 %**

It is found that in rural areas numbers of poisoning cases were increased.

Table-4 depicts that suicide was the common manner of poisoning followed by accidental as against homicidal poisoning.

It is obvious from Table-6 that ingestion is a major chunk among types of other routes of administration.

Majority of poisoning cases i.e. 472 were hospitalized for various duration before deaths, where as remaining 84 cases could not be hospitalized, due to various reasons. It has been observed that 84 cases died on the spot and were detected later, whereas 380 cases hospitalized within 1 to 4 hours of intake of poison. The poisoning deaths could be related to the does ingested as well as the time elapsed between ingestion and arrival at the hospital.

Table – 4: Distribution of cases in relation to marital status of victims and manner of exposure of poisoning

Year	Accidental			Homicidal			Suicidal			Total
	M	un	uk	M	un	uk	M	un	uk	
1995	10	7	0	1	0	0	45	30	0	93
1996	6	6	0	0	3	0	66	26	2	109
1997	5	6	0	0	0	0	64	46	0	121
1998	5	4	0	1	2	0	53	47	0	112
1999	11	8	0	0	0	0	72	30	0	121
Total	**37**	**31**	**0**	**2**	**5**	**0**	**300**	**179**	**2**	**556**
Total	**68**			**7**			**481**			**556**
M= married un= unmarried uk=unknown										

Table –5: Distribution of cases according to history of poisonous substance.

Poisonous substance	Frequency	Percent
Acid-corrosive	30	5.4
Aluminium phosphide	28	5.0
Carbamate propoxure	27	4.9
Chloroquine	7	1.3
Copper sulphate	3	0.5
Drug overdose	3	0.5
Drug reaction	2	0.4
Insect bite	26	4.7
Kerosene	7	1.3
Organo-phosphurour	9	1.6
Organo chloro	4	0.7
Scorpion bite	3	0.5
Sedative	4	0.7
Snake bite	3	0.5
Unknown	400	71.9
Total	**556**	**100%**

Table –6: Year- wise distribution of according to route exposure of poisoning cases from 1995-1999.

Year	I.v.	Ingestion	Inhalation	Skin contact	Total
95	0	82	3	8	93
	0.0%	88.2%	3.2%	8.6%	16.7%
96	1	100	5	3	109
	0.9%	91.7%	4.6%	2.8%	19.6%
97	0	113	4	4	121
	0.0%	93.4%	3.3%	3.3%	21.8%
98	0	105	2	5	112
	0.0%	93.8%	1.8%	4.5%	20.1%
99	0	102	7	12	121
	0.0%	84.3%	5.8%	9.9%	21.8%
Total	**1**	**502**	**21**	**32**	**556**
	0.2%	**90.3%**	**3.8%**	**5.8%**	**100%**

Table –7: Year- wise distribution of time lag between exposure and hospitalization of poisoning cases.

Time lag (in hours)	Year					Total
	95	96	97	98	99	
Spot death	9	20	13	21	21	84
	10.7%	23.8%	15.5%	25%	25%	15.1%
1 to 4	70	81	83	80	66	380
	18.4%	21.3%	21.8%	21.0%	17.3%	68.3%
5 to 9	7	7	15	7	23	59
	11.9%	11.9%	25.4%	11.9%	39.0%	10.6%
10 to 14	4	0	7	3	4	18
	22.2%	0.0%	38.9%	16.7%	22.2%	3.2%
15 to 19	2	0	3	1	3	9
	22.2%	0.0%	33.3%	11.1%	33.3%	1.6%
20 to 24	1	1	0	0	3	5
	20.0%	20.0%	0.0%	0.0%	60.0%	0.9%
70 to 74	0	0	0	0	1	1
	0.0%	0.0%	0.0%	0.0%	100.0%	0.2%

Table-8 suggests that finding froth at autopsy is not constant feature of poisoning. Even bleeding at nostrils was not very common. (Table-9)

Cyanosis was observed that relatively less number of cases showed cyanosis, however if present was both central and peripheral.(Table-10)

Discussion

The comparison of scientific observations of present study and other literatures indicates some significant aspects.

The incidence of poisoning observed in the present study ranges from 12.11-12.94 with average of 12.65 %. It is consistent with observation of Gupta & Vaghela [3](15.98%) and Gargi *et al* [2](11.60%).

Higher incidence of poisoning was found in age group 20-30 years(40.30%) in the present study. Gupta & Vaghela[3] (43.10%) and Gargi et al [2] (37.60%)observed almost similar incidence in their study .However, Kohli & Banerjee[4] in a study from Delhi observed higher incidence in age group 13-24 years(53.50%) and 25-36 years (22.40%) which varies a little form others but collectively it can be scientific to conclude that

Table –8: Distribution of poisoning cases in relation to froth.

Name of poison	Froth		Total
	Absent	Present	
C/a report pending	67	27	94
Acid-corrosive	8	0	8
Aluminium phosphide	83	17	100
Carbamate propoxure	77	34	111
Carbon monoxide	2	0	2
Chloroquine	3	4	7
Copper sulphate	2	1	3
Drug overdose	1	0	1
Ethyl alcohol	2	1	3
Kerosene	1	0	1
Organo- phosphurous	46	19	65
Organo chloro	14	8	22
Reducting agent sulfi	1	0	1
Rodenticide	1	0	1
Sedative	2	0	2
Undetected	99	36	135
Total	409	147	556

Table –9: Distribution of poisoning cases in relation to bleeding.

Name of poison	Bleeding		Total
	Absent	Present	
C/a report pending	89	5	94
Acid corrosive	8	0	8
Aluminium phosphide	85	15	100
Carbamate propoxure	101	10	111
Carbon monoxide	2	0	2
Chloroquine	6	1	7
Copper sulphate	3	0	3
Drug overdose	1	0	1
Ethyl alcohol	3	0	3
Kerosene	1	0	1
Organo phosphurous	58	7	65
Organo chloro	21	1	22
Reducting agent sulfi	1	0	1
Rodenticide	1	0	1
Sedative	2	0	2
Undetected	126	9	135
Total	**508**	**48**	**556**

Table –11: Distribution of poisoning cases in relation to stomach contents smell.

Name of poison	Empty	Bitter	Insecticide	Kerosene	No-smell	Sour	Sweet	Total
Ca report	1	3	33	3	46	7	1	94
Pending	1.1%	3.2%	35.1%	3.2%	48.9%	7.4%	1.1%	16.9%
Acid corrosive	0	0	0	0	1	7	0	8
	0.0%	0.0%	0.0%	0.0%	12.5%	87.5%	0.0%	1.4%
Aluminium	0	19	34	0	43	0	4	100
phosphide	0.0%	19.0%	34.0%	0.0%	43.0%	0.0%	4.0%	18.0%
Carbamate	1	3	90	6	10	0	1	111
propoxure	0.9%	2.7%	81.1%	5.4%	9.0%	0.0%	0.9%	20.0%
Carbon monoxide	0	0	0	0	1	0	1	2
Chloroquine	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	50.0%	0.4%
	0	3	0	0	3	0	1	7
	0.0%	42.9%	0.0%	0.0%	42.9%	0.0%	14.3%	1.3%
	0	2	0	0	1	0	0	3
Drug overdose	0.0%	66.7%	0.0%	0.0%	33.3%	0.0%	0.0%	0.5%
	0	0	0	0	1	0	0	1
Ethyl alcohol	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.2%
	0	0	0	0	0	0	3	3
Kerosene	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.5%
	0	0	0	1	0	0	0	1
Organo	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.2%
phosphurous	1	2	47	0	15	0	0	65
	1.5%	3.1%	72.3%	0.0%	23.1%	0.0%	0.0%	11.7%
Organo	0	0	16	0	6	0	0	22
Chloro	0.0%	0.0%	72.7%	0.0%	27.3%	0.0%	0.0%	4.0%
Reducting agent	0	0	0	0	1	0	0	1
sulfi	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.2%
Rodenticide	0	0	0	0	1	0	0	1
	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.2%
Sedative	0	0	0	0	2	0	0	2
	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.4%
Undetected	0	12	38	0	70	11	4	135
	0.0%	8.9%	28.1%	0.0%	51.9%	8.1%	3.0%	24.3%
Total	**3**	**44**	**258**	**10**	**201**	**25**	**15**	**556**
	0.5%	**7.9%**	**46.4%**	**1.8%**	**36.2%**	**4.5%**	**2.7%**	**100%**

younger and middle aged persons are more common victims of poisoning due to various common socio-economic factors like active life, ambitions and responsibilities etc.

The number of cases form rural area was quite significantly high even though the center is in a metro city. The incidence form rural area observed by Kohli & Banerje [4] was almost similar but Gargi et al [2] and Gupta and Vaghela[3] reported little higher ratio of rural cases. This can be attributed to the fact that the present study and that of Kohli & Banerje[4] represent metro cities like Ahmedabad and Delhi respectively. At other hand study by Gargi et al [2] and Gupta and Vaghela [3] involve more of rural area as a catchments of the health center.

With reference to manner of poisoning observations by Gupta & Vaghela [3] and Kohli & Banerje [4] were similar to our observations, that is to say majority of poisoning cases are suicidal in nature followed by accidents and very small number of homicidal nature. However,The higher incidence of accidental manner reported by Gargi et al [2] can be due to higher use of pesticides in a agricultural state like Punjab.

Table- 5 suggests that in majority of the cases the history of a particular type of substance was not available to attending clinician. Kohli & Banerje[4] also has reported a higher incidence of absence of history of a particular poison. This feature suggest that in absence of a reliable history the uphill task of diagnosis of a particular poisoning becomes more challenging which has to be addressed by set up of bed side chemical tests and an analytical toxicological set up, if circumstances permit.

Alluminium phophide, organo phosphorous and organo chloro compounds of various types form a major chunk in almost all studies[2,3,4]. However, alcohol formed a considerable part in cases observed by Kohli & Banerjee [4] and Gargi et al [2] as compared to Gupta & Vaghela[3] and present study. The lower incidence in two reports from Gujarat can be attributed to the fact that Bombay Prohibition Act exists in Gujarat, which is not the case for Delhi or Punjab. Keeping apart chemical substances , incidence of snake bite was higher in reports by Gargi et al [2] and Gupta & Vaghela[3] as compared to Kohli & Banerjee [4] and present study. This can be explained by the fact that incidence of snake bite are more common in non-metro area as compared to metros like Delhi and Ahmedabad. It is safe to conclude that Alluminium phophide, organo phosphorous and organo chloro compounds are common poisoning cases even with some geographical variation ,but incidence of snake bite is directly proportion to rural type of habitat. Such scientific deduction shall form a basis for diagnostic and therapeutic facilities at a hospital in question.

Ingestion was the most common route of administration in the present study as compared to skin contact and inhalation. With no literature available to us for comparison we presume it to be almost a universal phenomena. It signifies the need of more emphasis in treatment of poisoning by ingestion as compared to others.

Only 15% of cases in present study succumbed to death without any treatment. Kohli and Banerjee [4] have reported almost similar ratio of death within 3 hours. However, Gupta & Vaghela[3] reported 40.10% cases of spot death. Even with some variation in observations by different workers it is obvious that not less than 50% of patients die after hospitalization. Such situation can, again, indicates improvement in diagnostic and therapeutic facilities at a hospital in question.

The common features at autopsy like froth, cyanosis and bleeding(nostrils and mouth) mentioned in standard text books were not that commonly observed in our study. This can be explained by interval between poisoning and death (after reasonable hospitalization) and hence typical book findings shall not form basis of exclusion of poisoning in hospitalized cases. However, among all the cases such traits were higher in cases of Alluminium Phosphide, Organo-phosphurous and Organo-chloro compounds.

In present study, no characteristic smell was observed from stomach contents at autopsy in 36.2% cases. Mohanty *et al* [5] has reported that out of 144 cases charateric smell was absent in 53.43% cases. This can be explained by the fact that as majority of cases of poisoning are by ingestion and gastric lavage being a common tool to empty the stomach contents leaving no pathognomic odour behind at autopsy.

Conclusions

The trends of poisoning in our set up are in consonance with observations by other workers representing more or less similar geographical area. Such study shall form a basis to suggest need of toxicological analytical center at a hospital, at least for commonly prevailing poisoning conditions. After complete functioning of such additional facility, data and trends of poisoning can be reviewed again to check the effective outcome of such facility.

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Preliminary report

Detection and identification of components of household mosquito repellant liquidator in autopsy material

Vinod Dhingra & Jyotsna Pandey***

Abstract

Now a days liquid mosquito repellent are very common in the society due to easy availability, low cost and easy to use it remains available in most of the houses but its misuse in suicide/homicides cases can not be ruled out the present work describes the detection and identification of the components of these liquid mosquito repellent in biological fluids and in visceral materials by chemical colour tests, thin layer chromatographic(TLC) and gas chromatographic(GC) analysis.

Key words: *Mosquito repellent liquidator, pyrethroids, TLC & GC.*

Introduction

Fast changing life style of society, growing population, lack of sanitation, shattered garbage generating ideal atmosphere for mosquito and other insect variety. To kill them several newer varient are appearing in the market recently mosquito repellent liquidators were introduced in the market by various branded companies which were widely accepted by the society due to easy to use, cost effective and easy availability, therefore it remains available almost all type of houses but its misuse in suicide/homicide cases can not be ruled out.

The general composition of these mosquito liquidators of various brand names available in market are:

1. Pyrethroids (e.g. Cyfluthrin \ Cyhalothrin \ Deltamethrin \ Allethrin \ Prallethrin) as insect repeller and killer
2. Odorless kerosene as a solubilising media.
3. Fragrance as a room fragrent.

The present work describes the detection and identification of Pyrethroids which is key component of these mosquito repellent liquidators in autopsy material by chemical colour test, thin layer chromatography and gas chromatography.

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Experimental

All the reagents were analytical reagent grade distilled water was used throughout the study.

Extraction of Pyrethroids from autopsy material

Take 100 gm of thoroughly minced visceral tissue samples add 75 gm of anhydrous Sodium sulphate, 150 ml of mixture of acetone: dichloromethane (50:50) was added these was refluxed over hot water bath for two hours the tissue residue was again refluxed with 100 ml mixture of acetone: dichloromethane (50:50). The filtrate were combined and diluted with distilled water up to 400 ml. It was extracted thrice with 50 ml portions of n-hexane.

The n-hexane extracts were combined and subjected to clean up by passing through the mixture of silica gel g and activated charcoal filled column having glass wool at the bottom. Finally the collected filtrate was evaporated over hot water bath and can directly used for identification of Pyrethroids.

Chemical colour tests

Following chemical colour tests can be applied to test the Pyrethroids:

1. Extract + 10% NaOH + 5% Freshly prepared aqueous $FeSO_4$ then heat and add dil H_2SO_4 which gives Prussian blue Colour the Responding Pyrethroids are

Alphamethrin,Cypermethrin, Deltamethrin.

2. Extract + 1% Ethanolic Diphenylamine and exposed to U.V. light gives grey colour. The Responding Pyrethroids are Alphamethrin, Cypermethrin, Deltamethrin.
3. Extract + 1% Ammonical Silver Nitrate (Tollens reagent) and exposed to U.V. light gives black colour the Responding Pyrethroids are Alphamethrin, Cypermethrin, Deltamethrin.
4. Extract + 1% Iodine solution in Benzene gives yellowish brown colour the Responding pyrethroids are Alphamethrin, Cypermethrin, Deltamethrin.
5. Extract + 0.5 gm of Resorcinol in 100 ml of 10% w/v aqueous NaOH heat which gives pink colour the Responding Pyrethroids are Cyhalothrin, Cypermethrin, Deltamethrin.

Thin layer chromatographic analysis

A standard glass TLC plates was coated with slurry of silica gel G in water to a uniform thickness of 0.25 mm. The plate was activated by heating in an oven at 110^{o}C for about one hour. An aliquots of standard Pyrethroids and extract obtained from autopsy material were spotted on to the plate, which was developed with Cyclohexane : Toluene (60 :40) in a pre saturated TLC chamber, to a height of 10 cm. The plate was removed from the chamber dried in air and sprayed by 0. 5% Resorcinol in 100 ml of 10% aqueous NaOH (freshly prepared) reagent followed by heating the plate for 15 minutes in an oven at 100° C which gave pink coloured spots The R_f values of Cyhalothrin 0.35, Cypermethrin 0.38, Deltamethrin 0.31, Fenvelrate 0.42 can be compared with the obtained spots of visceral extract.

Gas Chromatographic analysis

The gas chromatographic analysis was performed on the Chemito 8610 HT Gas chromatograph the G.C. conditions was:

1. Sample injection 1 µl
2. Oven temp. 250oC
3. Air flow 1.4 bars
4. Flow of hydrogen gas 1.2 bar
5. Flow of carrier gas (nitrogen gas) 1.0 bar IOLAR Grade 1, 99.9% purified further by passing through silica gel and molecular sieve to remove moisture and oxygen respectively.
6. Injection temperature 250^{o}C
7. Detector temperature 180^{o}C
8. Detector ECD
9. Column Glass coloumn (6 m long; 4 m m i.d. packed with a mixture of 1.5% OV-17 AND 1.95% OV-210 coated on chromosorb-w, 80-100 mesh.
10. Chart speed 0.5 cm/min.

One microliter (1µl) of each Pyrethroid sample solution and autopsy material extract is injected and the chromatograms are compared under identical conditions. Peak areas of unknown samples are compared with those of standards of known concentration to deduce the concentration of unknown.

Discussion

The major agricultural Pyrethroids at present are esters of 3-phenoxy benzylalcohol or α-cyano-3-phenoxy benzylalcohol they can easily be extracted from autopsy material using liquid-liquid extraction with polar and /or non polar organic solvent the fat and other co extractive materials are removed by suitable adsorbent coloumn. The Prussian blue colour by NaOH + $FeSO_4$ reagent is due to cyano group, grey colour by ethanolic diphenylamine and black colour by ammonical Silver Nitrate is due to halogen group in structure of Pyrethroids where as yellowish brown colour with iodine solution is due to unsaturation and diphenyl ethereal group.

Resorcinol forms pink coloured complex owing to the reaction between alkaline resorcinol and 3-phenoxy benzaldehyde a comman hydrolysis product of all Pyrethroid insecticide having α-cyano ester group in their structure.

The prescribed methods and reagents are sensitive and can detect pyrethroid up to 10µg concentration by thin layer chromatography and in ppb level concentration by gas chromatography.

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Case Report

Complete suspense of strangulation

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Abstract

The Post-mortem examination on the dead body of a male aged 23 years was conducted at District Hospital, Navsari, in which the cause of death given by the Medical Officer was "Brain damage sustained as a result of Asphyxia, secondary to Strangulation". Crime scene examination, reveled it to be due to hanging and so the case was referred to Department of Forensic Medicine and Toxicology, Government Medical College and New Civil Hospital, Surat, for Expert opinion, along with the necessary documents. Controversy surrounding death due to neck compression has been discussed in this case report.

Key words: *Hanging, strangulation, scene of crime & expert opinion.*

Introduction

The postmortem examination of the dead bodies brought to mortuary can be conducted by medical officers or by Forensic experts. Usually this job is done by medical officers and in doubtful cases dead body is referred to Department of Forensic Medicine and Toxicology as per government directions in Gujarat. In India, medical officers working at Primary health centers, Community health centers or District hospitals, conduct majority of the post-mortem examinations. Most of them are not having sufficient updated knowledge of Forensic Medicine. Many a times medical officers fail to see injuries, they are not able to draw scientifically accurate opinion regarding cause of death, mode of death and manner of death. In some cases relatives of deceased or investing officer are not satisfied with the first autopsy report and thus they ask for second autopsy or expert opinion from the autopsy report of medical officer and/or from the photographs when dead body is disposed. Among various cases, neck compression deaths pose problems for medical officers or even investigating agency.

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Case history

On date 9/05/2007, a young male aged 23 yrs. was taken to private hospital, Navsari by his relatives, the person was admitted with history of fall from staircase and M.L.C. was done by hospital. Later on this case was referred to Mahavir general hospital, Surat. He was admitted to this hospital on 10/05/2007 in unconscious state. Patient was taken to Navsari private hospital at Navsari against medical advice, where he died on 16/05/07. The Post mortem examination was done on 17/05/07 at community health center

On date 27/06/2007, Investigating officer Chikhli police station, Navsari came at Forensic Medicine and Toxicology department, Govt. Medical college, Surat with autopsy report of medical officer, treatment case papers, photographs and other documents for expert opinion regarding cause of death.

Details of autopsy report of medical officer:

- A dark colored ligature mark seen on the neck on front two sides extending from lateral aspect of one side to lateral aspect of other side at level slightly below thyroid cartilage approximately 24cm.×1-1.5cm. Abrasion seen around mark, no other injuries seen.
- Congestion seen on face and neck.

- Fingers of both hands, mouth cyanosis seen.
- Fracture of hyoid bone made out on palpation.
- Cause of Death: Brain damage sustained as a result of asphyxia secondary to strangulation.

Observations by Forensic experts:

On observations from the autopsy report of medical officer, and photographs of deceased,

- Ligature was not transverse and it was going upward on the both sides [1].
- It was Incomplete over posterior aspect of neck.
- The structural damage to the internal structure of neck was minimal.
- No injury on any other part of body to support struggle.
- Viscera: no any specific finding.
- The Investigating officer has received the following information during inquiry that this person was residing at his father in-law's house. He had some problem with his wife on dated 9/05/07 after that he went upstairs, closed room and hanged himself with *duptta*, immediately his wife shouted out so family members and neighbors came and tried to open the door. They had broken the window and saw him to hanged with fan they inserted long instrument and cut the *duptta* , then broken the door and immediately the person was taken to hospital.
- We had also visited scene of crime.
- Scientific officer of Forensic science laboratory who visited scene of crime was of opinion that window, grill and door broken and force was applied on them from outside.

After complete study of the autopsy report of medical officer, photographs, scene of crime visit, hospital records of deceased – we had given the opinion that ligature mark mentioned in autopsy report can occur in hanging moreover circumstantial evidence was more indicative of suicide (hanging) [1,2,3,4]

Discussion

The only thing which caused medical officer to given opinion in favor of strangulation was ligature mark on lower part of neck but it could be possible in hanging also if knot is fixed or slipping knot get fixed at lower level so it may not shift upward due to the Adam' s apple [2]. There was minimal damage to the external and internal neck structure. There was no multiplicity of ligature mark. There were no any fingernail marks or any other injuries on the neck to support manual strangulation [3]. There were no any injuries on the fingers and hands.

Conclusion

This case report raises question that wrong interpretation and wrong cause of death given by medical officer leads the investigation in altogether different direction. As we all know so many programs are running at national and international level, but probably among these no program run to update medico-legal knowledge of medical officers who are working at root level. The Department of Forensic Medicine and Toxicology of various parts of our country should start training program with necessary permission from concerned authority to update medico-legal knowledge and to improve quality of medico legal work. Government has to take this matter seriously and support, facilitate and fund various Forensic Medicine departments for their work at the root level.

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Case Report

Simulation of sharp cuts on the skull bone as firearm injuries-A case report

P.S. Thakur , N.M. Unda** & R.K. Singh****

Abstract

Dead body of a young adult male was brought in a gunny bag for autopsy at M.Y. Hospital, Indore (M.P.) in the month of May 1999 by Ujjain police. The dead body was in advanced stage of decomposition with partial skeletonization effect. Skull vault was practically devoid of soft tissue. Examination of skull revealed two holes; one over the right parieto temporal region and another over the occipital region. Whether these holes were due to firearm or due to sharp objects has been discussed in the paper.

Key words: *Sharp force and skull injury*

Case history

Dead body of a young male was brought in a gunny bag tied with a rope at its open end to M.Y. Hospital, Indore for post-mortem examination by Ujjain police with the history that it was recovered from a well. The police and the relatives gave the history that he was missing since last two weeks.

On examination, the body was found in advanced stage of decomposition with partial skeletonization effect. His skull vault was practically devoid of soft tissues. At few places small pieces of clothes were present smudged with decomposed tissues and fluids. Two holes were observed on the vault of the skull; one at the right parieto temporal region and another at occipital region(Figure-1). On initial examination, the hole at the right parieto temporal region appeared as "Entry Hole" and that of occipital region as "Exit Hole" but when it was boiled, cleaned and further examined minutely, sharp cuts were seen at one margin of both the holes with slicing effects and with some chipping of bones(Figure-2). Parts of the bones from these regions were missing. The skull bone was preserved for further examination. After about two weeks time Ujjain police brought one hard and sharp object slightly curved in shape recovered from the accused. This weapon was approximated to the cut margins of the holes and on reconstruction both were found closely identical in respect to size and shape. (Figure-3 & 4) Thus, possibility of firearm as a cause of skull injuries was ruled out and those injuries were attributed to sharp cutting curved weapon submitted for comparison and reconstruction.

Discussion

The minute examination of skull bone revealed that the holes on the right parieto-temporal region and on the occipital region had their one margin sharply cut with chipping of bone due to slanting impact with hard and sharp object. Hence parts of bones were broken and missing. At occasions, the weapon of offense recovered by the investing agency is not submitted to the autopsy surgeon before filing the charge sheet. Under the circumstances, when the autopsy surgeon gives deposition in witness box the questions pertaining to relation between the weapon and injury are raised by prosecution or defense side. Any opinion there of may be an extempore and may have some shortcoming which may be misinterpreted by honorable courts. To avoid that, we recommend that in cases of assault the weapon of offence must be

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submitted to the autopsy surgeon and an opinion shall be deduced before the matter is committed to the honorable court.

Conclusion

This case reveals the importance of detailed and meticulous examination of the human remains. It also lays emphasis on proper cleaning and even boiling of the bones for minute and meticulous examination and reconstruction. The injuries, which were initially looking as firearm injuries were actually produced with the hard, sharp and slightly curved object.

Before a case of assault is committed to the honorable court, the investigating agency shall make it a routine to submit the weapon of offence to the autopsy surgeon and seek a scientific opinion about possibility of production of an injury by recovered weapon/s. Such exercise, we hope will help all the concerned to arrive at scientific opinion.

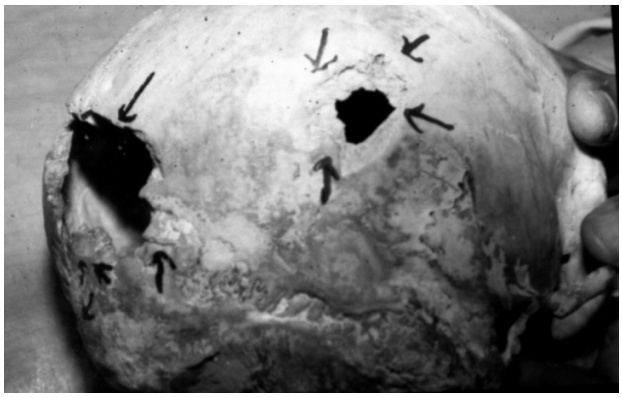

Figure-1: Separate skull defects in right parietal region and occipital region.

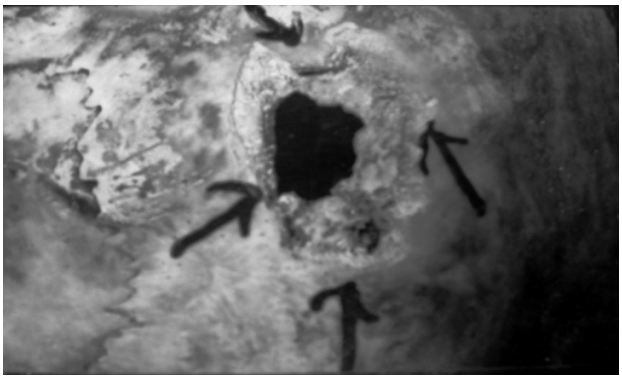

Figure-2: Closer view of skull injury over right parietal region.

Figure-3: Approximation and reconstruction with weapon of offence.

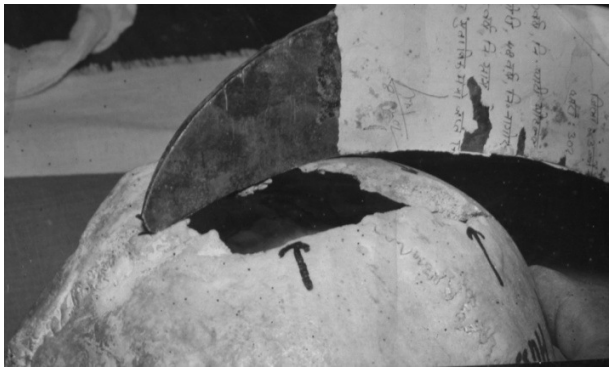

Figure-4: Approximation and reconstruction with weapon of offence.

Case Report

Interpretation of nature of injuries in a healed wound- some important reflections

S. P. Garg, D. K. Mishra ** & C. Jain ***

Abstract

Medicolegal injury report and scientific inferences drawn on its basis form a strong foundation for legal interpretation. With rapid growth in transportation, victims receive immediate treatment and leads to healing of such wounds. But lot many a times routine examination fail to differentiate the manner, especially if the wound is in the stage of healing. Two case reports are discussed in light of such circumstances.

Key words: *Recent scar, self inflicted injury, fabricated wound & incised wound.*

Introduction

Case-1:

A newly recruited police constable, undergoing mandatory police training was referred to the department for opinion regarding nature of injuries with recently healed injuries on flexor aspect of left forearm. As per the history supplied in the requisition letter for examination, the person allegedly received sharp cut injuries while on VIP duty 17 days prior to the date of examination. . The subject claimed that he had sustained these injuries on accidentally, falling over fencing wires, while he was passing urine in the backyard of his place of duty. A general practitioner sutured the wound on the same day with 35 stitches (as per the subject), however he later expressed his inability to opine regarding nature of injuries on account of poor medico legal record keeping. Subsequently, surgical specialists at the referral hospital treated the subject.

The case was examined in detail. The subject was an average built healthy young male of 24 years of age. On local examination, he had 24.5 cm long recently healed vertical (lower end being medial) linear scar marks on front of left forearm and adjoining wrist and palm (hypothenar eminence). When the area was closely examined, five 2 to 5 cm long vertical linear superficial scars (suggesting tentative cuts), nearly parallel to the main scar, were present at the starting point (distinctly visible on hand lens examination). The scar was discontinuous for 1.5 cm at the wrist & then continued in the same alignment over hypothenar eminence of left hand. The scar was more grooved in middle 1/4th part. The starting as well as terminal ends were acute, sharp and smooth. No evidence of tearing or tagging effect was present anywhere along the scar. The subject said he does not remember whether his clothing got torn at the time of incidence or not and which clothing did he wear/where is it now.

On repeated questioning he admitted that he has inflicted these injuries himself upon his body.

Case-2:

A young male of 22 years of age, with cut injury over front of right forearm was taken for examination to a medical officer, with the history that the subject had scuffle with some students of a school a couple of hours before. The medical officer opined that a single linear sharp cut was self inflicted in nature and sutured the wound. The affected party took the matter to the court of law, through a private petition challenging the medical opinion, which referred the case to district medical board of adjoining district. The board expressed its inability to opine regarding the nature of injury, as it has nearly healed on reaching before it i.e. a month after injury was sustained. The subject (a right handed person) was examined 6 weeks after the incidence in the

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department of Forensic Medicine. On elucidation of relevant history, it was claimed by the subject that the assailant slashed the flexor aspect of forearm of the subject with a knife, while he was trying to save his face. He also told that his full shirt worn at the time of incidence was intact i.e. no cut effect were there.

On examination there was a 5.2 cm long, obliquely vertical recently healed scar present over right forearm on flexor aspect, situated 11 cm below medial epicondyle, with the upper end being lateral. Interrupted surgical stitch marks were present on both sides along the scar. There was exuberant, irregularly raised fresh scar at mid of injury, indicating latest (delayed ? due to infection/depth) site of healing. Tailing off effect was evident at upper end. The scar was relatively firm, non-tender & pale as compared to the three as mentioned below).

On further detailed examination two slightly tender, recently healed relatively soft scars with stitch marks were present just above & below lateral canthus of left eye of o.8 & 0.7 cm lengths respectively directed along orbital margins. Similar scar was also present over left parietal eminence of head (part being shaved) o.7 cm long. The three scars with stitch marks were recently healed (one to three weeks duration). On enquiry the subject told that these injuries were inflicted two weeks after original incidence at his home, when few hooligans- allegedly at behest of previous assailants, attacked him and took away some valuables as well (police claimed it to be a fictitious complaint).

Discussion

Fabricated self inflicted sharp cut injuries are commonly encountered during day to day medico-legal practice. Deliberate self-harm refers to any attempt by an individual to harm himself or herself. Individuals injure themselves for numerous reasons, including psychiatric illness and others, such as attempting to imply events that did not take place or for motives of gain[1,2].

Fabricated (fictitious, forged or invented) wounds are usually superficial injuries mostly produced by a person on his own body (self inflicted) or occasionally, caused by another person acting in agreement with him (self-suffered). The fabricator usually produces or causes to be produced only that much of injury as he thinks necessary to confirm his story. The object may be to support a false charge of assault, to prove self defence in an accusation of assault, to obtain release from army service etc[3,6].

Fabricated wounds are mostly incised wounds, and sometimes contusions, stab wounds and burns. Lacerated wounds are rarely fabricated[4]. When inflicted with the help of another person these may be placed elsewhere[5].

The diagnosis of fabricated injury can be arrived at from a careful examination of clothes, characteristics of injuries, and the explanation of complainant in respect thereto. Since the fabricator rarely injures himself through his clothes, an examination of his clothes is very valuable when such suspicion exists. Even when the clothes are damaged, they are damaged in a way incompatible with the number, length, direction, and nature of wounds.

When examining a case of suspected fabricated injuries, one should look for not only recent injuries but for old scars also. A provisional diagnosis of fabricated injury is made when one discovers recent injuries which are multiple, superficial, half-hearted, and not on vital body parts. Multiple scars of different ages when present, on various body parts for which there is no satisfactory explanation, add to the evidence. Besides this, characteristic defense wounds are absent despite the history of assault.

When the fabricator is closely questioned about evidence of the alleged assault, his explanation will be found so inconsistent with observed facts that it will confirm the diagnosis[6].

Gorea et al [7]studied total of 757 cases of medicolegal injuries and reported that out of 159 cases of grievous injuries 62 were fabricated injuries in the form of cut fractures (38.99%).

1. The rigorous police training, strict discipline combined with inherent stresses and strains can at times be too difficult to handle for probationer trainees. Ignorant of the drastic fallouts of fictitious excuses for absence from duty, trainees attempt to justify them. In the first case though the subject (as he himself admitted later), on failing to secure due sanction of leave to attend important family

function, fabricated self inflicted sharp cut injuries on his forearm with a kitchen knife. The pattern, location (approachable to dominant hand, common site for self inflicted injuries), direction (slightly left to right, above downwards), presence of tentative cut marks at the upper end & the motive, the incredible history regarding clothes & other characteristics of the injury did not corroborate with the subject's version of events i.e. lacerations by fencing wires & rather revealed the true nature of the injury.

2. The circumstances were intricate and difficult to interpret in the second case. The presence of single healed surgically manipulated injury on the forearm of opposite side to the dominant hand made the diagnosis difficult. However, the presence of motive, three more healed wounds- two very close but not damaging left eye, injury being inconsistent with the history of a defence wound with respect to location, severity, direction etc & the previous criminal record of the subject were in line of fabricated nature of the injury.

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J Indian Acad Forensic Med, 31(2)

Case Report

Dyadic death due to drowning

*Prateek Rastogi * & Vikram Palimar***

Abstract

A case is presented wherein a female jumped into well carrying along her 45 days old daughter. This case can be listed as a combination of homicide with suicide occurring concurrently.

Key words: *Drowning, dyadic death, homicide, infanticide & posts partum psychosis*.

Introduction

Homicide-Suicide (dyadic deaths) is defined as a violent event in which an individual commits homicide and subsequently commits suicide within a few hours. They are relatively infrequent events. Yet, they are of great concern because they often result in the death of family members, young children, and cause additional morbidity, family disruption and childhood psychological trauma**.** [1] They account for approximately 1000 to 1500 deaths yearly in the United States. The annual incidence of these events is relatively constant across industrialized nations and has not significantly changed over several decades. [2] Although this phenomenon is more common in males**,** [1,3] we encountered a case wherein the female who was allegedly suffering from post partum psychosis was the perpetrator of the event, which is discussed here.

Case history

A 29 year old married female carried her 45 days old daughter and committed suicide by jumping into a well. As per relatives she was not able to cope up with mental and physical stress of delivery.

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Case 1 (Mother): On external examination dead body was moderately built and nourished. It was cold with rigor mortis present only in the neck. Postmortem lividity was present in patches at back but not fixed. Scar of cesarean section was present on the lower abdomen. No other external injuries were present on the body. On internal examination brain weighed 1280 gms and was oedematous. Right and left lungs weighed 450 and 370 gms respectively and were oedematous. No abnormal odour was present in gastric contents. Liver and kidneys were congested and other internal organs were unremarkable.

Case 2 (Daughter): On external examination dead body measured 55 cm in length and weighed 4.5 kgs. Body was cold and stiff, post mortem lividity was present at back but not fixed. No external injuries were present on the body. On internal examination Right and left lungs weighed 60 and 50 gms respectively and were oedematous.No abnormal odour was present in gastric contents. Liver was congested and all other internal organs were unremarkable.

Cause of death was opined as drowning in both the cases.

Discussion

Murder-suicide occupies a distinct epidemiological domain that overlaps with suicide, domestic homicide, and mass murder. These events may be categorized into one of only several phenomenologic typologies that share similar demographics, motivations, and

circumstances. [2] Homicide-suicides have been classified as spousal / consortial, familial, and extra familial types, with different sub classifications defined by relationship and age of individuals involved and attributions of motivation from postmortem interviews. [4]

The principal perpetrators are young males with intense sexual jealousy, depressed mothers, or despairing elderly men with ailing spouses. The principal victims are female sexual partners or consanguineous relatives, usually young children. Clinical depression, specific motivations such as male sexual proprietariness or maternal salvation fantasies, and a history of previous suicide attempts are important in explaining underlying psychopathological mechanisms. [2] The information available from literature suggests the presence of mental health problems in most perpetrators. [4]

Post partum psychosis is a condition wherein a female who has delivered recently is unable to cope up with the stress and strain of pregnancy and delivery. This condition is further worsened with the physiological changes during lactation and the strain of child care. Female may think child to be the root cause of her suffering and attempt to end the life of child. In some rare situations she might get so much frustrated that she may kill the child and subsequently commits suicide.[5] This possibility can not be ruled out in this case, in addition, as this is a case of cesarean section in place of normal delivery so obviously the strain and stress is higher.

Another hypothesis can be related to birth of a female child. In our Indian scenario still in lower socioeconomic strata birth of a female child is looked upon as a fault on the side of mother. There is a possibility that because of this reason the lady got frustrated and committed suicide in order to save herself and her daughter from day to day problems.

It is suggested to undertake prophylactic measures in women at risk for developing postpartum psychosis since the condition is closely associated with child birth. Despite the disruption of families and communities caused by murder-suicide, there are no standardized operational definitions, validated taxonomic systems, or national surveillance networks for these events, all of which are needed to develop prevention strategies. [2]

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Case Report

Interesting findings in a case of sexual offence

*Mandar P. Kantak * , Siddhartha S. Banaulikar* & E. J. Rodrigues****

Abstract

Sexual offences constitute the most common and gruesome of crimes against women. The medical findings on general and genital examination of the victim are invariably minimal or absent. However, the need for a meticulous medical examination by the doctor remains, in order not to miss the 'tell-tale' findings of sexual abuse that are occasionally present on the face, breasts, arms, thighs and the genitalia. We present here one such case were there were interesting medical findings in the victim consistent and corroborating with the history given.

Key words: *Sexual offence, sexual abuse, genital examination & general examination*.

Introduction

A seven year old girl was brought for examination for sexual offence to the Forensic Medicine Department, Goa Medical College one morning in December 2008 by the Police. The offence was registered under section 354 I.P.C and section 8 of the Goa Children's Act.The history given by the girl revealed that on the previous day morning she had gone to a shop to buy milk and sugar. There the shopkeeper's 16 year old son who was alone at the shop told her to sit inside the shop. He then removed her top and pants. He then tightly squeezed both her breasts with his hands. He then forcibly introduced his finger into her private parts. She began weeping and then the boy consoled her with a cold drink. Later at home when her mother was giving her a bath, she winced with pain over her chest and genitals and thereafter revealed the whole story.

After the mother's consent was taken, the girl was examined with the help of a pediatrician.

On general examination the following findings were noted:

1. Bruise, reddish-blue, tender in area of 9 x 8 cms over the left breast, consisting of four radiating linear bruise lines of 7 x 0.5 cms each, extending from right to left, separated from each other by a distance of 1.5 cms each.
2. Bruise, reddish-blue, tender in area of 9 x 8.5 cms over the right breast, consisting of four radiating linear bruise lines of 7 x 0.5 cms each, extending from right to left, separated from each other by a distance of 1.5 cms each.

On genital examination in supine lithotomy position, there was a bruise, reddish-blue, tender 1.5 x 1 cms, seen at the base of hymen between 2 to 4 O'Clock positions. No hymenal tears were seen. Normal physiological vaginal discharge was seen.

The opinion was given as : 1) There is evidence of recent blunt force genital penetration. 2) There are injuries over the breasts of the victim girl. 3) Vaginal and hymenal swabs were preserved for serological examination.

Discussion

Extra-genital trauma occurs in 20-50% of cases of sexual assault [1] . Injuries over the victim girl's body can occur in acts of sex-related violence especially scratches and bruises resulting from struggle. They may be found on the

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mouth, throat, around the wrists, arms, inner sides of thighs and over the breast. These are caused by rough handling, manual squeezing and manipulation causing discoid bruises of 1-2 cms on any part especially the nipples, neck, shoulders, chest wall, lower abdomen and thighs[2, 3] . The appearance, extent, situation and age of the injuries should be noted in detail. It should correspond to the victim's description of the assault and also to the time of the offence [2] . Mc Cann (1988) emphasized the importance of examination of this bruises in non-genital areas [4]. The physician's assessment of the age of a bruise may be used in the courtroom to corroborate or dispute the victim's claim by comparing it to the historical timing of the alleged assault. Another physical factor of legal significance of soft tissue injury or contusion is diagnosed by the doctor by the ability to elicit pain on palpation of the traumatized area [5]. Ultraviolet lamp has a place in the examination of bruises. Before the colour changes are apparent, areas of the extravasated blood beneath the skin can be appreciated by ultraviolet light [6].

Hymenal bruise or contusion includes blood blisters, edema, hematoma, petechiae and submucosal haemorrhages [7]. Abrasion and bruising of the hymen may be seen in the absence of hymenal tear due to digital or penile penetration [2]. In rape or digital penetration without consent where preliminary stimulation has not taken place, initial lubrication will be lacking due to which more severe bruising or abrasion can result [2] . In digital penetration of the infant vagina, there is frequent scratching and bruising of labia and vestibule but the circumferential tears are absent [2] . Injuries between 9 O'Clock to 3 O'Clock or those anteriorly present are more likely to be the consequence of digital manipulation or penetration [8].

Conclusion

A detailed general and local genital medical examination of the victim girl by the doctor is paramount to corroborate the history in cases of sexual offences.

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Figures: (Clockwise from left)- Injury on the right breast, injury on the left breast, and injuries on both breasts photographed together.

Review Article

Battered baby syndrome: The extreme case

Parteek R. Patel & Digvijay Vaghela***

Abstract

In India, it has been found that physical injuries, punishment or neglect of the child by parents or guardians is too common to be overlooked, unlike developed western countries, where law and order is so organized particularly for children. As forensic medicine expert, we have seen hundreds of cases of battered child, but, the case, which we are presenting here, is so different to be forgotten. A 4 yrs old female child was physically abused by her own father since her birth, ultimately killed her by strangulation. Before strangulating her, he tried to electrocute her to kill.

Key words: *Child abuse, battered baby syndrome, strangulation & electrocution.*

Introduction

Battered baby syndrome also known as radiologist Caffey first noticed non-accidental injury of childhood or child abuse syndrome in 1946, who reported multiple fractures of long bones in six infants suffering from chronic subdural hematoma. The long bone fractures appeared to be traumatic origin, but, the traumatic episode and actual causative factors or mechanism remained obscure.[1] In 1961, Dr. Henry Kempe- American pediatrics, proposed the term 'battered child syndrome' in order to direct attention to the seriousness of the problem, at a symposium of American Academy of Pediatrics. Since then, changes have been made to define and include cases of emotional and physical abuse or neglect.[2]

The federal government first provided child welfare services with the passage of the Social Security Act of 1935. Child Welfare Services Program of the act, the Children's Bureau received funding for grants to states for "the protection and care of homeless, dependent, and neglected children and children in danger of becoming delinquent." Prior to 1961 this program of the act was the only source of federal funding for child welfare services.

After Kempe's classic description of the battered child syndrome in his paper in 1962, nationwide unprecedented interest in child abuse is stimulated; this soon became recognized as a major public health problem. Dr. Kempe had also proposed that physicians be required to report child abuse. [2] According to the National Association of Counsel for Children, by 1967, after Dr. Kempe's findings had gained general acceptance among health and welfare workers and the public, forty-four states had passed legislation that required the reporting of child abuse to official agencies, and the remaining six states had voluntary reporting laws. This was one of the most rapidly accepted pieces of legislation in American history. Initially only doctors were required to report and then only in cases of "serious physical injury" or "non-accidental injury." Today all the states have laws that require most professionals who serve children to report all forms of suspected abuse and either require or permit any citizen to report child abuse. Social Services Block Grant formed in 1981, giving states more options regarding the types of social services to fund. Today child abuse prevention and treatment services have remained an eligible category of service.

In many states of USA, child abuse is defined as the infliction of injury on a child by parent or guardian. Abuse is differentiated from

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neglect, which usually refers to failure of parents or caretaker to provide the child with adequate physical care and supervision. Abandonment of a child also constitutes neglect.[3]

Laws for protection of child abuse and neglect have not been made in India till 90's except punishment for exposure and abandonment of child less than 12 years, which states that whoever being the father or mother of a child under the age of 12 years, or having care of such child, shall be punished with imprisonment of either description for a term which may extend to seven years, or with fine, or with both. This section is not intended to prevent the trial of the offender for murder of culpable homicide, as the case may be, if child die in consequence of the exposure.[4, 5]

Abused child is a child bellow 16 years of ages whose parents or other person legally responsible for his care:

1. Inflicts or allows to be infected upon the child serious physical injury, or
2. Creates or allows to be created a substantial risk of serious injury, or
3. Commits or allows being committed against the child an act of sexual abuse as defined in the penal law.[3, 6]

A neglected child is a child bellow 18 years of age, impaired as a result of the failure of his parents or other person legally responsible for his care to exercise a minimum degree of care:

1. In supplying the child with adequate food, clothing, shelter, education, medical and surgical care, though financially able to do so or offered financial or other reasonable means to do so, or
2. In providing the child with proper supervision or guardianship, or
3. By reasonably inflicting or allowing to be inflicted harm or a substantial risk there of, including the infliction of excessive corporal punishment, or
4. By using a drug or drugs, or
5. By using alcoholic beverages to the extent that he losses self control of his action, or
6. By any other acts of a similarly serious nature requiring the aid of the family court.[3, 6]

A neglected child is also a child below 18 years, who has been abandoned by his parents or other person legally responsible for his care.

Battered baby is defined as a child, who has received repetitive physical injuries as a result of non accidental violence produced by parents or guardian.[7] Though assault & murder of children is well known in every country, the battered child syndrome is different from usual homicide.

Classical features of child abuse syndrome are seen in child less than 3 years, but may occur at any age with male predominance (55% - 67%).[8] It has been found that older or younger child is a victim as it might be as a result of pregnancy before marriage or unwanted child as a result of failure of contraception or illegitimate child. Cases found more in low socio-economic class group than higher class family where family disharmony, long standing emotional problems or financial problems are more likely.[7,8,9] Many parents have criminal records or psychiatric problems with the background suggesting, battering parents were 'bettered children' themselves. Usually one of the most notable features of this syndrome is, it tends to remain non-instrumental, as direct manual violence is the most common method of injury. Even if intervention of instruments is there, use of feeding bottles, toys or any handy solid thing is most likely. In addition to physical injuries, there may be deliberate deprivation of nutrition, care and affection.[9]

The great diagnostic feature is obvious discrepancy between the nature of injury/injuries and explanation offered by parents, and delay between injury and medical attention, which cannot be explained. The constant feature is repetition of injuries, which are of different ages and in different phase of healing as well as progressing from minor to more severe degree.[10]

Spectrum of injuries is very wide. Though more common findings with great diagnostic value are:

1. Abrasions, contusions and lacerations of different ages over accessible parts of body and over bony prominences
2. Eye injuries
3. Head injuries
4. Visceral injuries and Burns [1, 9.]

In detail study of 'the battered baby syndrome', Camps, Cameron and Johnson found that the most serious lesion and hence the cause of death or disability are subdural hemorrhage with or without skull fracture, traumatic rupture of the liver and injuries to the viscera of upper abdomen.[11] Child abusers seldom intend to kill their victims. Death occurs if any, is a matter of an accident, but, may sometime be culpable homicide not amounting to murder or death due to rash or negligent act, depending upon the situation.[12]

The Child Abuse Prevention & Treatment Act was passed in 1974 & has been amended several times, most recently in 2003. This act seeks to provide for better protection & treatment of child abused and for that purpose provides for establishment of child abuse prevention & protection service councils and other authorities and for matters connected there with or incidental they're to. Newer amendment includes an act/failure to act that presents an imminent risk of serious harm in definition of child abuse.[13]

United Nations Convention on the rights of the child notifies basic rights and standards for judging the welfare of the children, including maltreatment. In United States of America, if any professional has suspicion as to the maltreatment of the child, it is mandatory for him to report such things to the local child welfare agency. In countries like Belgium & Holland, maltreatment cases are dealt with confidentially through health and social workers. The UK, stands between these two extremes. In India, any doctor has reason to suspect maltreatment of child is supposed to report the matter to police. The Juvenile Justice (Care & Protection of Children) Act, 2000 deals with special measures towards such cases in India.[12, 14]

So far, six patterns of child abuse are recognized.

1. Physical abuse
2. Nutritional deprivation
3. Sexual abuse
4. Intentional drugging
5. Neglect of medical care/safety &
6. Emotional abuse.[15]

Case history

Autopsy conducted on a four year old female body with following findings.

- Well developed rigor mortis, post mortem lividity on back & fixed and blood stained froth at nostrils.
- Multiple abrasions and contusion over body at places in different stage of healing. Contusions were present at inner aspect of both lips with slight fraenulum tear at tongue end.
- Contusions were present over nose (red) & below left eye also (bluish). Red abrasion present over left angle of mandible. (Figure-1)Greenish, large, contusion evident over left flank & front of abdomen. Linier scratch marks present over back, starting at left angle of scapula, obliquely going downwards & towards right, 3 in no, 1cm apart, 0.2cmx5cm in size with brownish hard scab.Electric burn marks over both wrists, on left wrist - over ventral aspect, 4x1cmxmuscle deep & on right wrist - 6x1cmx subcutaneous tissue deep. Figure-2)
- Ligature mark present encircling neck, which is 4-6-cm broad, prominent over front & left side of neck.
- Multiple petechial hemorrhages were founover conjunctiva & in white matter of brain.

On investigation it was found that parents were very poor & wanted male child. Because of female child, father was very much frustrated as they have already 3 female children in family before this. He used to beat, slap, and punch, bite & cruelly treat all his children, but has more enmity/rivalry towards this younger one. One day he decided to kill her by wrapping a metal wires around her both wrists & tried to electrocute her, but she survived that though had severe burns over both wrists. More frustrated father ultimately wrapped duppata around her neck & strangulates the child to end story & escaped.

Discussion

Before diagnosing battered baby syndrome, we must have proper knowledge of some other pathological conditions in which long bones fractures occur with history of seemingly minortrauma. Even these kinds of fractures occur

recurrently and show pathological changes similar to those of physical abuse, i. e. *osteogenesis imperfecta, scurvy, congenital syphilis, spina bifida* etc. In bleeding disorder, such as *purpura, hemophilia* etc., recurrent collection of blood may look like contusions. [3, 12]

Even true accidental injuries are very common in young children, but, the picture is not typical of physical abuse & parents seek help of medical personal quickly.

Maltreatment is currently regarded as the leading cause of death in young children. The proliferation of child abuse & neglect is felt to be related to the alarming general increase in violence in this society, demonstrated by the rising incidence of violent crimes, delinquency, suicide and fatal accidents.

Since described by Caffey, Camps, Cameron & Johnson, battering & killing child is a big issue to deal with, especially in our country. Provision of law & enforcement is needed very strongly & also special task force to deal with this issue is needed to be formed because recent law enforcement agency (police) is already working under pressure of load of work. Routine way to kill child, without making someone know about that, is drowning, head injury etc., but, this case showed severe degree of frustration of father that he used methods to kill his child that is very much alarming & conspicuous to be caught by investigation officer.

Proper family rehabilitations and behavior improvement services should be supplied very enthusiastically to fight with this kind of issues. It has been found that poverty and alcohol abuse are two main devils that results battered baby/wife syndrome. So we need to take steps to improve socioeconomic conditions to fight against this burning issue.

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Figure-1: Contusions over nose (red) & below left eye also (bluish). Red abrasion present over left angle of mandible. Also note ligature strangulation at neck.

Figure-2: Electric burn marks over both wrists.

J Indian Acad Forensic Med, 31(2)

Case Report

Torture leading to suicide- A case report

Indrajit Khandekar, Vishwajeet Pawar **, Bipinchandra Tirpude *** & Pankaj Murkey*****

Abstract

Medical profession is probably the one which is most likely to be confronted with torture victims. However the degree of awareness of the medical fraternity regarding torture and their role in it, is not effectively rendered as it should be have. The responsibility of a doctor does not cease only in prescribing treatment for the afflicted persons. In this article we have reported one case which was brought for autopsy with the allegation that he was an eyewitness for the murder and deceased was taken to the police station and beaten by the policemen in connection with the murder case. At the time of release, he was threatened for not telling truth and again he will be beaten o next day if doesn't tell the fact regarding the case. Afraid of possible torture, the deceased consumed poison on the next day morning. Thereafter he was admitted to Kasturba Hospital Sevagram where he died during treatment. His family member's made an allegation that, he was illegally taken into police custody where he was unnecessarily tortured and it was because of this torture, he was mentally upset and had consumed poison. Autopsy findings along with the findings of medical records are presented here.

Key words: *Medical Profession, torture & medical ethics.*

Introduction

Torture and violence are as old as the human civilization. They have been identified with the police in India ever since the Vedic Age (2000-1400 BC) [1]. Kautilyas Artasastra speaks about various kinds of torture such as burning of limbs, tearing by wild animals, trampling to death by elephants and bulls, mutilation etc. Manu and in recent era by amputing the limbs, mutilating the genital organs and by pouring hot liquids like oil in the eyes etc., the law givers of this age emphasized the necessity of torture to protect the society from the hands of criminals. In the Gupta period, (A.D. 320-500) if the facts against a prisoner were not clearly established by evidence, recourse was to be had to various kinds of ordeals. In the Muhammadan era, the Shariat law was applied to crimes (thieves hands were cut off; stoning to death etc.). Great reformation in the society was brought about by the enactment of criminal laws and procedures; Indian Penal Code of 1860, Indian Evidence Act of 1872, Criminal Procedure Code of 1898. Sections 162, 163, 172 and 173 of CrPC read with sections 24 and 25 of Indian Evidence Act provided for rules of conduct and procedure to prevent torture of persons under interrogation .[2]

Case history

On 9 August 2007 a dead body of deceased Pankaj (name changed) was brought to the mortuary of department of Forensic Medicine with the allegation that he was beaten by the police 5-6 days back in police station. He was brought to the police station and thrashed by the policemen in connection with dead body of another person who was murdered named Mahadev (name changed). Afraid of possible torture, Pankaj has consumed poison at around 12 noon on August 4. Thereafter he was admitted

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to Kasturba Hospital Sevagram on the same day. He died during treatment on 9 August 2007. His family member's made an allegation that, he was illegally taken into police custody where he was unnecessarily tortured and it was because of this torture he had consumed poison.

This was the background against which we have conducted the postmortem and gave opinion regarding the cause of death.

Autopsy findings

As per beginning the postmortem, external examination shows that eyes were closed, pupils fixed and dilated, mouth closed with tongue inside the cavity. Blood tinged reddish colour froth oozing from both nostrils, fingernails shows bluish purple colour. Rigor mortis was slightly present all over the body with no signs of decomposition seen. Postmortem lividity was present on the back of the body but not fixed.

On external examination, we have found some injuries mentioned below were not present in the case sheet of the hospital which created suspicion and confusion as the diagnosis given by the treating doctor was "Insecticide Poisoning" along with bed sore at the buttock region with no evidence of injuries.

Following injuries found on external examination -

1. Contusion present over the buttock region of size 15.5cm x 9cm horizontally placed involving 2/3rd portion of the buttock except the gluteal cleft, epidermis is peeled off and at some places tags are attached to the margins, colour of the injury is red-brown in nature. On giving multiple incisions over the buttock, subcutaneous tissue shows infiltration of blood of 0.9cm deep on left buttock and on right buttock it is 2cm deeper.
2. Abraded-contusion present over the right side of the back in the scapular region 4cm x 2cm in length, vertical in direction, upper border is 25 cm from the midpoint of the clavicle, reddish brown in colour, on giving incision, subcutaneous tissue shows infiltration of blood.
3. Contusion with abraded margin present on right side of the back, vertical in direction, reddish brown in colour,1.5cm x1 cm in size, on giving incision, infiltration of blood under subcutaneous tissue is present.
4. Upper 1/3rd of the back shows brownish black discoloration on giving incision, the subcutaneous tissue shows mild infiltration of blood at places suggestive of, infiltration of blood by hard and blunt object.
5. On the planter aspect of the sole, below 1st, 2nd, 3rd toe shows bluish brown colored area of size 3cm x 1cm horizontal in direction on giving incision, infiltration of blood is present.
6. On the posterior-lateral aspect of the heel shows bluish-brown discoloration with swelling, 6cm x 3.5cm horizontal in direction, 5cm below to the right lateral malleolus, on giving incision, subcutaneous tissue shows , infiltration of blood of underlying bone.
7. Contusion present over the ear lobule and pinna 3cm x 1.5cm vertical in direction, bluish in colour.

All the injuries were ante-mortem in nature and are possible by hard and blunt object with multiple forceful impacts.

On internal examination

No injuries were present under the scalp, no fracture of skull and vault, meninges were intact and tense, brain matter edematous and congested. No injuries were present to ribs, cartilage and walls, both lungs were edematous and congested. On cut section of lungs, hemorrhagic exudative blood tinged reddish colored froth present with no specific smell. All other organs were normal in size and shape on cut section shows congestion. In this case viscera and blood has been preserved for chemical analysis to rule out poisoning.

CAUSE OF DEATH

We had given the cause of death "pending till blood and viscera report made available". We summaries the findings of postmortem examination as follows:

We have differentiated the injuries from the bed sores as mentioned by the treating doctor by giving multiple incisions and taking photograph. we conclude that all injuries are

contusion and not bedsores, possible by hard and blunt object with multiple forceful impacts.

After his report, the offense of **abetment of suicide 306 IPC** was registered against the police officers. After having socials and political pressure the investigation of the case was transferred to the **Central Investigation Department (CID)**.

We also directed the investigating police officer to collect the gastric aspirate, blood, urine of the deceased from the treating doctor for analysis at **Forensic Science Laboratory**.

Discussion

Torture cases by and large are very tricky cases, where many times we may not find any signs of injury. This is mainly because these days many refined methods of torture have appeared which do not leave any overt signs of injury. Preventing a person from sleeping is an excellent form of torture and yet it leaves no signs of injury whatsoever.

An unsophisticated way of torture is simple beating by *lathis* or rods. If such type of torture has occurred it makes our work simpler in the sense that such type of torture leaves tell-tale signs such as bruises and contusions. A typical sign of beating by rod is the formation of parallel bruises on the body, known as railway track bruises or tramline bruises. The mechanism of formation of these bruises is very interesting. When a person is hit by a heavy rod or stick or the like-object forcibly, it dents the skin and underneath tissues in the area where it makes its impact, while the sides on each side of this impact gets stretched. The blood vessels which lie directly underneath the compressed portion of the skin are not damaged (they are rather compressed), but the blood vessels which lie in the stretched portion are torn which results in oozing of blood leading to formation of line of bruising on either side. [3] The appearance is similar to that of a railway track. Sometimes injuries inflicted in this manner are so severe that they heal with the formation of a scar. The scar in such cases also takes the shape of a railway track .[4]

There are many other ways in which a victim can be tortured. Whipping was very common in our country. There are some special forms of torture too. The most common and perhaps most painful is the so-called 'falanga'. This is the name given to beating of the soles of the feet with canes or rod. Its practice is going on since ancient times. The beauty of this method is that despite being very painful, it leaves little or no external signs of injury. This is because the skin and other tissues of the soles are very tough and thick. However if the investigator is careful and dissects the tissues of the sole, he may find heavy oozing of blood underneath. Another favorite means of torture is the so-called 'telefono'. It consists of repeated slapping of both the ears with the palms. It causes rupture of the tympanic membrane causing pain, bleeding and hearing loss [5].These cases are very tricky because externally there is hardly anything one would find. But if ears are dissected (they have to be dissected from the base of the skull), one finds the ear drums ruptured. By seeing the state of repair, we can say if the rupture was recent (and hence due to beating) or old.[4]

Conclusion

Medical profession is probably the one, which is most likely to be confronted with torture victims. Hence there should be a greater awareness amongst the medical profession on this issue.

While handling such cases, we should do complete and thorough examination along with photography to avoid future speculation. As a medical man, one should work to find out the truth only so that innocent victims get justice and the perpetrators of crime should be punished.

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J Indian Acad Forensic Med, 31(2)

Case Report

Blunt trauma and petechiae

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Abstract

Petechial haemorrhages, although non-specific findings are considered hallmarks of asphyxial deaths. Despite the common knowledge that they are neither predictable findings in all asphyxial deaths nor rare in natural, non-asphyxial deaths, the belief persists that petechiae are corroborative evidence of asphyxia. Four cases of vehicular accident are discussed in which blunt trauma to heart, lungs, and liver was present. The presence of petechial haemorrhage on these traumatized organs substantiates that petechiae are the product of purely vascular phenomenon unrelated to asphyxia or hypoxia and they are possible due to direct blunt trauma to the organs.

Key words: *Petechiae, blunt trauma, heart, lung& liver*

Introduction

The word petechiae always reminded death due to asphyxia in forensic medicine. Parisian Professor Ambroise Tardieu in 1866 was the first to describe minute haemorrhages due to rupture of small blood vessels on the surface of lungs, heart, and other parts and regarded them as "characteristic" of death from suffocation [1]. Petechiae are often known as 'Tardieu's spots', but this eponym should be restricted to those lying in the visceral pleura, where they were described by Ambroise Tardieu, in the bodies of infants who he claimed had been 'overlain' [2].

Luke was the first to propose that increased intracranial vascular pressure is the basis for the development of petechial of the head in deaths involving compression of chest and neck. Conjuntival and facial petechiae, which have been regarded as classic signs of asphyxial deaths, are the product of purely mechanical vascular phenomenon unrelated to asphyxia or hypoxia [1]. Many causes of petechiae are given in the literature. However, no literature is available about association of blunt injury to organ and petechial haemorrhages. Against this background present cases are presented with a view to substantiate blunt trauma to the organs as a cause of petechial haemorrhage in that organs.

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Case history

Case 1:

A male aged about 40 years who had died due to vehicular accident was brought for medicolegal autopsy from the site of accident. On external examination, multiple abrasions of size 4" x 4" were present over back of trunk and back of left arm with multiple lacerated wound over back of left forearm. Bones of left upper limbs were fractured and 2nd to 9th ribs on both sides fractured at places.

Internally, visceral and parietal pleura were torn corresponding to fractured ribs. Fibrotic adhesions were present between visceral and parietal pleura at places. Pleural cavity contained ~700 ml of blood. Both lungs were partially collapsed and lacerated at places. The shower of sub-pleural petechiae was present on both the lungs. Contusion was present over heart at pulmonary trunk and petechial hemorrhages were found at the anterior surface (Figure- 1 and 2). Cause of death was given as shock due to injury to thorax.

Case 2:

A male aged 30 years died due to vehicular accident was brought for medicolegal autopsy from the site of accident. On external examination, multiple abrasions of variable sizes were present over left face, left shoulder and scapular region, lower half of posterior left arm, anterior right thigh with lacerated wound over right forearm, right palm, right popliteal fossa and crush wound over right knee. Bones of right upper limb and right lower limb were fractured at places.

Internally, contusion to right parietal lobe of brain and contusion to right lung at upper lobe near hilum and left lung at posterior region of upper lobe were present. Shower of sub-pleural petechiae was present on both the lobes (Figure-3). The cause of death was shock and hemorrhage due to crush injury to right knee with injury to brain and lungs.

Case 3:

A male aged 35 years, brought to the casualty with history of vehicular accident, died within an hour, and sent for post mortem examination. Externally, a stitched lacerated wound was present over left maxillary region and a lacerated wound over right shin. No evidence of resuscitation was found.

Internally, hematoma was present under the scalp in mid fronto-parietal region. Brain was congested and edematous. Subarachnoid hemorrhage was present with contusion to left parietal lobe. Contusion was present in posterior aspect of lower lobes of both lungs (Figure- 4). Shower of petechiae was present over both lungs and heart.

Case 4:

A male aged about 55 years died due to vehicular accident was brought for medicolegal autopsy. On external examination, fine glass-pieces were present over clothes, face and neck region. Multiple lacerated wounds were present over forehead and face; multiple abrasions were present over face, right forearm, right lumbar region, left leg and dorsum of left foot. Pelvis was fractured on right side.

On internal examination, hematoma was present in the scalp in mid frontoparietal region. Subdural hematoma of about 100 ml was present over left cerebral hemisphere with subarachnoid hemorrhage all over brain surface with flattening of sulci and gyri of right cerebral hemisphere with evidence of herniation of medial part of temporal lobe. Peritoneal cavity contained ~1 liter of blood and clots. Retroperitonial hematoma was present in pelvic cavity corresponding to fractured pelvis. The right lobe of liver was ruptured over antero-superior surface. The shower of petechiae was present under visceral peritoneum of right lobe of liver (Figure- 5).

Discussion

Rupture or laceration of a blood vessel is the obvious cause of haemorrhage. If a significant amount of released blood accumulates within a tissue, it is referred to as a haematoma. Smaller haemorrhages usually encountered in skin, mucous membrane and serosal surfaces are known as petechiae (minute), purpura, (upto ~1cm) or ecchymoses (when large and blotchy). Microscopic haemorrhages may be produced in loose tissue such as the lung, merely by marked congestion followed by escape of erythrocytes – a phenomenon referred to as red cell diapedesis. The causes of haemorrhage are too numerous to be detailed and include trauma as well as disease that primarily or secondarily attack vessel walls [3].

Petechiae are the small pinpoint collection of blood lying in the skin, the sclera or the conjunctivae and under thoracic serous membranes. They vary in size from tenth of a millimetre to about two millimetres. The petechiae are caused by acute rise in venous pressure that in turn causes over distension and rupture of thin walled peripheral venules, especially in lax tissues, such as the eyelid, and in unsupported serous membranes, such as the visceral pleura and epicardium [2,4,5]. This mechanism of raised venous pressure may be supported by the fact that they are rarely found in the victims dying of obstruction to air passages by means other than compression of neck, or from breathing some inert gas [4].

Thus, petechiae are seen most often in the face and eyes of victims of compression of the neck (hanging/ strangulation) or fixation of the chest (traumatic asphyxia). In compression of neck, there is occlusion of jugular veins thereby preventing venous drainage from the head. There

is rapid rise in venous pressure in the head, leading to engorgement of the veins. The consequences are swelling of the tissues, followed by showers of petechial haemorrhages in unsupported areas, such as the skin of the upper eyelids, the forehead, the skin behind the ears, the circumoral skin, and the conjunctivae and sclera of the eye. The same venous engorgement often leads to frank bleeding from the nasal mucosa and the external auditory meatus. Petechiae are most often seen on serous membranes in the thorax. They are also seen in the buccal mucosa and epiglottis [5]. As described by Tardieu, petechiae in the thorax are often seen on the visceral pleura, especially in the interlobar fissures and around the hilum. Petechiae are also common on the surface of the heart, especially on the epicardium around the atrioventricular groove, particularly on the posterior surface. In traumatic asphyxia, lungs have subpleural petechial haemorrhage, the true 'Tardieu spots'. Petechiae are rarely seen in the parietal pleura and peritoneum except in hemorrhagic diatheses [2]. In infants and children, the thymus or thymic remnants may show numerous petechiae. It is claimed that in sudden infant death syndrome these are confined to the cortex, whereas in other 'asphyxial' conditions they are scattered throughout the gland [2].

In the brain, petechiae occur in the white matter and there may be larger patches of bleeding in the subarachnoid space where superficial vessels have ruptured because of acute venous engorgement. The same mechanism often produces profuse petechiae and ecchymoses under the scalp [2,5].

Petechiae and ecchymoses are common non-specific autopsy findings and many are postmortem in origin, especially in dependent positions. They may occur in many non-asphyxial states and, in the lungs, some petechiae can be found in the interlobar fissures and around the hilum in most routine autopsies [2,5]. Conversely, in some types of death where oxygen deprivation is to be expected (such as drowning, suffocation) petechiae are seldom demonstrable [2].

Apart from asphyxia, the causes of petechial hemorrhage includes bacterial endocarditis, meningococcal septicemia and blood dyscriasis and in deaths from secondary shock, coronary thrombosis and rapid anoxia. Petechiae can be seen following any severe increase in intrathoracic pressure including asthmatic attack, heart failure, respiratory failure, straining at stool, and soon after delivery. These conditions produce relative large hemorrhages, which tend to coalesce. Their distribution is general, whereas Tardieu spots are present above the level of obstruction [5]. Visceral petechiae may be found after death from causes other than respiratory obstruction, especially when the death has been associated with convulsions or congestive cardiac failure [4]. Thus, petechial haemorrhages in the visceral pleura and pericardium have been frequently observed in deaths from shock and in many deaths from natural causes [5].

Petechial hemorrhage, which may simulate bruising, can arise in boxing contest. Similar hemorrhages situated in cerebral white matter (rather than in the cortex) may be seen in fat embolism and after death from delayed coal gas poisoning [2]. Petechial haemorrhage can be found in any part of central nervous system including spinal cord in dysbarism and barotrauma deaths [2]. Focal petechial haemorrhage may be found along the line of the passage of current, under the endocardium, pericardium, pleura, and in the brain and spinal cord, especially in the medulla and gray matter of an anterior horn, in lightning and electrocution due to electric current [5].

A number of factors cause difficulty in the interpretation of petechial haemorrhages. Posture also has an effect on the appearance of haemorrhages. They are often present in normal postmortem hypostasis, especially where the mode of death was congestive as in many types of natural heart disease. Another problem in the autopsy interpretation of petechiae is that not all punctate lesions in the pleura are petechiae [2].

In the present cases petechial haemorrhage are present in those visceral organs, which are traumatized due to blunt trauma in different cases of vehicular accident. The organs, which showed petechial haemorrhage and involved in trauma are thoracic and abdominal organs like liver, heart and lungs.

That in addition, they can be easily traumatized by blunt trauma. Both these cavities are flexible and can be compressed. These very facts substantiates that, petechiae are the product of purely vascular phenomenon unrelated to asphyxia and hypoxia; and they are possible even due to direct blunt trauma to the organ.

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Figure-1: Contusions over pulmonary trunk.

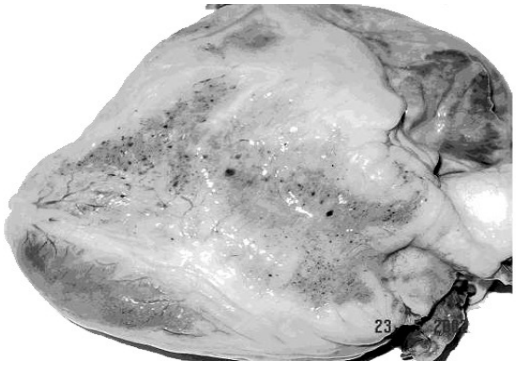

Figure-2: Petechiae in anterior wall of heart.

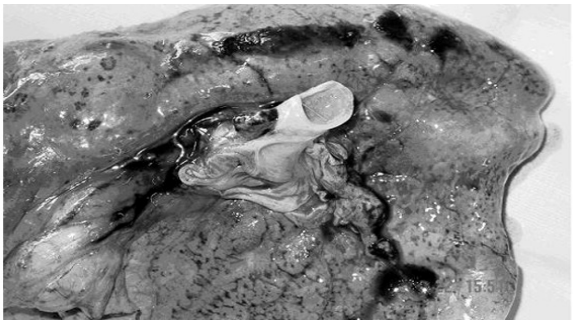

Figure-3: Petechiae and contusion in lung.

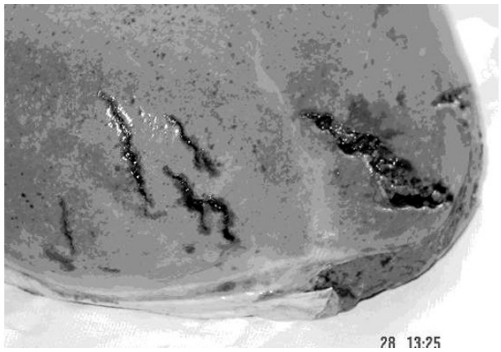

Figure-4: Ruptured liver and petechiae under visceral peritoneum.

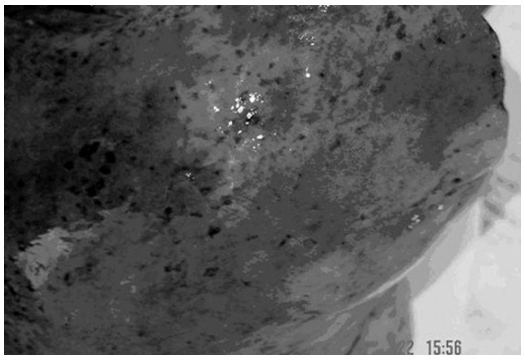

Figure-5: Petechiae in lung.

J Indian Acad Forensic Med, 31(2)

Review Article

Mass disaster management: Forensic aspect

Rahul Jain & (Col.) K.M. Rajoo***

Abstract

This paper deals with definition and meaning of mass disaster, need for management plan for Forensic Medicine expert so that Medical officers and Forensic expert can efficiently work during mass disaster. There are certain fundamental principles which should be thoroughly understood by everyone who may have responsibility for helping the victim of a disaster, it is important that these principles be applied in the proper sequence; otherwise they loose effectiveness or cause even more deaths and injuries.

Key words: *Mass disaster, management, Forensic expert, mortuary & postmortem examination.*

Introduction

Disaster literally means 'catastrophe'. The United Nations observed the nineties as the 'International decade for natural disaster reduction', in order to focus on international initiatives for minimizing the adverse impact of natural calamities particularly in developed countries like India. In twenty century more than 10 million people have died due to mass disaster. In recent times the largest casualties have been in 1987 when earth quake in Armenia (part of then USSR) killed about 55,000 people and in India, earthquake in Bhuj, Gujarat killed about 10,000 people in January 2001.

Disaster is an event of serious magnitude, causing severe damage to life and property. Loss of life of ten or more may be considered as Mass Disaster.

WHO has defined disaster as an event; natural or man-made, sudden or progressive, which impacts with such severity that the affected community has to respond by taking exceptional measures.

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Oxoford dictionary describes disaster as: "A sudden calamitous event brining great damage, loss or destruction."

Aims & Objectives

To create a medical community, which has adequate knowledge about disaster management and about different problems it, may face when mass casualty arrives in hospital. The ultimate aim of disaster management plan is to save life of patients and provide them best possible medical care as soon as possible.

Principle

Some Principle of disaster management are:

1. It should be a continuous process
2. Should evoke appropriate and prompt response.
3. Plan should be based on valid knowledge must foresee what is likely to happen.
4. It should be tested.

Types of Disasters

Mass disaster could be of the following types:-

a) Natural – Flood, cyclone, earthquakes, drought
b) Accidents – Rail, Air, Road, Sea, fire, Stampede
c) Industrial – gas leaks, explosions
d) Man made – riots, war, terrorist attack

Some of recent disasters

In the year 2008 stampede and bomb blasts (including terrorist attack in Mumbai on 26/11) have killed about 700 people.

1. Bomb blast in Jaipur killed 80 people and wounded 150 on May 14, 2008.
2. On 3.7.2008, 162 people died in stampede triggered by rumors of rockslide at Naina devi temple in Himachal Pradesh.
3. Stampede in Jodhpur killed 147 person and 60 were injured at Chamunda devi temple in Mehrangarh fort for darshan of goddess Chamunda Devi on 30.9. 2008. All it took was some unruly people jumping the queue and some furiously whispered rumors of a bomb going off. At that time about 10,000 people were present in the temple campus.

Features Peculiar to Mass Disaster:

a) Sudden occurrence
b) Extensive damage – both life and property
c) Lack of preparedness and delayed response
d) Panic and anxiety
e) Lack of timely and correct information
f) Disruption of communications
g) Beurocratic delay in decision making

The Disaster plan should have following features:

- It should be simple and understandable by all.
- It should be flexible and fit in different types of disasters.
- It should clear and concise – even in loud noise and confusion.
- It should be adoptable during all hours day and night including holidays.

Role of Forensic expert

In cases of injured patients:

He should identify the patient properly. In cases of unconscious or unknown patient their BHT (Bed head ticket) number should be noted.

Thorough external examination should be done and there should be a separate register which should be marked as 'Mass casualty MLC register' in which injury report should be prepared.

If X rays or other investigations are indicated than they should be advised accordingly.

Information to police station be sent.

In cases of dead bodies:

Forensic Pathologist is primarily responsible for the conduct of a thorough and meticulous autopsy. The autopsy should be aimed at, in collecting as much data as possible to establish the following:-

a) Identity
b) Cause of death
c) Cause of disaster

Other manpower required

- Trained class III and class IV employee
- Adminstrator
- Public relation officer
- Secretarial staff
- Social workers

Modalities of Forensic Investigation – Team Work

The investigation is to be carried out by a well coordinated team, such a team should consist of:-

a. Forensic Pathologist
b. Forensic Odontologist
c. Forensic Scientist
d. Ballistic experts
e. Finger print experts
f. Other experts, relevant to the nature of the disaster.

Scene of Disaster

Ensure the following measures:-

a) Secure the disaster site
b) Prepare a sketch plan of the site, showing parts of the wreckage andposition of the bodies.
c) Take photographs of the site.
d) Locate each body and label it with a "Mass casualty card", givingnumber in seriatum. Note: - Mutilated bodies and fragmentary remains should also be labeled and numbered.

e) Early and prompt transportation of the bodies to the mortuary.

Post mortem examination

Post mortem examination in all cases of mass disaster is not required under Indian Law. Therefore in known cases where cause of death is prima facie obvious even investigating officer can summarize the cause of death and hand over the dead body to relatives of the deceased (as per Cr.P.C. 174 and 176).

Mortuary Services

A temporary mortuary should be constructed with facilities for refrigeration.

Tables or make shift tables, instruments, gloves, cotton, packing and labeling materials, preservatives, disinfectants, antiseptic, whole body size polythene bags or paper bags, small glass bottles of capacity 20 ml to 100ml and 1000ml, sutures, needles, additional supply of water and light etc.

Mortuary services available near the site should be utilised.

Note: - Resource mobilization with regard to mortuary services should be incorporated in the "Disaster plan", prepared by hospitals.

Communication systems like black / white board, telephones, computers, internet, loud speakers, public address system should be used.

Adequate security arrangements should be there to avoid 'secondary disaster' due to law and order problem.

Autopsy Protocol – Preliminary Steps

a) Check the label (Mass casualty card) and enter the same number in the autopsy report
b) Take photograph of the body.
c) Take necessary `Finger prints'
d) Record details of personal clothing's and other belongings. They are removed, packed and properly labeled with the same number as that of the body. Keep them in safe custody for future reference and examination.
e) Arrange for a radiological examination of the body.
   Note: - Radiological survey is mandatory in the case of Mutilated and fragmentary remains.

External Examination

Record the following data:-

a) State of body – entire, mutilated or fragmentary remains
b) Height and Weight
   Note: - In the case of mutilated and fragmentary remains, the actual measurement of the parts and the nature of mutilation should be recorded.
c) Presence or absence of specific cadaveric changes – rigor mortis, postmortemstains, cadaveric spasm etc.
d) Putrefactive changes – nature and extent.
e) Colour of eyes.
f) Hair – colour, length and other features with regard to both scalp and body hair.
g) Identification marks – scars, moles, tattoo-marks, deformities.
h) Dental Data - complete and detailed dental data is to be recorded. This will be of paramount importance in establishing identity. A Forensic odentologist may be co-opted at this stage.
i) Injuries - Site, number, nature and special features if any.

Internal Examination

The procedure of internal examination remains the same as that of any routine autopsy. However, the following points need special attention and record:-

a) State of putrefaction of the internal organs.
b) Surgical absence of any internal organ (appendix, spleen, tonsil)
c) Evidence of pre-existing disease.
d) Internal injuries – nature, extent and specific organ involved.
e) Evidence of organic disease suggesting sudden death – coronary occlusion, cerebrovascular accident ruptures aneurysm.
f) Evidence of poisoning.
g) Presence of foreign bodies.

Specimens/Materials for Special Investigations

Specimens to be collected would depend upon the nature of disaster. As a routine the following specimens/materials are to be collected and preserved for special investigation:-

a) Clothes if found charred/or stained with blood or any other material.
b) Foreign bodies or any other trace material found over the clothes and body surface.
c) Foreign bodies found retained inside the body. Internal organs, including blood and urine for chemical analysis.
   Internal organs for histo-pathological examination.
   Note: - The specimens/materials should be properly preserved, labeled and sealed for subsequent dispatch to the concerned expert for analysis.

Processing of Data and Conclusions-Identification

a) Process all identification data.
b) Compare with the information and records furnished by the relativesand establish identity.
c) Actual identification of the body by the relatives.

Cause of Death

a) Compile the salient gross post-mortem findings of majority of bodies.
b) Study the special investigation results and correlate with the morbid findings.
c) Give opinion as to the cause of death based on the above and nature ofdisaster.

Cause of Disaster

Medical opinion, in this regard can only be partial and contributory to other investigations. However, an opinion regarding the cause of disaster may be given in the case of Aviation disasters, train mishaps and vehicular accidents, based on the following data:-

a) autopsy findings of the body of pilot/driver
   i. Evidence of organic disease, like coronary occlusion, cerebrovascular accident or any other disease which could produce sudden collapse or blunting of mental faculties.
   ii. Evidence of poisoning due to alcohol or other psychotropic drugs affecting higher mental functions.
   iii. Evidence of gun-shot injuries (air piracy).
b) Nature of injuries of the victims.
   Explosion injuries with evidence of retained explosive material, suggest sabotage.

Reception of Bereaved Relatives

There should be proper and adequate facilities for reception and waiting for the bereaved relatives.

a) Modalities for identification and handing over of the bodies to therelatives should be laid down. The process should be smooth with minimum delay and inconvenience to relatives.
b) The officials responsible for completion of legal formalities, prior tohanding over of the bodies to next of kin should be available at the site,round the clock.

Some difficulty can be encountered due none or inadequate avaibality of medical help, due to disorganization, delay in transport, inadequate availability of data, delay in postmortem examination.

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J Indian Acad Forensic Med, 31(2)

Review Article

Medical negligence – Hospital's responsibility

Sweta S. Agarwal & Swapnil S. Agarwal ***

Abstract

In the twentieth century, the hospital's sole responsibility was "to provide a properly equipped medical facility". Over the years the function of the hospital has slowly changed from a venue for treatment to a provider of treatment. The patient has a right to expect a certain standard of care when he puts himself in the hands of the hospital authority or health care providers. When a hospital fails to uphold this responsibility, the institution may be held liable for causing damage to its patients. They can be vicariously as well as directly liable for providing health care facilities.

Public awareness of medical negligence in India is growing. Hospital managements are increasingly facing complaints regarding the facilities, standards of professional competence and the appropriateness of their therapeutic and diagnostic methods. This article reviews the issue of liability of the hospital with reference to medical negligence and the resulting implications both to the hospital as well as the patients.

Key words: *Hospital, negligence, direct liability, vicarious liability, compensation & competent care*.

Introduction

As per Salmond' Law of Torts, negligence is an omission to do something which a reasonable man, guided upon those considerations which ordinarily regulate the conduct of human affairs, would do, or doing something which a prudent and reasonable man would not do [1].

Negligence is the breach of a legal duty of care. A breach of this duty gives the patient a right to initiate action against negligence [2]. All medical professionals, doctors, nurses, and other health care providers are responsible for the health and safety of their patients and are expected to provide a high level of quality care. Unfortunately, medical professionals and health care providers can fail in this responsibility to their patients by not giving them proper care and attention, acting maliciously, or by providing substandard care, thus causing far-reaching complications like personal injuries, and even death [3].

Over the years the function of the hospital has slowly changed from 'a venue for treatment' to 'a provider of treatment.' It is important to remember that virtually every country in the world operates its own unique legal system. Persons who offer medical advice and treatment implicitly state that they have the skill and knowledge to do so, that they have the skill to decide whether to take a case, to decide the treatment, and to administer that treatment. This is known as an "implied undertaking" on the part of health care providers [2].

Civil vs Criminal negligence and Consumer Protection Act

Hospitals in India may be held liable for their services individually or vicariously. They can be charged with negligence and sued either in criminal/ civil courts or Consumer Courts. As litigations usually take a long time to reach their logical end in civil courts, medical services have been brought under the purview of Consumer Protection Act,1986 wherein the complainant can

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be granted compensation for deficiency in services within a stipulated time of 90 -150 days[4].

Cases, which do not come under the purview of Consumer Protection Act, 1986 (e.g., cases where treatment is routinely provided free of cost at non-government or government hospitals, health centers, dispensaries or nursing homes, etc.) can be taken up with criminal courts where the health care provider can be charged under Section 304-A IPC [4] for causing damages amounting to rash and negligent act or in Civil Courts where compensation is sought in lieu of the damage suffered, as the case may be.

Liability of hospitals in cases of negligence

Hospitals liability with respect to medical negligence can be direct liability or vicarious liability. Direct liability refers to the deficiency of the hospital itself in providing safe and suitable environment for treatment as promised. Vicarious liability means the liability of an employer for the negligent act of its employees [5]. An employer is responsible not only for his own acts of commission and omission but also for the negligence of its employees, so long as the act occurs within the course and scope of their employment. This liability is according to the principle of '*respondent superior'* meaning 'let the master answer'. Employers are also liable under the common law principle represented in the Latin phrase, "*qui facit per alium facit per se*", i.e. the one who acts through another, acts in his or her own interests. This is a parallel concept to vicarious liability and strict liability in which one person is held liable in Criminal Law or Tort for the acts or omissions of another. An exception to the above principle is 'borrowed servant doctrine' according to which the employer is not responsible for negligent act of one of its employee when that employee is working under direct supervision of another superior employee [e.g. Where a surgeon employed in one hospital visits another hospital for the purpose of conducting a surgery, the second hospital where the surgery was performed would be held liable for the acts of the surgeon].

Direct liability

A hospital can be held directly liable for negligence on many grounds.

Failure to maintain equipments in proper working condition constitutes negligence. In case of damage occurring to a patient due to absence/ non-working equipment e.g. oxygen cylinder, suction machine, insulator, ventilator etc. the hospital can be held liable [6].

Failure to hand over copies of medical records, X-rays, etc., constitutes negligence or deficiency in service [6]. In India, a provision in respect of medical records has been made in The Indian Medical Council [Professional conduct, Etiquette and Ethics] Regulations 2002, Regulations 1.3.1 and 1.3.2 which state that every registered medical practitioner has to maintain medical records pertaining to its indoor or outdoor patients for a period of at least three years from the date of commencement of treatment in the prescribed form given by MCI and if any request is made for medical records either by patient/ authorized attendant or legal authorities involved, the same may be duly acknowledged and documents be issued within the period of 72 hours[7]. Also it must not be forgotten that it is the right of every patient to obtain in writing about his/her medical illness, investigations and treatment given on a prescription/ discharge ticket. Non-providing of medical records to the patients/ attendants may amount to deficiency in service under the Consumer Protection Act, 1986.

Improper maintenance of cleanliness and/or unhygienic condition of hospital premises amounts to negligence. In *Mr. M Ramesh Reddy v. State of Andhra Pradesh* [2003 (1) CLD 81 (AP SCDRC)], the hospital authorities were held to be negligent, inter alia, for not keeping the bathroom clean [in this case the bathroom was covered with fungus and was slippery], which resulted in the fall of an obstetrics patient in the bathroom leading to her death. A compensation of Rs. 1 Lac was awarded against the hospital [6].

A curious issue is that of liability in cases of polyclinics. Polyclinic means a place where doctors of different specialties practice with common staff and other facilities. Since every

doctor is practicing individually, he would be responsible for his own negligence and not for others. But a particular doctor may also be vicariously liable for negligence of staff of the polyclinic, if the negligence occurs during the care of his particular patient in addition to the polyclinic being held liable for the negligence of its staff. The other doctors may get involved as partners of the polyclinic depending upon the agreement between them [6].

Where the ambulance service provider, usually a hospital, professes that the ambulance is equipped with life-saving equipment and such equipment is either absent or non-functioning, it is liable for negligence in case of a mishap. In the United Kingdom, even delay in arrival of ambulance has been held negligent on the part of hospital as even a common man knows the importance of properly equipped ambulance arriving on time in saving a life [*Kent vs Griffiths,* (2002) 2 AII ER 474] [6].

Levying of excess/ wrong charges is considered as deficiency of service and can be claimed under Consumer Protection Act and in Civil Court. Charging for a bed facility, which was not provided, taking surcharges, amount taken as medicolegal charges etc. are examples where hospitals can face litigations. A patient can file a complaint in Consumer Court if the hospital charges fees in excess of that mentioned in the list of charges displayed or disclosed or agreed upon [6].

With regards to HIV & HBsAg, most of the hospitals have made it mandatory to get all their indoor patients investigated for HIV & HBsAg. These investigations are not a part of any treatment and are done without prior consent of the patient. Carrying out such investigations without the consent that too for reasons not related to the treatment of the patient can be considered as unethical practice and either a complaint can be lodged with State Medical Council or charges/ damages can be claimed through civil litigation or consumer forum. HIV testing is either mandatory or voluntary. When testing is legally done without the consent of the person, it is known as mandatory testing e.g., for screening donors of blood, semen, organs or tissues in order to prevent transmission of HIV to the recipient of the biological products. In all other circumstances, it has to be voluntary, i.e., with the knowledge and express written consent of the person as it is necessary to respect the individual's need to maintain confidentiality [8].

Hospitals can be charged with negligence for transmission of infection including HIV, HBsAg, etc. if any patient develops such infection during the course of treatment in the hospital and it is proved that the same has occurred on account of lapse on part of the hospital.

As applicable to any other organization, hospitals too cannot blanketly refuse to give employment on the basis of an individual's HIV status. It depends on what job a particular person is to be employed for. A sero-positive individual can be employed if there is no question of him/her coming in contact with patients or procedures that can result in spread of infection. If any person on the rolls of a hospital is found to be sero positive or develops AIDS, the hospital should review that person's staff privileges and determine whether or not the medical condition interferes with the persons' ability to perform on the job and whether the condition creates a health risk to the patients. The Centre for Disease Control [CDC] although does not advise that HIV positive individuals be routinely restricted from performing surgery, it does recommend that the restrictions be determined on a case by case basis. The employee could be given other duties in the hospital that involves lesser degree of direct patient care or could be required to use extra safety precautions while dealing with patients. There is no generally accepted medical evidence that HIV can be transmitted through normal day to day contact in typical private workplace setting. The CDC has issued guidelines that recognize that, with the exception of health care workers and personal service workers who use instruments that pierce skin, no testing or restriction is indicated for workers known to be infected with HIV but otherwise is able to perform their jobs. If any hospital does not follow the guidelines and there results an infection of the patient, it can be held directly responsible for negligence [8].

Misleading signboards, prescription slips and advertisements of hospitals can be construed as deficiency in service or unfair trade practice under the Consumer Protection Act,

1986 and damages can be awarded for such practices. Wrong claims of availability of certain facilities like some hospitals claiming in their sign boards/ prescription slips that 24 hr emergency services are available in their setup but in fact they lack basic emergency facilities like services of a doctor round the clock, necessary equipment in working order, intensive care facilities etc. construes negligence. Wrong depiction of qualifications of doctor like MD [Gyn.] against a doctor's name creating an impression and misleading the patients that the doctor possesses PG degree in Gynecology whereas it was obtained from Germany and was equivalent to MBBS as per rules of MCI may also be construed as negligence [1993 (1) CPR 422 (NCDRC)]. Claiming guaranteed results for operative procedures that do not give desired outcome also amount to negligence [6].

Vicarious liability

A hospital can be held vicariously liable on numerous grounds on different occasions. Several High Court Judgments have held hospitals vicariously liable for damages caused to the patients by negligent act of their staff. In one judgment of the Kerala High Court in *Joseph @ Pappachan v. Dr. George Moonjerly* [1994 (1) KLJ 782 (Ker. HC)], in support of the following effect stated that 'persons who run hospital are in law under the same duty as the humblest doctor: whenever they accept a patient for treatment, they must use reasonable care and skill to ease him of his ailment. The hospital authorities cannot, of course, do it by themselves; they have no ears to listen to the stethoscope, and no hands to hold the surgeon's scalpel. They must do it by the staff which they employ; and if their staffs are negligent in giving treatment, they are just as liable for that negligence as anyone else who employs other to do his duties for him. In another judgment by the Madras High Court in *Aparna Dutta v. Apollo Hospitals Enterprises Ltd*. [2002 ACJ 954 (Mad. HC)], it was held that it was the hospital that was offering the medical services. The terms under which the hospital employs the doctors and surgeons are between them but because of this it cannot be stated that the hospital cannot be held liable so far as third party patients are concerned. It is expected from the hospital, to provide such a medical service and in case where there is deficiency of service or in cases, where the operation has been done negligently without bestowing normal care and caution, the hospital also must be held liable and it cannot be allowed to escape from the liability by stating that there is no master-servant relationship between the hospital, and the surgeon who performed the operation. The hospital is liable in case of established negligence and it is no more a defense to say that the surgeon is not a servant employed by the hospital, etc. In another judgment by the National Consumer Redressal Commission in case of *Smt. Rekha Gupta v. Bombay Hospital Trust & Anr.* [2003 (2) CPJ 160 (NCDRC)], related to negligence of a consultant doctor, the Commission observed that the hospital who employed all of them whatever the rules were, has to own up for the conduct of its employees. It cannot escape liability by mere statement that it only provided infrastructural facilities, services of nursing staff, supporting staff and technicians and that it cannot *suo moto* perform or recommend any operation/ amputation. Any bill including consultant doctor's consultation fees are raised by the hospital on the patient and it deducts 20% commission while remitting fees to the consultant. Whatever be the outcome of the case, hospital cannot disown their responsibility on these superficial grounds.

The hospital authorities are not only responsible for their nursing and other staff, doctors, etc. but also for the anesthetists and surgeons, who practice independently but admit/ operate a case. It does not matter whether they are permanent or temporary, resident or visiting consultants, whole or part time. The hospital authorities are usually held liable for the negligence occurring at the level of any of such personnel. Where an operation is being performed in a hospital by a consultant surgeon who was not in employment of the hospital and negligence occurred, it has been held that it was the hospital that was offering medical services. The terms under which the defendant hospital employs the doctors and surgeons are between them but because of this it cannot be stated that the hospital cannot be held liable so far as third

party patients are concerned. The patients go and get themselves admitted in the hospital relying on the hospital to provide them the medical service for which they pay the necessary fee. It is expected from the hospital, to provide such medical service and in case where there is deficiency of service or in cases like this, where the operation has been done negligently without bestowing normal care and caution, the hospital also must be held liable and it cannot be allowed to escape from the liability due to reason of non-existing master-servant relationship between the hospital and the surgeon.

There are many instances where a senior or super-specialist performs surgery in a centre where such expertise is not locally available. After the surgery, the post-operative care is left to the local competent doctor. Failure of the senior/ super specialist to personally supervise the postoperative care may not constitute negligence provided the doctor to whom responsibility of the post operative care lies is competent; same applying to a visiting physician. It has been held by National Consumer Redressal Commission [1993 (3) CPR 414 (NCDRC)] that in case of the operation being performed in an institution, it is the duty of the institution to render postoperative treatment and care to the hospital's patients. Quite often foreign doctors undertake operations in India and it cannot be maintained that the post operative care and treatment shall continue to be provided by the foreign doctor who may no longer be in the country. But same may not be held in every case if the visiting surgeon never inquires about the condition of the patient and leaves the patient for postoperative care and follow up treatment to the competence of the other surgeon who was unable to properly treat and look after the patient and the patient dies. Here the treating doctor can also be made party to the negligence.

In many cases of negligence against government hospitals, it has been held that the State is vicariously liable for negligence of its doctors or staff or even primarily liable where there is lack of proper equipment or staff. In few cases, court has passed orders to the effect that the compensation paid to the complainant may be recovered from the government doctors whose negligence has been established. The Honorable Supreme Court in *Achutrao & ors v. State of Maharashtra & Ors* [JT 1996(2) SC 664] has observed that running a hospital is a welfare activity undertaken by the Government but it is not an exclusive function or activity of the Government so as to be regarded as being in exercise of its sovereign power. Hence, the State would be vicariously liable for the damages which may become payable on account of negligence of its doctors or other employees. In another case of *Smt. Santra v. State of Haryana & Ors* [(2005) 5 SCC 182], the contention that the State is not vicariously liable for the negligence of its officers in performing the sterilization operation was not accepted in view of the above judgment of the Supreme Court of India. In another case of *Rajmal v State of Rajasthan* [AIR 1996 Raj. HC 80], where the patient died of neurogenic shock following laparoscopic tubal ligation done at a primary health centre, an enquiry committee constituted on the directions of the Rajasthan High Court found that the doctor was not negligent in conducting the operation, nor his competence, integrity or efforts were doubted. It was lack of adequate resuscitative facilities and trained staff that was held responsible for the death and the State Government was held vicariously liable and was directed to pay compensation to the husband of the deceased. In another case of *Dr. M. K. Gourikutty & etc. v. M. K. Madhavan and Ors* [AIR 2001 Ker. HC (DB) 398], where patient had died following post partum sterilization, the Court found negligence on part of the defendants and liability was fixed on State Government, anesthesiologists and other staff instead of holding only the State vicariously liable. The Honorable Punjab and Haryana High Court, in *Punjab State v. Surinder Kaur* [2001 ACJ 1266 (P&H-HC], has stated that the doctor working in a government hospital was performing the duty while he/ she was under the employment of the State and in these circumstances, the master is always responsible for the vicarious liability of the acts committed by the employee in the course of such employment. It is for the State to determine the liability of the erring doctors. It is their internal affair but so far as patient is concerned she can recover the amount from the State Government. It is the duty of the authorities under the State to see that its

employees are available in time in the hospital. If for any reason, a doctor or expert is not available, the Hospital authorities would have known before hand and some other persons should be posted. The primary responsibility of the Hospital authorities is to see that there is no negligence on its part or on the part of its officers. The non-providing of a doctor or anesthetist or an assistant is essentially a lapse on the part of hospital authorities and are thus liable for negligence. In *R. P. Sharma v. State of Rajasthan* [AIR 2002 Raj. HC (Jpr. Bench) 104], where a woman died because of mismatched blood transfusion, the State was held vicariously responsible for the negligent act of its blood bank officer and the doctor who transfused the blood. It was further held that the State of Rajasthan is free to recover the amount from those doctors. In *Rukmani v. State of Tamil Nadu* [AIR 2003 Mad. HC 352], the Madras High Court observed that in India where the population is increasing each second and family planning is a national programme, the doctor as well as the State must be held responsible in damages on account of failure of a sterilization operation which is directly responsible for an additional birth in the family, creating additional economic burden on the family.

Compensation can be awarded to an injured person for not being provided treatment in a Government hospital or for death or injury caused therein because of negligence. In the case of *Paschim Bangal Khet Mazdoor Samity & Ors v. State of West Bengal* [1996 (4) SC 260], the Honorable Supreme Court held that providing adequate medical facilities for the people is an essential part of the obligations undertaken by the Government in a welfare state. Failure on the part of government hospital to provide timely medical treatment to a person in need of such treatment is violation of his right to life guaranteed under Article 21 of Indian Constitution [death of the patient occurring for not being admitted/ given proper treatment for want of bed in a government hospital].

Appointing practitioners of Alternative Systems of Medicine [Ayurveda/ Unani/ Sidha] or Homeopaths in hospitals giving services in allopathy too amounts to negligence. It is the duty of the hospital to provide properly qualified, skilled and experienced doctors for treatment. The Supreme Court of India has held that there is no scope for a person who is registered under the Indian Medicine Central Council Act, 1970 [Council for registration of practitioners of Indian Medicine – Ayurveda, Unani and Sidha] and enrolled on the State or Central Register of Indian Medicine to practice modern scientific medicine [allopathy] in any of its branches. All that is allowed to such practitioners is to make use of the various modern advances like radiology reports, laboratory investigations etc. for the purposes of practicing in their own system. However, if any State law recognizes the qualification of integrated courses or other qualifications as 'sufficient qualification' for registration in the State Medical Register, within the meaning of the Indian Medical Council Act, 1956 on being registered in the State Medical Register, he is eligible to practice allopathic medicine. This benefit would be available only in those States where the privilege of such right to practice any system of medicine is conferred by the State law which is for the time being in force, under which practitioners of Indian Medicine are registered in their State Medical Register. However, in the States where no such privilege is available, this does not debar them from prescribing or administering allopathic drugs sold across the counter for common ailments. The same rule does not apply for homeopaths as their registration is restricted to Homeopathic Practitioners Act, 1959 [6].

Conclusion

The complex legal relationship between hospitals, doctors and paramedical staff leads to issues, which the courts find difficult to resolve. However, certain trends have emerged in modern medicine:

1. There is a need to provide competent care based on a national standard.
2. Competent care is no longer predicated on 'locality rules'. The state has to intervene with statutes and regulations to ensure that a 'standard' of practice is established in hospitals.
3. The hospital has both a vicarious as well as an inherent duty of care (corporate obligation) to

its patients.

4. The statutory regulations result in doctors being involved directly in setting of standards. This brings a separate liability upon the doctors independent of their professional liability.
5. There is a demand not only for establishing initial standards of care, but for continuous monitoring of these standards and proactive measures to ensure that they are updated.

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Review Article

Retrieval of organs, body parts and tissue from the medicolegal postmortems for mounting and research purpose: Some legal and ethical aspects

Indrajit Khandekar, P. N. Murkey** & B. H. Tirpude****

Abstract

The police today order most medico-legal post-mortem examinations and the executive magistrate orders some. Previously in some cities like Mumbai the coroner ordered them but now this system is abolished. In all these cases consent of the relatives is not needed. Establishing the cause of death may require proper preservation of organs for further medico legal investigations as the case may be. Sometimes some organs are retrieved for the purposes other than medico legal investigations namely for museum specimens or research or other academic purposes. Such academic exercise in good faith may lack consent, documentation etc. The article is presented to review least attended ethical and legal aspects and to open up a debate with reference to retrieving organs form medico legal case for academic and research purposes.

Key words: *Retrieval, human organs, body parts, medico legal case (MLC), academic and research purpose & legal and ethical aspects.*.

Introduction

There are generally two types of autopsies[1]:

The Clinical or Academic Autopsy, which is performed with the *consent of the relatives* of the deceased to arrive at the diagnosis of cause of death where diagnosis could not be reached during the treatment or to confirm diagnosis where it was doubtful

The Medico-legal or Forensic autopsy, which is performed on the instructions of the legal authority in circumstances relating to suspicious, sudden, obscure, unnatural, litigious or criminal deaths. In The Medico-legal autopsy, the body belongs to the State for the protection of public interest until such time till complete and thorough investigation into the circumstances attending the death has been completed. Any or all portions of the body may be taken and kept for detailed examination as well as preserved for later trial purposes.

The pathologist undertaking a medico-legal post-mortem examination is under a duty to remove organs for examination, for histology, toxicology, and so on. He must ensure that he takes what is necessary to establish the cause of death and for any other medico-legal purpose.

So, question is whether doctors while conducting medico-legal post-mortem examination can remove, retain or use body parts from a dead body for any purpose (like research, mounting, teaching etc.,) other than medico-legal purpose without any proper authority and documentation? If no, then what procedural aspects of administrative nature i.e., authority, documentation in both identified and un-identified dead bodies shall be taken care of?

In England and Wales, when death is reported to the Coroner and the law officer orders an autopsy, the retention of relevant material is not only sanctioned but is mandatory. The Coroner's Rules (1984) state:

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A person making a post-mortem examination shall make provision, so far as possible, for the preservation of material which in his opinion bears upon the cause of death, for such period as the Coroner thinks fit.

The statutory duty to retain organs and tissues from a Coroner's autopsy strictly applies only to those tissues where further examination is relevant to the cause of death or to an interpretation of the nature of the associated injuries or conditions. It is also intended to preserve relevant material for later examination by another histopathologist acting on behalf of a third party, such as any person accused of causing death. This duty does not cover the incidental lesions unrelated to the nature of death, though in most instances it can be legitimately argued that all abnormalities must be investigated to determine their relevance.

The Human Tissue Act 2004 was passed as a result of the concerns resulting from the Aldey Hey and other hospital scandals on organ removal, retention and storage and in the light of the feedback from the consultation document 'Human Bodies Human Choices', which was published in July 2002 [2]. Under this act a Human Tissue Authority was appointed in April 2005 and will be responsible for the implementation of the Act in April 2006. The Act makes provisions for [3]:

- Removal, storage and use of human organs and other tissue for scheduled purposes
- Regulation of activities involving human tissue
- Establishment of the Human Tissue Authority
- Preservation for transplantation
- Non-consensual analysis of DNA
- Powers of inspection, entry, search and seizures
- Offences by bodies, corporate and prosecutions

Following an outcry by parents about organs from their dead children having been removed and retained without their explicit consent, an inquiry was set up to look at the removal, retention and storage of body parts at Aldey Hey Children's Hospital. The inquiry found that thousands of children's body parts had been collected at the hospital, some going back to before 1973. Most however were retained after 1988 when Professor Richard Van Velzen was appointed to the Department of Pathology and there was a huge increase in the number of organs removed and retained. Between 1988 and the end of 1995, it was the practice to remove every organ from every child in a post-mortem [3].

At present in the UK the vast majority of post mortem examinations are done without the consent of the deceased relatives, on the authority of the coroner or procurator fiscal who is directing the investigation into the death. The coroner can only authorize the collection of material from a particular deceased if it is to assist in establishing who the deceased was and where, when and in what broad circumstances he came by his death [4].

The Human Tissue Act 2004 prohibits the collection of samples for research purpose without "appropriate consent".

In practical terms, getting consent for the collection of samples for such research at a coroner's post mortem will be impractical [4]. So whether it will be lawful to collect and retain at post mortem of small amounts of body fluids and non emotive tissues, such as muscle, for research as it is normally understood and for other purpose in clinical, forensic and research laboratories?

Internet auction sites have become increasingly popular, with diverse items up for sale to the public worldwide. Internet auction sites, such as "e Bay", and "Yahoo", have become a mainstay of American society. Wide varieties of items, including human skeletal remains, are placed on these sites for auction to the highest bidder. An unfortunate consequence of such sale may generate interest in stealing remains from graves, mortuaries, hospitals, or county morgues worldwide. The sale of human remains needs to be regulated by drafting and enforcing federal laws that limits sale of human skeletal remains [5].

Such laws prevailing in western world can't have effect in India. Patient waiting area in hospitals of renowned surgeon usually has display of surgical specimens removed by him, probably to convey a particular level of surgical competence to the visitors. Such specimens belong to living subjects and presumed to be consensual retrieval and display.

However, with regard to organs of dead

persons and rights there up on are not categorically documented in a single law in India. As per jurisprudence " Dead men are no longer persons in the eye of law".[6] However, criminal law secures a decent burial for all dead men and its violation is a grave offence. Without conferring rights upon the dead, law recognizes and takes account after death of a person of his desires and interest when alive. In *Williams* v. *Williams*, it was laid down that a person cannot during his lifetime make a will disposing of his body. E.g. giving brain to the museum or giving any part of his body to the medical college. However, the trend is changing today and it is perfectly legal to donate one's eyes after death.[6] This theory of jurisprudence forms the basis of consensual retrieval of human organs for the purpose of donation and transplantation. The provisions of The Transplantation of Human Organs Act, 1994 [7] more or only relevant to " Brain-dead persons" and removal or storage for therapeutic purposes and hence its application in case otherwise is doubtful. Post mortem donation of cornea and whole body to Anatomy for dissection purpose is hence, strictly guided by the consent of next of kin. The only act which gives a legal sanction for removal of human organs for the purposes of medical education or research including Anatomical examination and dissection is Bombay Anatomy Act, 1949 [8] which is enforced in few states (a per our best belief) and that to if body is unclaimed. The guidelines on cadaver donor transplants by ICMR [9] also states that it shall be informed consent by next of kin in absence of any other will or consent. Thus, there is absence of categorical and unequivocal legal sanction to medical practioners retrieving human organs for teaching purpose in good faith.

A particular school of thoughts may dare to endorse non-consensual removal, of course in good faith for teaching or research purpose. The argument put forward by them may be, something not having a legal sanction does not become illegal in India. But it has so many risks of consecutive nature. In a medico legal case, there is always a chance of re-post mortem examination by other person and at a different center. Under the circumstances, any organ or body part preserved, as museum specimen may not appear in the list of samples preserved at first autopsy for medicolegal analysis and at second autopsy may show absence of such organs, which is sufficient to trigger on a controversy.

In case of foreign national, next of kin may claim on all human tissues after the investigation is over. What justification may be given for removal of tissue from a dead body In absence of a legal sanction in lax loci. The stringent interpretation of international law may complicate the issue further.

In recent past, medical colleges are mushrooming in private sector that are in need of such specimens for their museum to have recognisation from MCI. If they don't have autopsy functioning how they can justify the source of such specimens.

Thus, at present except for Bombay Anatomy Act (only for unclaimed dead body), we feel that there are no legal guidelines authorising such removal. Overburdened with medicolegal work many faculties may not document the events even in consensual cases.

We feel, such work needs streamlining at least when the scientists at large undertake such exercise with bonafide cause of teaching and research.

Conclusion

In case of dead body, provisions of Bombay Anatomy Act shall be closely followed and organs shall be procured only after a sanction from authority in cases of unclaimed body. Written informed consent shall be obtained from person lawfully in possession of claimed body.

A proper documentation shall be made in museum register or any such similar records, which shall have limited access. Identity of such specimens shall not be disclosed publicly.

Ethical guidelines by ICMR shall be closely followed for research purposes.

Summarily, we are of the opinion that uniformity, transparency and legality of ethical nature shall prevail at all medical centers for removal of human organs for purposes other than medicolegal investigations and probably, with that we can convince the world that such bonafide exercise is having legal and ethical

sanction in the interest of medical education and research.

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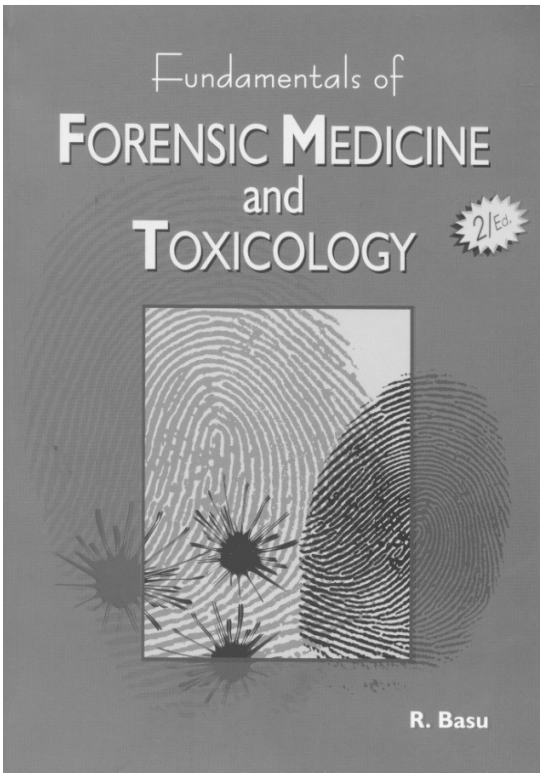
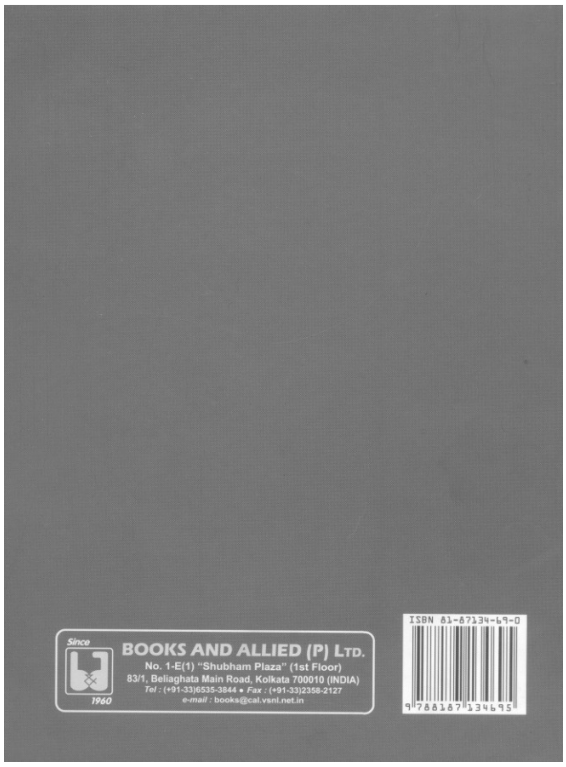
Book Review





It is my privilege to express opinion about a book which is one of the already recommended ones by Expert panel chaired by Hon'ble justice M.N. Venkatachaliah (Draft for Approval Restructured Medicolegal Curriculum for MBBS course in India) .

Prof. R. Basu, one of the senior and experienced teachers of the field has incorporated plenty of latest facets of the subject in 2nd edition of the book. The wide variety of about 320 photographs, 50 diagrams and 66 tables makes the book an exclusively illustrative one. The striking feature of the book is " Poisons at Glance" - wonderful and comprehensive compilation of common poisons. In addition to fundamentals of the subject the wide variety of "Questions" will form a good basis for self evaluation by student while objectively preparing for examination.

I wish the text and presentation of the book will attract many teachers and in turn students at large will be beneficiaries.

C. B. Jani
Editor-JIAFM

Supplements

The Bombay Anatomy Act, 1949.

[*As modified upto 10th November 1997*]

CONTENTS

PRAEMBLE

SECTIONS

1. Short title, extent and commencement
2. Definitions
3. [*Deleted*.]
4. Power of State Government to authorize officers to act under section 5.
5. Unclaimed dead bodies to be used for therapeutic purpose or anatomical examination.
5A. Doubt or dispute whether person claiming body is near relative to be referred to Coroner or Executive Magistrate and body to be preserved pending decision.
5B. Donation of dead bodies or any part thereof deceased person to be used for Therapeutic and certain other purposes.
5C. No authority for removal of body or part thereof when body is entrusted to another only for interment or cremation.
5D. Authority to remove body etc., when body is lying in approved institution.
5E. Approved Institution to receive with body, certificate of death etc.
5F. Notice of place where body will be dealt with for all of the purposes of this Act.
6. Penalty.
7. Duty of Police and other officers to assist.
8. Protection of persons acting under the Act.
9. Officers to be public servants.
10. Rules.
10A. Act not to prohibit *post mortem* examination.
10B. Saving.
11. Repeal and saving.

BOMBAY ACT No,.XI OF 1949 [1]

[THE BOMBAY Anatomy ACT, 1949]*

[this Act received the assent of the Governor on the 13th April 1949; assent was first published in the *Bombay Government Gazette*, part IV, on the 22nd April 1949.]

Adapted and modified by the Adaptation of Laws Order, 1950.

Adapted and modified by the Bombay Adaptation of Laws (State and Concurrent Subjects) Order, 1956.

Amended by Bom.33 of 1957.
Amended by Bom.44 of 1959.

Adapted and modified by the Maharashtra Adaptation of Laws (State and Concurrent Subjects) Order, 1960.
Amended by Mah.35 of 1975 (1-9-1976)£

An Act to provide for the supply of unclaimed bodies of deceased [2][and for Donation before death by a person of his body or any part thereof after his death]to hospital and medical and teaching institution [3][for therapeutic purpose or]for the purpose of [4][medical education or research including] anatomical examinations and dissection.

WHEREAS it is expedient to provide for the supply of unclaimed bodies of deceased person [2][and for donation before death by a person of his body or any part thereof after his death] to hospitals and medical and teaching institutions [3][for therapeutic purpose or] for the purpose of [4][medical education or research including] anatomical examination and dissection;
It is hereby enacted as follows:-

1. (*1*) This Act may be called the Bombay Anatomy Act. 1949. *short title*
[5][(*2*) It extends to the whole of the [6][State of Maharashtra.] *extend and*
(*3*) This section shall come into force at once *commence-*
(*4*) The [7][State] Government may, by notification in the *Official Gazette* , *ment*
direct that the remaining provisions of this Act shall come into force on such date and in such area as may be specified in the notification :

Bom. XLIV of 1959 M.P. XVI of 1954 Hyd. X of 1955. Sau. XXX-II of 1955.

[8][Provided that on the date of commencement of the Bombay Anatomy (Extension and Amendment) Act, 1959 the remaining provisions of this Act shall come into force in those local areas in the Vidarbha region, Hydrabad area and Saurashtra area of the state of Bombay** in which the provisions of the Madhya Pradesh Anatomy Act.1954, the Hydrabad Pathology & Anatomy Act,1955 or, as the case may be, the Saurashtra Anatomy Act,1955 were brought into force before such commencement.]

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1. For Statement of Objects and Reasons, see *Bombay Government Gazette,1948,* Part V, page 65
* This Act was extended to that part of the State of Bombay to which, immediately before the commencement of Bom.44 of 1959, it did not extend (*vide* Bom.44 of 1959, s.2).
2. These words were inserted by Mah. 35 of 1975, s.2(1).
3. These words were inserted by Bom. 38 of 1957, s.8(a)
4. These words were inserted by Mah. 35 of 1975, s. 2 (2).
5. Sub-section (2) was substituted for the original by Bom.44 of 1959, s.3(I).
6. These words were substituted for the words “State of Bombay” by the Maharashtra Adaptation of Laws (State and Concurrent Subjects) Order , 1960.
** The words “State of Bombay” stand unmodified, *ibid.*
7. This word was substituted for the word “Provincial” by the Adaptation of Laws Order,1950.
8. This proviso was added by Bom. 44 of 1959, s. 3 (*2*).
£. This indicates the date of commencement of Act.

Definitions. 2. In this Act unless there is anything repugnant in the subject or context,-
(1)“approved institution” means a hospital or a medical or teaching institution approved by the [1][State] Government [2][for all of any of the purposes of this Act]
(2) “Authorise officer” means an officer authorised to act under section 5;

(3)"near relative "means any of the following relatives of the deceased namely, a wife, husband, parent, son, daughter, brother and sister and includes any other person who is related to the deceased (a) by lineal or collateral consanguinity within three degree in lineal relationship and six degrees in collateral relationship, or (b) by marriage either with the deceased or with any relative specifically mentioned in this clause or with any other relative within the aforesaid degrees.

Explanation – The expressions "lineal and collateral consanguinity" shall have the meanings assigned to them in the Indian Succession Act, 1925 *XXXIX of 1925.*

(4)"prescribed" means prescribed by rules made under this Act;

(5)"unclaimed body" means the body of a deceased person who has no near relative or whose body has not been claimed by any of his near relatives within such period as may be prescribed.

3. [*Doubt or dispute as to near relative to be referred to Coroner or authorised Officer*] *Deleted by Bom. 44 of 1959, s.4.*

Power of [1] [State] Government to authorise

4. The [1] [State] Government may, by notification in the *Official Gazette*, authorise for the area in which this Act comes into force or any part thereof, one or more officers to whom a report shall be made under section 5 and who shall be competent to act under the said section.

Officers to *act under section 5.*

Unclaimed dead bodies to be used for [therapeutic purpose or] anatomical examination.

5. (1) where a person under treatment in a hospital whether established by or vesting in, or maintained by, the [1][State] Government or any local authority , dies in such hospital and his body unclaimed, the authorities in charge of such hospital shall with the least practicable delay report the fact to the authorised officer and such officer shall then hand over the unclaimed body to the authorities in charge of an approved institution [1][for any therapeutic purpose or] [4][for the purposes of medical education or research including] anatomical and dissection.

(2) Where a person dies at a hospital other than a hospital referred to in sub section (*I*) or in a prison and his body is unclaimed, the authorities in charge of such hospital or prison shall with the least practicable delay report the fact to the authorities in charge of an approved institution for the purpose specified in sub-station (*I*) .

(3) Where a person having no permanent place of residence in the area where his death has taken place dies in any public place in such area and his body is unclaimed, the authorised officer shall take possession of the body and shall hand it over to the authorities in charge of an approved institution for the purpose specified in sub- section (*I*)

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1. This word was substituted for the word "Provincial" by the Adaptation of Laws Order, 1950.
2. These word were substituted for the words "to carry on Anatomical examination and dissection" By Bom. 33 of 1957, s. 8 (*b*).
3. These words were inserted by Bom. 33 of 1957 , s. 8 (*c*).
4. These words were substituted for the words "for the purpose of conducting " by Mah.35 of 1975, s. 3.
5. These words were inserted, *ibid, s. 5 (2)*.

[1][(4) where there is any doubt regarding the cause of death or when for any other reason the authorised officer considers is expedient so to do, he shall forward the unclaimed body to a police officer referred to in section 174 of the criminal procedure,1898] *

V of 1898.

[2][5 A. (1) If any doubt or dispute arises as to whether a person claiming the body of a deceased person under section 5 is near relative of the deceased or not the matter shall be referred in Greater Bombay to the Coroner or Additional coroner appointed under the coroners Act, 1871 and elsewhere to the Executive Magistrate or such officer as may be appointed in this behalf by the State Government and his decision shall be final and conclusive.

Doubt or dispute whether person claiming body is near Relative to be referred to coroner or Executive Magistrate and body to be preserved pending decision.

V of 1871

(2) Pending such decision, the authorised officer shall take all reasonable care and steps to preserve the body of the deceased person form decay.]

[3][(5B. (I) If any person either in writing at any time or orally in the presence of two or more witness during his last illness whereof he died has expressed a request that his body or any part of his body be given to authorities in charge of an approved institution for being used after his death for therapeutic purposed or for the purpose of medical education or research including anatomical examination and dissection, the person lawfully in possession of his body after his death may unless he has reason to believe that the request was subsequently withdrawn, authorise the removal of the dead body or such part thereof to any approved institution for use in accordance with the request.

Donation dead bodies or any part hereof of deceased person to be used for therapeutic and certain other purposes.

(2) Without prejudice to the provisions of sub-section (I) , the persons lawfully in possession of the body of a deceased person may authorise the removal of the whole body or any part from the body for use for the purpose specified in sub- section (I) unless such person has reason to believe-

(a) that the deceased had expressed an objection to his body or any part thereof being so dealt with after his death, and had not withdrawn such objection : or

(b) that any near relative of the deceased objects to the body being so dealt with.

(3) Subject to the provisions of sub-sections (4) and (5) of this section, the removal and use of the whole body or any part of a body in accordance with an authority given in pursuance of this section shall be lawful, and shall be sufficient warrant or the removal of the body or any part thereof and its use for the purposes of this Act.

(4) In no case shall be body or any part of the body of any person be removed for any of the purpose specified in sub-section (I) form any place where such person may have died until after forty-eight hours from the time of such person's decease, nor until after twenty- four hours notice, to be reckoned from the time of such deceases to the coroner or Additional Coroner or the Executive Magistrate, of the intended removal of the body , not unless a certificate stating in what manner such person came by his death shall, previously to the removal of the body, has been signed by a registered medical practitioner who attended such person during the illness whereof he died, or, if no such practitioner attended such person during such illness, then by a registered medical practitioner who shall be called in after the death of such person to view his body, and who shall state the manner and cause of death according to the

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1. Sub-section (4) was added by Bom. 44 of 1959 , s. 5 (I)
* See now the Code of criminal Procedure , 1973 (II of 1974)
2. Section 5 A was inserted, ibid., s.6
3. Section 5B to 5 F inserted by Mah.35 of 1975, s.4.

best of his knowledge and belief, but who shall not be concerned in dealing with the body for any of the purposes aforesaid after removal; and in case of such removal, such certificate shall be delivered together with the body to the authority in charge of an approved institution receiving the same for any of the purposes aforesaid.

(5) If the person lawfully in possession of the body has reason to believe that in inquest or a post-mortem examination of such body may be required to be held, in accordance with the provisions of any law for the time being in force, the authority for the removal of the body or any part thereof shall not be given under this section except with the consent of the authority empowered to hold an inquest or order a post-mortem under such law.

No authority for removal of body or part thereof when body is entrusted to another only for interment or cremation.

5C. No authority for the removal of the body or any part thereof for the purposes of this Act shall be given under section %B in respect of any body of a deceased person by a person entrusted with the body for the purpose only of its interment or cremation

Authority to remove body, Etc, when body Is lying in approved institution

5D. In the case of a body lying in any hospital, nursing home or other institution, any authority for the removal of the body or any part thereof under section 5B may be given on behalf of the person having the control or management thereof by any officer or person designated for that purpose by the first-mentioned person.

Approved Institution to receive with body certificate of death etc.

5E. The authority in charge of an approved institution, on receiving the body of a deceased person for all or any of the purposes of this Act., shall demand and receive, together with the body, a certificate as aforesaid and shall, within twenty-four hours next after such removal, transmit in Greater Bombay to the Coroner of Additional Coroner appointed under the Coroners Act,1871, and elsewhere to the Executive Magistrate or such officer as may be appointed in this behalf by the State Government, a copy of such Certificate and also a return stating on what day and what hour and from whom the body was received, the date and place of death, the sex and (as far as known at the time) the Christian and surname, age and last place of abode of such person and shall enter, or cause to be entered, the aforesaid particular relating thereto, and a copy of the certificate and the approved authority received therewith, in a register to be kept by such authority for that purpose and shall produce such register whenever required to do so by the Coroner or Additional Coroner or, as the case may be, by the Executive Magistrate or any officer aforesaid.

V of 1871

Notice of place where body will be dealt with for all or any of purpose of Act.

5F. Every dead body removed as aforesaid for any of the purpose of this Act, shall, before such removal, be placed in a decent coffin or shell or any other thing for olding the dead body, and be removed therein; and that the party removing the same, or causing the same to be removed as aforesaid, shall make provision that such body, after being dealt with for any of the purposes of this Act, be decently cremated or interred in consecrated ground, or in some public cremation or burial ground in use *the* for persons of that religious persuation to which the person whose body was so removed belonged; and that a this certificate of the cremation, interment or burial of such body shall be transmitted in Greater Bombay to the Coroner, and elsewhere, to the Executive Magistrate, or any officer appointed by the State Government for the purposes, within six weeks after the day on which such body was received as aforesaid].

6. Whoever disposes of, or abets the disposal of [a dead body] save as permitted by this Act, or obstructs any authority in charge of an approved institution or an authorised officer from handing over, taking prossession of, removing or using, such dead body [1][for all or any of the purpose of this Act] shall, on conviction, be punished with fine which may extend to five hundred rupees . *Penalty.*

[3]**[7.** All Officers and servants of police, Medical and public Health departments all officers and servants in the employ of a local authority and all village officers and servants shall be bound to take all reasonable measures to assist the authorities and officers authorised under this Act in the discharge of their duties under this Act]. *Duty of Police and other Officers to assist.*

8. No suit prosecution or other legal proceeding shall be against any person for anything which is good faith done or intended to be done under this Act. *protection of persons acting under the Act.*

XLV of 1860. **9**. All officers appointed or authorised to act under this Act, shall be deemed to be public servant within the meaning of section 21 of the Indian Penal Code. *officers to be Public servants.*

10. (1) The 4[State] Government may be notification in the *Official Gazette* Make rules for carrying out the purposes of this Act. *Rules.*

(2) Without prejudice to the generality of the provisions of sub-section (1) such rules may prescribe the period within which a near relative shall claim the body of a deceased person.

[5]**[10A**. Nothing contained in this Act shall be construed to extend to or to prohibit, any post-mortem examination of any human body required or directed to be made under any law for the time being in force in the State. *Act not to prohibit post-mortem examination.*

10B. (1) Nothing in this Act shall be construed as rendering unlawful any dealing with the body or any part thereof of a deceased person which would have been lawful if this Act had not been passed. *saving*

XLV of 1860 (2) Any authority for the removal of the body or any part thereof given in accordance with the provisions of this Act shall not be deemed to be contravention of the provisions of section 297 of the Indian Penal Code].

Bom. XLIV of 1959 [6]**[11**. On the date of commencement of the Bombay Anatomy (Extension and Amendment) Act., 1959 (hereinafter in this section referred to as "the said Act"), he following Acts, shall stand repealed, namely:- *repeal and saving*

M.P.XVI of 1954 (1) The Madhya Pradesh Anatomy Act, 1954 in its application to the Vidarbha region of the State of Bombay *;

Hyd.X of1955 (2) The Hydrabad Pathology and Anatomy Act, 1955, in its application to the Hydrabad area of the State of Bombay * ; and

Sau.XXX II of 1955 (3) The Saurashtra Anatomy Act, 1955 :

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1. These words were substituted for the words "an unclaimed body" by Mah.35 of 1975 , s.5 (1)
2. These words were substituted for the words" for the purpose specified in the Act",*ibid*.,s.5 (2)
3. Section 7 was substituted for the original by Bom. 44 of 1959, s.7.
4. These words were substituted for the words "Provincial" by the Adaptation of Laws Order 1950.
5. Sections 10A and 10B were inserted by Mah. 35 of 1975, s.6.
6. Section 11 was added by Bom. 44 of 1959, s.8.

* The words "State of Bombay" stand unmodified by the Maharashtra Adaptation of Laws (State and Concurrent Subjects) Order, 1960.

Provided that such repeal shall not affect,-

(a) the previous operation of any enactment so repealed;
(b) any right, privilege, obligation or liability acquired, accrued or incurred under any enactment so repealed.
(c) Any penalty incurred in respect of any offence committed against any enactment so repealed; or
(d) Any investigation, legal proceeding or remedy in respect of any such right, privilege, obligation, liability or penalty as aforesaid;

and any such investigation, legal proceeding or remedy may be instituted, continued or enforced, and any such penalty may be imposed as if the said Act had not been passed:

Provided further that, subject to the preceding proviso, any officer appointed or authorised, or institution approved, or reference made by or under such enactment shall in so far as it is not inconsistent with this Act, be deemed to have been appointed, authorised, approved or made under the corresponding provisions of this Act and shall continue to be in force accordingly, unless and until superseded by anything done or any action taken under this Act:

Provided also that, the rules made under this Act and in force immediately before the date of commencement of the said Act, shall be deemed to be the rules made under this Act in relation to the whole of the State, unless and until suspended by anything done under this Act.]

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GUIDELINES TO AUTHORS/ CONTRIBUTORS

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