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From Editor's Desk

It is my pleasure to present before you the first issue of this New Year 2005. As it is customary to take a resolution on the New Year eve, we also make a resolution to improve the quality and status of our journal. We learn from the mistakes and try to improve upon these mistakes. We have tried to improve the journal by forming a global advisory panel along with the national advisory panel. You will be glad to know that now this journal is indexed with the IndMed (medind.nic.in) and your full papers will now be available online. I am thankful to the advertisers who have provided additional funds for this journal.

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CRIME SCENE INVESTIGATION-A HOLISTIC VIEW

Physical evidence has potential to play a critical role. Approach should be objective, thorough and thoughtful. Recognize and preserve physical evidence. It is the only opportunity to recover and preserve physical evidence. Case information is obtained by statements from witnesses and suspects. Physical clues initially though irrelevant may become crucial to successful resolution of the case. During crime scene investigation one must follow fundamental principles of investigation. Variations can be depending upon local facilities

Crime scene personnel must have basic training, update their knowledge and must develop skills and abilities by advanced training. For potentially devastating situations as biological weapons, radiological or chemical threats, fire and arson, bomb and explosions, electronic crime investigations need special care and advice.

Investigation of death is very important and need special attention and training. Protection of crime scene is very important for the investigation of crime scene.

It is important for initial responding officers (when we dial 100) to be observant when entering the crime scene. The person who has informed first must be guided not to re-enter the crime scene and prevent others also from entering the crime scene. If additional force is required to maintain scene integrity must be requested to higher officials. It is the foremost duty to preserve the scene with minimal contamination and disturbance of physical evidence. The scene should be treated as a crime scene. One should promptly and cautiously enter crime scene without disturbing and distorting the evidence. One common entry path should be earmarked after prior examination for evidence. Crime scene protection is very important. We should look for the material which can provide a link between the victim, the suspect and the crime scene.

Observe persons, vehicles events, potential evidence and environmental conditions. Safety and well being of officers and other individuals should be first priority. Identify and control any dangerous situations or persons. Control of physical threats will ensure safety of officers and others present.

Such initial responding officers can work in a better manner if they have with them following items e.g. consent/search forms, crime scene barricade tape, first-aid kit, flares, flashlight and extra batteries, paper bags, personal protective equipment (PPE). These items should be in police vehicles or readily available to initial responding officer. Other items like audiotape recorder, camera with flash and extra film, chalk, directional marker/compass, disinfectant, maps, plastic bags, pocket knife, reflective vest, tape measure, tarps to protect evidence from the, weather, traffic cones, waterless hand wash with germicide and wireless phone.

Medical attention is provided to the injured persons with minimal contamination of the scene. Assisting, guiding about need to preserve and secure evidence. Instructing medical personnel during care and removal will diminish risk of contamination and loss of evidence. If injuries are incompatible with life emergency personnel should not be allowed to enter. Identify persons at the crime scene and control their movements. Controlling persons at crime scene is essential in maintaining scene integrity, safeguarding evidence and minimizing contamination. This is very difficult job but one should be tactful and courteous. A log book can be put and ask everybody entering crime scene to register his name, fingerprints and shoe prints to rule out contamination

Boundaries should be identified and secured. This can be done with a tape, rope, branches of a tree or vehicles present there. One should remember that boundaries can be reduced in size if necessary but cannot be easily expanded. All observations must be documented at the earliest possible to preserve information.

When the investigating officer arrives turn over control of scene and brief investigating officer in charge. Briefing the investigator taking charge helps further investigative responsibilities. Initial responding

officer will provide a detail report to the investigating officer when he arrives.

Investigating officer after arrival at the crime scene will conduct scene assessment. Assessment of investigator determines type of incident and level of investigation. He will identify specific responsibilities, share preliminary information and develop investigative plans. Written and photographic documentation provides a permanent record.

Identify valuable and fragile evidence by systematic examination and documentation of scene. In crimes against the persons these may be in the form of blood, semen, saliva, hair, tissue and fibres. In crimes against property these may be in the form of glass, paint, tool marks or accelerants.

Problems are complicated due to minute amounts of material and complexities of the matrix in which the materials are found. We should do our best with these trace evidences as results should be beyond any reasonable doubt.

Search should always be in such a manner that no area is left without search. It may be done strip wise, grid wise, zone wise or in a spiral manner. Determine composition of team that which type of experts are required for that particular crime scene. Prioritize collection of evidence, preserving, packing and transport evidence. Minimize contamination by being safe, clean and careful to ensure the welfare of personnel and integrity of evidence. A well documented scene ensures the integrity of the investigation and provides a permanent record for later evaluation. Documentation can be done by notes, sketches or by photography and audio-video recording.

Appropriately packaged, labeled and maintained in a secure, temporary manner until final packaging and submission to FSL. Continuity in the chain of custody is essential

Final survey of crime scene should always be done. Performing final survey of crime scene allows investigating officer and other responders to share information. It is the best opportunity for investigating officer and other responders to ensure that crime scene investigation is complete.

After the investigation is complete reports and other documentation should be compiled into a case file.

It is essential for the investigating officer to possess the following additional items other than initial investigating officers for successful investigation e.g. the crime biohazard bags, body fluid collection kit, casting materials, cutting instruments (knives, box cutter, scalpel, scissors), evidence collection containers, evidence identifiers, evidence seals/tape, high-intensity lights, latent print kit, magnifying glass, measuring devices, permanent markers, photographic scale (ruler), presumptive blood test supplies, sketch paper, tool kit, tweezers/forceps. Other helpful items are bloodstain pattern examination kit, business cards, chemical enhancement supplies, entomology (insect) collection kit, extension cords, forensic light source (alternate light source, UV lamp/laser, goggles), gunshot residue kit, laser trajectory kit, maps, marking paint/snow wax, metal detector, mirror, phone listing (important numbers), privacy screens, protrusion rod set, sexual assault evidence collection kit (victim and suspect), shoe print lifting equipment, thermometer, video recorder.

In addition to it there are specific evidence collection kits like Blood collection, Blood stain pattern documentation, Fingerprint Impression and excavation Tool marks, Trace evidence collection, trajectory and Pattern print lifter kits.

A great emphasis should be laid on proper training of police officials. There should be specific policies concerning crime scene investigations. There is great need for strengthening of resources of police stations. In these investigations when the impossible has been eliminated, what so ever will remain, however improbable, will be the truth."

Moreover there should be zeal to solve the crime. I have no hesitation in concluding that if investigator has the highest integrity along with training and resources then justice is done at crime scene only.

Prof. R.K. Gorea

SEXING OF SACRUM BY SACRAL INDEX AND KIMURA'S BASE-WING INDEX.

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ABSTRACT

A study for sexing of sacra was carried on 64 sacra (32 male & 32 female sacra) by two methods. One method used was sacral index and the other method was Kimura's base-wing index. The measuring instrument used was sliding vernier caliper. The method of sacral index showed high success rate as compared with Kimura's base-wing index method.

Keywords : Sacra, sacral index, Kimura's base-wing index.

INTRODUCTION

The identification of sex in human skeletal remains an important component of many anthropological investigations, and should be based on measurements and observations on the entire skeleton to be meaningful (Stewart 1954). Sacrum is an important bone for identification of sex in human skeletal system. Since it is a component of axial skeleton and because of its contribution to the pelvic girdle and in turn to the functional differences in the region between the sexes, it has an applied importance in determining sex with the help of measurements carried upon it. Over the years different authors had carried various types of measurements on human sacra of different races and regions.

The well known method for determination of male type sacrum or female type sacrum has always ideally been the Sacral Index method as explained in the Hrdlicka's Practical Anthropometry. The formula for Sacral Index is; $\text{Sacral Index} = \frac{\text{Width of Sacrum} \times 100}{\text{Height of Sacrum}}$.

MATERIALS & METHODS

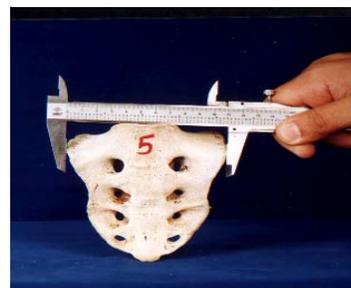
Materials

The materials for the present study consisted of 64 human adult sacra obtained from Dept. of Anatomy, M. P. Shah Medical College, Jamnagar,

Saurashtra region. All the sacra were normal, fully ossified, were devoid of any osteophytes and were fully mature.

Methods

There were two methods followed. And in both the methods, the use of sliding vernier caliper was incorporated. The first method was to determine the sacral index of sacrum. Therefore sacral index was measured by taking the breadth and length of individual sacrum with the help of vernier caliper and adopting the method demonstrated in Hrdlicka's Practical Anthropometry. The stem of caliper was applied to upper surface of the body of first sacral vertebra and measurement of maximum breadth was taken across the greatest expanse of lateral masses of the bone as shown in photograph-1.



Photograph-1.(to measure the width of sacrum)
SVC=sliding vernier caliper, S=sacrum

The maximum height or length was measured by applying the sliding caliper to middle of promontory and middle of anteroinferior border of fifth sacral vertebra as shown in photograph-2. Thus sacral index was calculated as Width (maximum breadth) x 100 / Maximum Height.



Photograph-2.(to measure the height of sacrum)

The second method adopted by the present study for sexing the sacrum was by means of Kimura's method of base-wing index. According to the above method, the transverse width of sacral base, as shown in photograph-3(i.e.: the transverse width of superior surface of body of first sacral vertebra i.e.: transverse diameter of body of S1) was taken. And the other parameter the transverse width of the wing (lateral margin of the base to the most lateral border of the wing or ala of sacrum) as shown in photograph-4 was taken into consideration.



Photograph-3.(to measure the base of sacrum)



Photograph-4.(to measure the wing of sacrum)

And therefore Kimura's Base-wing index was calculated as Width of wing x 100 / width of base. (Width of the base = transverse diameter of body of S1 or transverse width of superior surface of body of first sacral vertebra.)

OBSERVATIONS

Table-1

Sacral index (t=10.06, t>3.55, p<0.001)

	Male (mm.)	Female(mm.)
Range	90.5 - 106	104.8 - 131
Mean	96.25	113.25
S.D.	4.6	5.74
Mean±3S.D.	82.45 -110.05	96.03 - 130.
Demarking point	<96.03	>110.05
Percentage of bone identified by demarking point	62.5% N=20 readings	68.75% N=22 readings

point

Table-2

Base-Wing index (Right side) t=2.06, t>2.02, p<0.05 (mm.)

	Male (right side)	Female (mm.) (right side)
Range	41.5 - 83.7	64 - 100.5
Mean	61.55	79.5
S.D.	11.7	11.93
Mean±3S.D.	26.45 - 96.65	43.71 - 115.29
Demarking point	< 43.71	> 96.65
Percentage of bone identified by demarking point	18.75% (N=6 readings)	18.75% (N=6 readings)

Table-3

Base-Wing index (Left side) t=1.79, t<2.02, p>0.05

	Female(left side)	Male(left side)
	(mm)	(mm)
Range	41.2 - 87	64 - 103.7
Mean	62.15	75.9
S.D.	12.64	9.3
Mean±3S.D.	24.23 - 100.07	48 - 103.8
Demarking point	<48	>100.07
Percentage of bone identified by demarking point	18.75% (N=6 readings)	18.75% (N=6 readings)

The individual measurements were carried out with the help of vernier caliper, i.e. height, width and index of the sacra and statistical analysis were carried out for both the methods and the results were compiled and arranged in the above tables. The observations showed that in case of the sacral index method; the range for males was 90.5 - 106

and in case of females it was 104.8 - 131; mean for males was 96.25 and for females it was 113.25, as shown in table-1. Thus by using $\text{mean} \pm 3\text{S.D.}$, the demarking point for males was <96.03 and for females was >110.05 . The present study had found 20 readings of male falling within the demarking point and 22 readings of female falling within the demarking point. Therefore, the percentage beyond demarking point for males was 62.5% and for females was 68.75% with an accuracy of 99.75% as shown in table-1.

Similarly, according to table-2 and table-3; the Kimura's base-wing index for right side and left side respectively, with their range, mean and standard deviation (S.D.) were shown. The percentage beyond demarking point for base-wing index of right as well as of left side was 18.75% for both males and females. Thus, the Kimura's base-wing index for right side showed 6 readings as male type and 6 readings as female type and same was true for the left side.

The t value for sacral index was 10.06 and p value was <0.001 and as t was >3.55 , it was considered highly significant. The t value for Kimura's base-wing index of right side was 2.06 and $p < 0.05$ and the t value for base-wing index of left side was 1.79 and $p > 0.05$ and therefore they were not significant.

DISCUSSION

Flander (1978) had showed the univariate and multivariate methods for sexing the sacrum. She had used numerous new osteometric dimensions (around 15 dimensions), the method she had followed was rather complex. Flander's study was useful because she had developed a technique to assess sex and race simultaneously by using sacra from American Blacks and Whites (50 each sex-race). Two discriminant functions were developed by her. The first one assumed that race was known. The accuracy of determination based on a total of six measurements ranged from an average of 84% for Whites to 91% for Blacks. The most discriminating variables were the anteroposterior dimension of the S1 body and transverse breadth of the S1 body for both races in known races. In the second function, she had assumed race to be unknown. Classification accuracy ranged from 54% to 78%. Stradalova

(1974), had also shown a complex method for sexing of sacra using 15 dimensions and her sample consisted of 128 sacra (72 males, 56 females) from Charles University, Prague. The accuracy ranged from 86.5% to 88.5%, depending on the number of measurements taken. Kimura (1982) had presented a base-wing index and his samples included Japanese sacra (52 males and 51 females) from the Yokohama city Medical school, American Whites (50 males and 50 females), and American Blacks (49 males and 48 females) from the Terry collection. Measurements and the index obtained from these collections included the transverse width of the sacral base (i.e. the transverse width of superior surface of first sacral vertebra), and transverse width of the wing (lateral margin of the base to the most lateral border of the wing i.e. ala of sacrum) and the index was calculated as $\text{width of the wing} \times 100 / \text{width of base}$ i.e. Kimura's index = $\text{Width of wing} \times 100 / \text{Width of base}$.

The Present study had adopted two methods for sexing of sacrum; one was the sacral index method as described by Hrdlicka's Practical Anthropometry and other method was of Kimura's Base-Wing index method. The observations obtained by the present study as a result of the above two methods on 64 sacra were shown in respective tables. Mishra et al (2003), showed in their study that while using sacral index method, 39.2% of male sacra were identified and 80.1% of female sacra were identified by demarking point; But they also showed that only 2.7% of male sacra were identified (demarking point) and 38.0% of female sacra (demarking point) were identified when they used the alar index method.

Alar index = $\text{length of ala} \times 100 / \text{transverse diameter of body of S1}$.

The Alar index was same as Kimura's base-wing index.

Thus comparative graphs showing the standard deviation and means of length, width, transverse diameter of body of S1, length of ala, sacral index and base-wing index of the sacra (both male and female), were constructed according to the studies by Mishra et al and the present study.

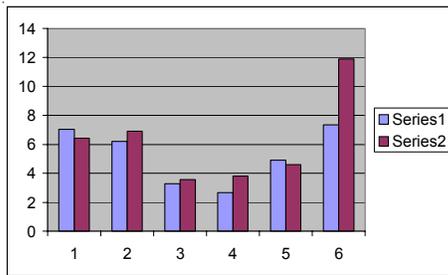
Similarly, percentage of bone identified by demarking point by using sacral index and alar

index according to Mishra et al was shown as graphical representation and also percentage of bone identified by demarking point by using sacral index and Kimura's base-wing index according to the present study was also represented in the form of graphs.

Similarly the Present study showed that according to sacral index method; 62.5% of male sacra were identified (demarking point) and 68.75% of female sacra (demarking point) were identified. Thus 20 readings out of 32 males sacra confirmed male type and 22 reading out of 32 female sacra confirmed female type by using Sacral index method. The present study also showed that according to Kimura's Base/Wing index method only 18.75% (demarking point) of male and female sacra were identified both on the right and left sides. Thus, only 6 readings out of 32 male sacra confirmed male type and 6 readings out of 32 female sacra confirmed female type while using Kimura's Base/ Wing index method.

CONCLUSION

The present study therefore revealed that for sexing of sacrum, the readings obtained by sacral index method were more relevant and more



Graph- 1

Series 1 is Mishra et al and Series 2 is Present study.
(S.D. of male type).

1- height, 2- width, 3- transverse diameter of body of S1, 4- ala, 5- sacral index and 6- Kimura's base-wing index

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LIGATURE MARK ON NECK: HOW INFORMATIVE?

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ABSTRACT

Many a times, a ligature mark may be the only evidence available in cases of asphyxial deaths due either to hanging or strangulation. A thorough examination of the ligature mark and analysis of the information provided by it, is therefore, a must to arrive at the most probable cause of death and differentiate between hanging and the ligature strangulation. A retrospective study was conducted at the Department of Forensic Medicine and Toxicology, Government Medical College & Hospital, Chandigarh, between 1997 to 2004 to assess the information provided by a ligature mark in such cases. We found that deaths due to hanging constituted 3.4% of the total unnatural deaths subjected to medicolegal autopsy; young adults, of the age group 21 to 25 years accounted for the maximum cases, 27%; and the male: female ratio was 2:1. Chunnis was the most common ligature material used. Majority of the victims preferred multiple knots (61%) and fixed knots (58%) and a single loop (93%). The mark was obliquely placed (98% cases) above the larynx (85% cases). In all the cases of ligature strangulation, the mark was transverse, below the level of thyroid cartilage. Imprint over the groove when present, corresponded with the ligature material used in all the cases. It was concluded that a thorough, scientific examination of the ligature mark, though not conclusive, but is the most important part of the postmortem examination of deaths due to hanging and ligature strangulation.

Keywords: Ligature mark, Strangulation, Asphyxial deaths

INTRODUCTION

Hanging is asphyxia due to constriction of neck as a result of suspension in such a manner that the weight of the body or a part of the victim's body pulls upon the ligature. The factor of suspension differentiates hanging from strangulation by ligature, the later being caused by the application of a ligature to the neck in such a way that the force acting upon it is other than the weight of the body [1]. Both, in hanging and ligature strangulation, a ligature mark may be produced by local damage to the skin of the neck due to pressure that may be associated with an additional lateral rubbing action resulting into associated abrasion. This ligature mark on the neck is of crucial diagnostic importance and requires detailed inspection with regard to its course, depth and width. Sometimes the groove retains the pattern of the ligature material (as for example, a spiral weave of the rope). Vice versa, the examination of the ligature material is an indispensable part of

the autopsy [2].

The ligature mark appears as a furrow on the skin whose direction is determined by the point of suspension (knot). Depending upon the duration of suspension, the furrow is initially pale or yellow parchment like area with a rim that is congested or with slight punctiform haematomas. With time, the furrow dries & becomes brownish [3]. The narrower the ligature and the harder its material, and also, the longer the suspension time, the more detectable is the ligature mark on the skin. However, for record purposes, the contrast between the reddish and paler bands of skin can be accentuated in a properly taken photograph. To obtain this result, a number of photographs should be taken, each at a different exposure times - a technique called 'bracketing' or color saturation.

The line of congestion or the hemorrhages, which may be seen along the course of a furrow, is of interest with regards to its significance. This line was interpreted as a vital reaction by Polson [4] but

not unquestionably so by Simpson [5]. Casper [6], in an attempt to ascertain the diagnostic value of a ligature mark, experimentally suspended or strangled cadavers for varying periods of time and produced markings of different shades of yellow or brown. In some instances, these colors, along with the parchment-like changes in the skin, appeared within a few minutes after the body was suspended. In order to make the noose tight in these cases, the bodies were forcibly depressed by pressure on shoulders or by strong pulling at the feet. In one case of ligature strangulation, the mark was bluish. In no instances did he describe any reddish or pink discoloration of the skin at the ligature site.

Streaks or bands of reddened or pink tissue, distinct and apart from the natural color of the skin, when seen in cases of hanging, can be interpreted as an intra-vital reaction. These streaks and bands, in and of themselves, are not sufficient to establish a diagnosis of ante-mortem hanging. However, if in a particular case of hanging, the following three characteristics are shown by neck markings, the diagnosis of ante-mortem hanging can be made with a high degree of probability, in the absence of strong proof to the contrary [7]. This triad of characteristics consists of:

- 1) Streaks or bands of reddened or pink tissue;
- 2) A pattern that reveals the imprint of ligature; and
- 3) Canting or sloping of the markings upwards towards the back of neck.

An additional and corroborating quantum of proof would be the demonstration, by microscopic examination, of engorgement in the reddened and pinkish area in contrast to the adjacent non-engorged and non-hemorrhagic areas. However, it must be stressed that without the presence of reddened or pink colored neck markings, differentiation from post-mortem hanging is not possible [7]. Furthermore, the histological findings in hanging and ligature strangulation marks have mainly been studied under the aspect of vitality [8]. In this context, the significance of skin blisters has been discussed controversially [9]. In recent times, most authors have agreed that blisters in the periphery of skin marks can also be formed postmortem, especially in cases of prolonged

suspension small sub- and intra-epidermal blisters filled with serous fluid and fat may form on wide skin ridges between ligature turns or at the margin of the groove. This is obviously the result of local skin compression that forces the tissue fluid not only into the depth but also towards the skin surface. In view of the vulnerability of the blisters, it is not surprising that the thin epidermal wall may easily rupture thus contaminating the ligature with serous fatty fluid. The abraded epidermal scales attached to the ligature material mostly consist of horny material derived from stratum corneum but sometimes basal layers containing cell nuclei can also be found. This can be subjected to DNA-typing [10].

It is also said that the ligature mark being mainly a post-mortem phenomenon, any inner neck structure injury indicating ligature mark intra-vitality is to be identified to establish the ante-mortem hanging [1]. However, the frequency and distribution of injury to the inner neck structures caused by hanging is not always forthcoming and the doctor conducting autopsy has to rely upon the ligature mark and the circumstantial evidence that may be misleading at times. The present study evaluates neck markings to determine whether these, in and of themselves, demonstrate characteristics suitable for a diagnosis of ante-mortem hanging.

MATERIAL & METHODS

A retrospective study of asphyxial deaths due to hanging and ligature strangulation, subjected to medicolegal autopsy by the department of Forensic Medicine, Government Medical College Hospital, Chandigarh, between 1997-2004, was carried out with a view to assess the information that a ligature-mark can provide in such deaths. History regarding the incident, age, sex, distribution of postmortem staining, absence/ presence and the material used as the ligature, the particulars of the knot and the ligature mark, etc, were obtained from the hospital records.

OBSERVATIONS

A total of 2668 medicolegal autopsies were conducted by the department during the period under study, of which 91 (3.4%) were deaths due to hanging and 04 (0.15%) were due to ligature

strangulation. The year-wise percentage of hanging cases in relation to the total autopsies was almost constant at 3% with a slight variation from 2% - 5%.

Table 1

Year-wise distribution of cases

Year	Total autopsies		Cases of hanging	
	No.	%	No.	%
1997	264	09.90	10	03.79
1998	287	10.76	09	03.14
1999	352	13.19	13	03.69
2000	387	14.51	14	03.62
2001	383	14.36	11	02.87
2002	338	12.67	07	02.07
2003	288	10.80	15	05.21
2004	369	13.83	12	03.25
Total	2668	100	91	03.41

Young adults, of the age group 21-25 years, accounted for the maximum number cases, 25 (27%); followed by the 16-20 yrs age group - 20 (22%) cases and the 26-30 yrs group - 17(19%) cases. In males, the 21-25 yrs group [17 (27%)] was followed by the 31-40 yrs group [14 (23%)] in contributing towards the maximum cases; while in females, it was the 16-20 yrs group [9 (31%)], followed by the 21-25yrs group [8 (28%)], there being no cases in the 31-40 yrs age group. 79% of female deaths occurred in the age group 16-25 yrs. Overall, males accounted for 68% cases, the male: female ratio being 2:1.

Table 2

Age and sex-wise distribution of cases

Age-Group (Yrs)	Males		Females		Total
	No.	%	No.	%	
0-10	00	00	00	00	00
11-15	02	100	00	00	02
16-20	11	55	09	45	20
21-25	17	68	08	32	25
26-30	11	65	06	35	17
31-40	14	100	00	00	14
41-50	06	55	05	45	11
51-60	01	100	00	00	01
>60	00	00	01	100	01
Total	62	68.1	29	31.9	91

The ligature material was not present in 36 (40%) cases. In those cases, where it was present [55 (40%) cases], "chunni" was the most commonly used ligature material, 17 (31%) cases; followed by nylon rope, 10 (18%) cases and bed-sheet, etc., 09 (16%) cases. Shawl, 01 (02%) cases, was the least used ligature material.

Table 3

Ligature material

Ligature material	Cases (N=91)	
	No.	%
Absent	36	39.56
Present	55	60.44
a) Nylon rope	10	18.18
b) Jute rope	07	12.73
c) Chunni	17	30.90
d) Bed sheet, etc.	09	16.36
e) Newar	04	07.27
f) Cable wire	04	07.27
g) Electric wire	03	05.46
h) Shawl	01	01.82

Of the 55 cases in which the ligature material was present, the type of knot used was not mentioned in 19 (35%) cases. In the rest, the ligature material was tied either with a single knot, 14 (39%) or multiple knots, 22 (61%) cases. Again, the knot used was a 'Slip knot' in 17 (42%) cases and 'Fixed knot' in 19 (58%) cases.

The position of the knot, was similarly, not mentioned in 6 (11%) cases. In the rest [49 (89%) cases], the most common side was the left side neck, 21 (43%) cases; followed by the right side neck, 15 (31%) cases. Front of neck was the least preferred position for the knot, 01 (2%) cases.

Table 4
Particulars of the knot

Knot particulars	Cases (N=55)	
	No.	%
Type of knot		
Not mentioned	19	34.55
Mentioned	36	65.45
(a) Multiple	22	61.11
Single	14	38.89
(b) Slip	17	42.22
Fixed	19	58.78
Position of knot		
Not mentioned	06	10.90
Mentioned	49	89.09
a) Right side, neck	15	30.61
b) Left side, neck	21	42.86
c) Back, neck	12	24.49
d) Front, neck	01	02.04

The ligature mark was complete in 15 (17%) cases, there being a single loop round the neck in 85 (93%) cases. The level of the mark was above the larynx in maximum cases, 77 (85%) and below the larynx in the least no. of cases, 02 (02%), while, it was not mentioned in 07 (08%) cases. The ligature mark was obliquely placed in 89 (98%) cases. However in all the 4 (100%) cases where ligature strangulation was reported as cause of death, the ligature mark was transversely placed,

DISCUSSION

The mark on the neck is the principal external sign of hanging and ligature strangulation that requires detailed inspection, bearing in mind, the possibility of coincidental signs of strangulation. The appearance of ligature mark at autopsy naturally depends on the nature and texture of the ligature material. When there is a pronounced pattern, such as the weave of a cord or plaiting of a thong, the same pattern may be imprinted into the skin. In homicide where the ligature has been removed by the perpetrator, such a pattern may be of great value in tracing its origin. When a fabric, such as a scarf, chunni, or towel has been used, the marks on the neck may be difficult to interpret. A broad

below the thyroid cartilage. There were no imprints on the ligature mark, corresponding to the ligature material used, in 65 (71%) cases; however, they were present in 16 (18%) cases. There was no mention of any imprints in 10 (11%) cases.

Table 5
Particulars of the ligature-mark

Ligature mark	Cases (n=91)	
	No.	%
Mark		
Complete	15	16.48
Incomplete	76	83.52
Loops		
Single	85	93.41
Multiple	06	06.59
Level		
Above larynx	77	84.62
At the level of larynx	05	05.50
Below larynx	02	02.20
Not mentioned	07	07.69
Position		
Obliquely placed	89	97.80
Transversely placed	02	02.20
Transversely placed, below thyroid cartilage	04	100
Imprints		
Absent	65	71.43
Present, corresponding to ligature material	16	17.58
Not mentioned	10	10.99

flat band may leave no mark whatsoever, but it usually leaves one or more, often discontinuous, linear marks on the skin of the neck. This sharply defined mark may be misinterpreted as being caused by a narrow cord or wire because when a broad piece of cloth is tightly stretched, one or more bands appear that are under greater tension than the rest. These marks, though less well demarcated at the edges than that of a cord or rope, can cause confusion [11].

The geometry of the mark is important in interpreting the events. In hanging, the mark of a fixed loop takes the form of a groove, which is deepest opposite the knot. Here the width of the groove is about or rather less than the width of the

ligature. Skin in the groove is pale or it may be yellowish brown, and is not infrequently hard, like parchment. Any well-defined pattern in the ligature is likely to be reproduced in the groove. A thin red line of congestion or hemorrhage is likely to be present above and below the groove at some points, if not throughout the course, in case the hanging is ante-mortem. The groove nearly always lies above the larynx and its course is to be traced round the neck, although the mark is rarely as clear at the nape as at the front or sides of the neck. It takes an upward course in the region of the knot to form an inverted 'V', the apex of which corresponds with the site of the knot. In case of ligature strangulation, normally, the mark is a groove, of about the same width and about half of the thickness of the ligature in depth, which takes a horizontal course round the neck, more prominent at the front and sides than at the back, at a level which lies on or below the 'Adam's apple'. The course of the mark may be interrupted and an abrasion in the gap indicates the position of the knot [12].

A ligature, which is wound more than once round the neck will impart a corresponding complexity to the grooving, usually with red linear bruising between the grooves, where the skin has been pinched between the strands. Multiple turns thus produce a complex mark in which it may be possible to trace the number of turns but a complex ligature composed of several pieces knotted together may yield a mark that suggests multiple turns when in fact there was only one. Furthermore, any departure from the running noose or a noose fixed by a granny or reef knot calls for special care in interpretation.

Occasionally, when the ligature is still in position when the body is examined, it may appear to be deeply embedded in the skin, sometimes almost out of sight, and on its removal a deep groove may be seen in the skin. This embedding may be accentuated by edema of the tissues, especially above the ligature. Presumably, some passive transudation of tissue fluid continues even after the circulation has stopped, and as such, edema may continue to develop to some extent even after death, accentuating the depth of the groove.

There may be additional marks by way of

bruising and abrasion in both hanging and strangulation, which may result either from manual strangulation, or attempted manual strangulation prior to hanging or strangulation by a ligature. Alternatively, the victim may produce them in an attempt to slacken the ligature, or rarely they may be a result of unskilled attempts at resuscitation. Furthermore, a mark may appear on the neck of an obese subject as a result of hypostasis, the skin in the natural folds of the neck remaining pale by contact flattening and hypostasis ending abruptly on each side of the fold. When the neck is extended, the resulting appearances superficially resemble those produced by a ligature. The 'mark' however, can easily be seen to coincide precisely with folds in the neck. Tight neckwear, through contact flattening, may also yield a mark that superficially resembles that of a ligature. Putrefaction, by causing swelling of the tissues, can yield appearances, which simulate strangulation by a ligature; however, if death had been due to strangulation the mark on the neck is not necessarily obliterated by putrefaction. On the contrary, the compressed skin in the mark tends to be better preserved than the skin beyond it, and even when obscured, subcutaneous hemorrhages in relation to the mark may still be found. Obviously, in these cases, the interpretation must be made with utmost care.

CONCLUSION

A careful forensic examination in asphyxia involving pressure on the neck is of great importance, even in the cases of hanging supposed to be suicidal, with the aim of ascertaining the antemortem character of the lesion and the physio-pathological mechanism of death and to exclude the possibility of murder dissimulation. Furthermore, the furrow being mainly a post-mortem phenomenon, any inner neck structure injury indicating ligature mark intravitality is to be identified to establish the antemortem hanging. However, the frequency and distribution of injury to the inner neck structures caused by hanging is not forthcoming on many occasions and the doctor conducting autopsy has to rely upon the ligature mark and the circumstantial evidence that may need to be interpreted very carefully to arrive at a possible conclusion.

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A STUDY OF SERUM ENZYMAL CHANGES AFTER DEATH AND ITS CORRELATION WITH TIME SINCE DEATH.

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ABSTRACT

A prospective study was undertaken as a part of postgraduate thesis work on quantitative serum enzymal changes after death in the Deptt. of Forensic Medicine GMC Bhopal (M.P.) in 1999-2002. A total of one hundred study cases and ten control cases were randomly selected after screening. The sera was assayed biochemically by photoelectric colorimetry for an imotransfereases (AST & ALT) and serum acid phosphatase. The enzymal levels were plotted against known postmortem interval. The graphical records were studied with a view to ascertain whether such assyas could be of any help to calculate time since death routinely.

Key Words: Time since death, Serum enzymes, amino Transferase, acid phasphatase.

INTRODUCTION

The estimation of time since death after autopsy has been and remains to be one of the most difficult challenges to a medigolegal expert. This single vital information when calculated accurately has the potential to unravel many unfolded medicolegal mysteries. Thoughtall claims have been made regarding break throughs in this direction in recent times, but on analysing the whole scenario, it is very clear to see that medicolegal experts have to rely heavily and probably solely on age old subjective medhods of observing the external as well as visceral somatic changes in the dead body that take place after death like cooling of the body, rigor mortis, changes in the eyes, hypostasis, signs of decomposition, mummification, adipocere formation, maggots infestation etc and circumstantial evidences. No objective and accurate method is available which is unequivocally accepted.

Hence there is need to re-explore other objective methods such as bio chemical, histological, serological assays etc, An effort was made to ascertain, whether it was practical and significant enough to estimate time since death by knowing quantitative serum enzymal changes.

Obviously one has to keep in mind that since he is dealing with biological material like human corpse, blood sera etc. there have to be inherent biological variations in antemortem levels as well as the postmortem changes.

MATERIAL & METHODS

A total of hundred study cases, which were the dead bodies brought to the departmen by investigative agencies for medicolegal autopsy, were studied. Ten living control cases have also been selected to study their serum enzymal profile obtained by the same method of enzymal assay as of study cases.

Enzymes studies were

1. Aminotransferances
AST aspartate aminotransferase
ALT Alanine aminotransferase
2. Serum acid phosphatase.

Ten ml. blood was taken out with a wide bore disposable plastic syringe through femoral puncture and was immediately centrifuzed and the available serum aminotransferases were assayed by Reitman & Frankel's DNPH (Diphosphopyridine

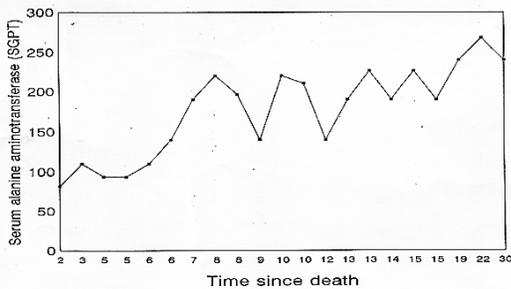
nucleotide) colorimetric method using photoelectric colorimeter. Calibration curve was drawn, absorbance of light was measured from photoelectric & colorimeter and enzyme activity estimated by referring the absorbance value to calibration curve.

Serum acid phosphatase was estimated by KING'S method. Optical densities were measured from photoelectric colorimeter and enzyme activity was measured in King Armstrong units/ml by the following formula :

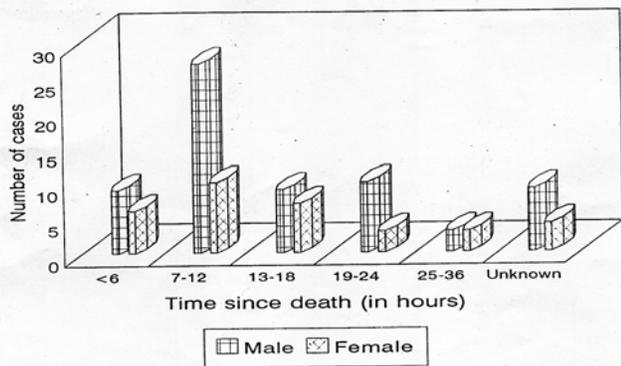
$$\text{Serum acid phosphatase activity (in king armatrong units)} = \frac{\text{Optical density (control)} \times 5}{\text{Optical density (blank)}}$$

OBSERVATIONS

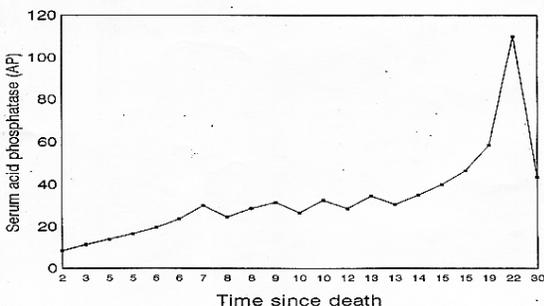
SHOWING RELATIONSHIP BETWEEN (SGPT) AND TSD IN BURN CASES



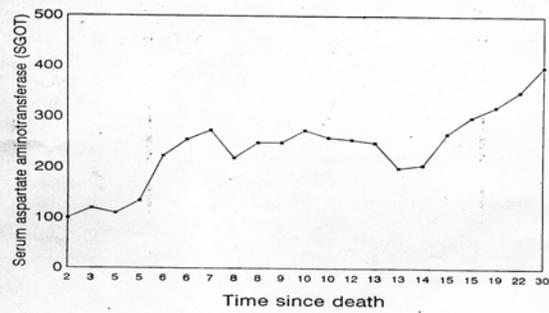
TIME SINCE DEATH OF DIFFERENT STUDY CASES



SHOWING RELATIONSHIP BETWEEN (AP) AND TSD IN BURN CASES



SHOWING RELATIONSHIP BETWEEN (SGOT) AND TSD IN BURN CASES



RESULTS AND DISCUSSION

1. The available literature on biochemical (enzymal) changes in postmortem blood (serum) and its relation with time since death is scanty. Whatever little work is available is almost exclusively by forensic scientists from the temperate countries, where environmental factors inclusive significantly of temprature, affecting such biochemical changes differs in a big way from countries like INDIA.
2. Increasing hemolysis of postmortem blood with greater postmortem interval seems to be the single most important confounding factor giving erroneously high values with photoelectric colorimetry. Hence further study involving other more sensitive & specific methods least effected by degree of hemolysis like radio immunoassay is recommended.
3. A definite and marked rise in serum enzymal levels after death was noted from 2 hours after death on wards.
4. In many cases with increasing time since death enzyme levels register increasing values but interspersed cases show such abnormality and non regular high or low values that deciphering the graphical pattern thus drawn involving two variables in terms of time since death seems unwisely.
5. The refrigerated bodies and samples give abnormally low values.
6. The cases dying of multiple injuries involving trauma to liver show markedly high levels.
7. In burn cases the graph is relatively more linear.

8. The conventional and routinely used subjective parameters like rigor mortis, hypostasis, cooling of the body, putrefactive changes etc. combined with the experience, acumen and "third eye" of the medicolegal expert and circumstantial evidence remains to be the best available tools for estimation of time since death.
9. This study is presented as a pilot study in this relatively less investigated subject and hopefully should pave the way for more elaborate, enthusiastic work in future in this subject.

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PATTERN OF FATAL HEAD INJURIES DUE TO VEHICULAR ACCIDENTS IN MANIPAL

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ABSTRACT

Head injury is an important cause of mortality worldwide as head is the most vulnerable part of the body involved in fatal road traffic accidents. The present study was undertaken on 100 victims of Road Traffic Accident who died due to injuries sustained to the head, which were autopsied at Kasturba Medical College, Manipal over a period of 3 years between January 1995 and December 1997.

Most of the accidents had taken place in the afternoon hours (12.01 - 18.00 hrs). There was a marked male preponderance (89 %). The most vulnerable age group to accidents was found to be 21 to 30 years. Both pedestrians and occupants were equally involved. Two-wheeler occupants were most commonly involved.

Head injury was present in 82 % of cases with skull fracture in 62 %. Fracture of the vault was found in 38 %, base of the skull in 34 % and both in 28 % of cases. In most of the cases, fissured fracture was found (57 %). Among intra-cranial haemorrhages, subdural haemorrhage was found in 77 % and subarachnoid haemorrhage in 55 % of cases. Contusions and lacerations of brain were found equally in 35 % of cases.

Key words: Road traffic injury, vehicular accident, head injury.

INTRODUCTION

WHO defined accident as an unexpected, unplanned occurrence that may involve injury[1]. During 1990's Road Traffic Accidents ranked 9th among the leading causes of death in the World. It was projected that, if the same trend continued it would become the 2nd leading cause by the year 2020[2]. Each year road traffic injuries take the lives of 1.2 million people around the world[3]. In 2002, the Global rate of deaths from road traffic injuries was about 19 per 100,000 people with adults aged between 15 - 44 years accounting for more than 50 % of deaths[4].

In developing countries, pedestrians were more frequently involved in road accidents than others and two-wheelers more commonly than other vehicles. In South-East Asian countries, 60-80 % of road traffic injuries occurs in urban and semi-urban regions[5]. In India, one accident occurs every 2 minutes with the accident rate corresponding to 45 per 100,000 population. In 1999, India had road traffic accidents at a rate of

7.5 accidents per 1000 vehicles with injuries and deaths correspond to 7.9 and 2.0 per 1000 vehicles respectively[6].

MATERIALS AND METHODS

The present study includes the retrospective analysis of 100 fatal head injury cases due to Road Traffic Accident, which were autopsied at Kasturba Medical College, Manipal over a period of 3 years from January 1995 to December 1997. Data were collected from police, relatives, hospital and post mortem records. The age & sex wise distribution, time of occurrence of accident, mean survival time of victims, profile of victims, type of vehicles involved and the pattern of cranio-cerebral trauma were studied.

RESULTS AND OBSERVATIONS

Sex and Age distribution:

Males comprised 89 % and females 11 % of the total victims. The age groups of the victim were grouped into 10 year intervals ranging from 0-80

years. The youngest victim was a male child aged 4 months and the oldest was a 77 years old male. The age distribution of study sample is shown in Figure 1. Highest numbers of victims were found in the 21 - 30 years group (24 %) and least in the 71 - 80 years group (1 %).

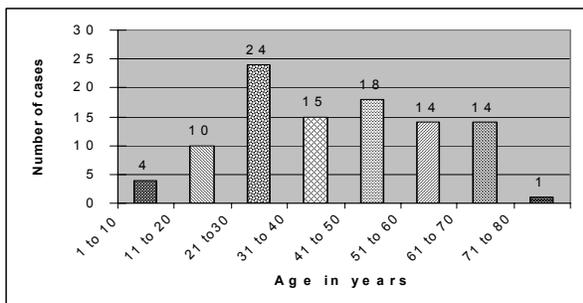


Figure -1

Time of occurrence of accident

The time was divided into 4 periods of 6 hours interval i.e. 0.01 - 6.00 hrs, 6.01 - 12.00 hrs, 12.01 - 18.00 hrs and 18.01 - 24.00 hrs as shown in table 1. Most of the accidents have occurred during 12.01 - 18.00 hrs (39 %) followed by 18.01 - 24.00 hrs (27 %) and least during 0.01 - 6.00 hrs (19 %).

Table 1
Time of occurrence of accident.

Time interval (hrs)	% of cases
0.01 - 6.00	19
6.01 - 12.00	25
12.01 - 18.00	39
18.01 - 24.00	27

Profile of victims

Pedestrians & vehicular occupants were equally involved in the present study (48 % each), while 4 % were due to fall from moving vehicle, which is shown in Figure 2. The types of vehicular

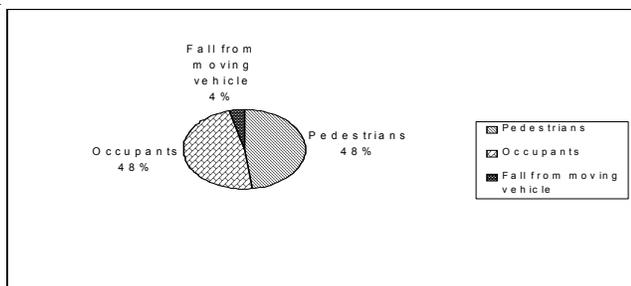


Figure -2

occupants involved in accidents are shown in table 2. Most of the occupants belonged to two wheelers (43 %) and occupants of light motor vehicles and heavy motor vehicles were almost equally involved, which corresponds to 29 % and 28 % respectively.

Table 2
Type of Vehicular Occupants.

Occupants	% of cases
Two-wheelers	43
Light Motor Vehicles	29
Heavy Motor Vehicles	28

Duration of survival and Surgical intervention

Of the total cases, 17 % of victims died on the spot, while 26 % of the victims were treated surgically. Burr holes were observed in 22 % of cases with craniotomy done in 4 %. Dura was sutured in 8 % and lobectomy was done in 6 % of cases. The mean survival period of victims was 3 days.

Pattern of crania - cerebral trauma

External injury to the face & scalp were found in 82 % of the victims. In 62 % of cases, fracture of skull was found. The types of skull fractures are shown in the Figure 3. Fissured fracture was the most commonly observed fracture (57 %). Whereas, comminuted fracture, diastic fracture and depressed fracture were seen in 18 %, 16 % and 9 % respectively. Cranial vault was involved in 38 %, base of skull in 34 %, and both vault and base in 28 % of cases. The sites of skull fractures are shown in table 3. Middle cranial fossa, parietal bone and temporal bone were the commonly involved areas in fracture, which corresponds to 26 %, 22 % and 20 % respectively. Least involved area in fracture was the occipital bone (12 %).

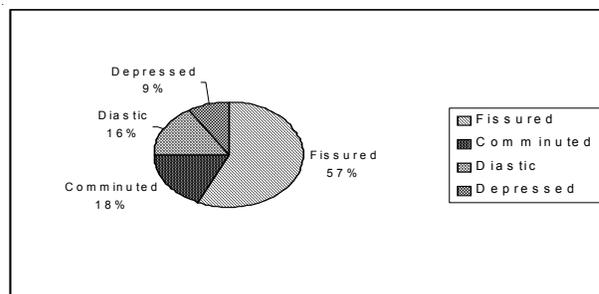


Figure-3

Contusions and lacerations of brain were found in equal number of cases (35 %). Table 4 explains the type of intracranial haemorrhages seen. Subdural haemorrhage (77 %) was observed most commonly, followed by subarachnoid haemorrhage (55 %). Whereas extradural, intracerebral and intraventricular haemorrhages were found in comparatively less number of cases viz., 26 %, 23 % and 22 % respectively. Combination of all haemorrhages was seen only in 5 % of cases.

Table 3
Site of Skull fractures.

Site of fracture	% of cases
Frontal bone	17
Temporal bone	20
Parietal bone	22
Occipital bone	12
Anterior Cranial Fossa	15
Middle Cranial Fossa	26
Posterior Cranial Fossa	17

Table 4
Type of Intracranial haemorrhages.

Haemorrhages	% of cases
Extradural	26
Subdural	77
Subarachnoid	55
Intracerebral	23
Intraventricular	22
Combination of all	5

DISCUSSION

Current trends in population growth, industrialization and urbanization are putting heavy pressure on transport networks particularly on the road systems in the developing world. Because of this, deaths due to Road Traffic Accidents are steadily increasing in the developing countries[7].

In the present study, males are largely involved in the accidents with male to female ratio 9:1. This is in concurrence with other studies8-12. This shows the male dominance in the moving population especially on the roads and in vehicles.

In our study, 21 - 30 years was the most common and those above 70 years was the least common age group involved in accidents. This corresponds with other studies[8-12]. The young and middle aged groups largely consist of students and working people in various jobs, who usually travel by either own vehicles, buses or walk. This results in the involvement of young adults more commonly in road traffic accidents.

Pedestrians & vehicular occupants were equally involved in the present study. In some studies, pedestrians were more involved than vehicular occupants [8,9,11]. Whereas, few studies showed more involvement of vehicular occupants than pedestrians[10,12]. This shows the erratic pedestrian behaviour and reckless driving of vehicles on the roads. Majority of the occupants belonged to two wheelers in our study, which is consistent with other studies[9,11,12]. The increasing trend of driving two-wheelers by college students, who have tendency to drive fast, is probably the reason for increased two-wheeler accidents.

Most of the accidents in our study have occurred in the afternoon (12.01 - 18.00 hrs) followed by evening hours (18.01 - 24.00 hrs), which is in concurrence with study of Nilamber Jha et al[12]. Whereas, findings of some studies have showed that accidents were more between 18.01 - 24.00 hrs followed by 12.01 - 18.00 hrs8,11. That means accidents are common in the afternoon and evening hours. Working people usually get strained physically and mentally by end of the day. This results in decreased reflex action of the person due to fatigue, which may lead to accidents.

In the present study, head injury was present in 82 % cases. This is comparable to studies done by Akang et al[10] (83.8 %) and Chandra et al [9](72 %). Whereas, studies of Gautam Biswas et al11 and Patel8 found it in 56.4 % and 47 % respectively. From the above facts, it appears that head is the most vulnerable part of the body involved in road traffic accidents, which alone accounts for most of the fatalities.

Skull fractures were found in 62 % of our cases, which involved vault and base equally. In the studies done by Chandra et al [9] and Akang et al[10] skull fractures were found in 79.87 % and 38.2 % respectively. This shows that fatalities are

more common in head injuries associated with skull fractures than those without fractures.

In the present study, the most common type of intracranial haemorrhage found was subdural haemorrhage (77 %), which is consistent with the study of Akang et al[10] (62.4 %). This is followed by subarachnoid haemorrhage, which was found in 55 % cases of our study and 24.6 % in Akang et al[10] study. Whereas, study done by Chandra et al[9] showed subarachnoid haemorrhage as most common type (66.9 %), followed by subdural haemorrhage (58.2 %). Extradural, intracerebral and intraventricular haemorrhages were found in significantly less number of our cases, which is in concurrence with other studies[9,10]. Contusions and lacerations of brain were found equally in our study (35 %), which is consistent with study of Chandra et al[9] (24 %). Therefore, it is difficult to predict the type and extent of injury, which would be compatible with life.

Road traffic policies such as pedestrian-friendly paths, separate lanes for light motor vehicles and heavy motor vehicles, and strict implementation of traffic rules and regulations may decrease the incidence of road traffic accidents and its fatalities.

CONCLUSION

From the present study, following conclusions were derived regarding road traffic accidents:

-Males are more commonly involved in accidents.

-Young adults between 21 - 30 years are more vulnerable to accidents.

-Accidents are more during afternoon hours (12.01 - 18.00 hours) and evening hours (18.01 - 24.00 hrs).

-Fatalities are more in two-wheeler occupants than other vehicles.

-Fatal head injuries are commonly associated with skull fractures.

-Subdural haemorrhage is the commonest

intracranial haemorrhage seen in accidents, followed by subarachnoid haemorrhage.

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CORRELATION BETWEEN POSTMORTEM DIAGNOSIS AND SURVIVAL TIME IN POISONING DEATHS

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ABSTRACT

Every deaths resulting from poisoning has to be investigated to establish cause of death. Difficulties in clinical diagnosis of poisoning cases is well known because many a time they present with non specific symptoms and signs or the features may simulate natural disease process. Same with Forensic Pathologist as many times postmortem findings are nonspecific. Some poisons are retained in the body for long time after deaths while others may be rapidly destroyed during metabolic activity. This study was undertaken to find out effect of survival time on the postmortem findings, and on chemical analysis of body tissue and body fluids in poisoning deaths. In majorities of cases death was due to insecticides. Toxicological report showed positive for poison in 70% of cases. Kerosene smell, which is present in Organophosphorus poisoning, is present maximum upto three days. Chemical analysis report showed positive in 94% of cases in first three days. There after chance of detection of poison in routine viscera decreases upto 50%. Suggestions have been made for postmortem diagnosis in poisoning victims.

Key words: Survival time, chemical examiner's report, Kerosene smell, Organophosphorus and stomach wash

INTRODUCTION

In every case of poisoning death, it is the job of the toxicologist to determine exact causes of death by analysis of postmortem remains. Investigation of cases of poisoning is difficult when proper history is not available or when person was brought dead to Hospital or found dead. Antemortem diagnosis of poisoning is based upon signs and symptoms of a specific toxic substance or chemical analysis of stomach wash. When there is delay in transfer of the patient to the Hospital, the diagnosis is based only on signs and symptoms or laboratory investigation of body fluids. After death the positive proof of poison rests in detection of poison in the samples at the Forensic Science Laboratory. Negative report shall always be supplemented with clinical/ postmortem findings and circumstantial evidences [1]. Poison present in the stomach, neither establishes nor eliminates poisoning as cause of death, except for local acting

poison like corrosive acids or alkalis. Toxic effect of the poison on the body is demonstrated by identifying toxic substances or its byproduct through chemical analysis in the tissues or body fluids. [2]

Many of the poison affect the victim immediately and most of the victims' dies within 1 or 2 days. In some cases of fatal poisoning, if the person survives, the poison is metabolized and excreted and no longer detected on chemical analysis. Postmortem changes in these cases are usually nil or in few cases late changes due to poison may be seen. Present study was undertaken to find out the affect of survival time on chemical analysis and postmortem finding. Along with that a suggestion have been proposed for easy diagnosis of poisoning deaths.

MATERIAL AND METHODS

It was a retrospective study of all the

poisoning deaths, which were brought for post-mortem examination to the department of Forensic Medicine, Kasturba Medical College, Manipal during the period from 1st September 1993 to 31st August 2004. During the above-mentioned 11-year period a total of 348 poisoning cases were subjected to autopsy. Relevant data were collected from the autopsy files, inquest papers, information furnished by the police. Hospital records were reviewed in cases where chemical analysis showed negative for the poison., In poisoning death, routine viscera preserved are stomach with its content, initial 30 cms of small intestine, minimum 500gms of liver, half of each kidney and 30ml blood from peripheral blood vessel. In India, Police usually take the relevant samples to the Forensic Science Laboratory and after analysis he has to produce the chemical analysis report before the autopsy surgeon for final cause of death. This process is often lengthy and takes months or even years. Out of 348 cases of poisoning deaths, in 308 cases the police produced the chemical analysis report for final diagnosis at the time of collection of data. Based on the diagnosis that was given by the autopsy surgeon it was grouped into 4 types.

Group-1: When there was definite history of poisoning and Hospital records findings are suggestive of a poison.

Group-2: Postmortem finding suggestive of a poison with at least any one of the above-mentioned features in group-1.

Group-3: Chemical analysis report of the stomach wash showed a poison with or without any of the feature mentioned above in group- 1 and 2.

Group-4: Chemical analysis of the viscera and body fluids showed a definite poison with or without any of the feature mentioned in group- 1,2 or 3.

In this study survival time refers to duration of the interval between consumption of poison and death. Cases where the entry of poison was other than the oral route were excluded from the present study. Variables like kerosene smell in organophosphorous and chemical examiner's report was compared with survival time

RESULTS

During the period of 11 year from September 1993 to August 2004, a total of 348 cases were of

deaths due to poisoning. Types of poison were diagnosed based upon the police history or from retrospective analysis of hospital records and inquest reports. In most of the cases (268) insecticides being the commonest agent (Table-1).

Table 1
Types of toxic agent

Name of the poison	No. of cases	Percentage
Insecticide	268	77.0
Zinc phosphide	10	2.8
Copper sulphate	09	2.5
Medicinal drugs	08	2.3
Alcohol	07	2.0
Mixed	07	2.0
Glycosides	04	1.1
Corrosives	06	1.7
Kerosene	02	0.6
Cyanide	02	0.6
Others	08	2.3
Unknown	17	4.9
Total	348	100

*Presumptive diagnosis based on the inquest report and hospital record

Amongst insecticide, organophosphorous comprised of 228 cases followed by organochlorine (26cases) and carbamates (14 cases). In all cases, viscera, blood and other relevant samples were sent for chemical analysis to Forensic Science Laboratory. In forty cases report of the chemical examiner is yet to be produced by the police before Forensic Pathologist, which was excluded from the further studies. In maximum number of cases (70.6%) viscera showed positive for a definite poison (Table-2).

Table 2
Analysis of the chemical examiner report

Outcome of the report	No. of cases	Percentage
Poison detected	246	70.6
Poison not detected	62	17.8
Report yet to come	40	11.5
Total	348	100

Kerosene smell, which is important

postmortem finding in insecticide poisoning, was studied in relation to survival time. Not a single case of insecticide showed kerosene smell in stomach contents after three days. All the cases that produced kerosene smell in the stomach content were those organophosphorous variety poisoning. In 75.6% cases, kerosene smell was observed in the stomach content within 12 hours of survival time. All the cases of organophosphorous poisoning, who survived more than three days were excluded, as no single case showed kerosene smell (Table-3).

Table 3
Kerosene smell in relation to survival time

Survival times	Total case	No. of case with Kerosene smell	Percentage
<12 hours	41	31	75.6
>12 hours-1 day	37	16	43.2
>1- 2 days	39	14	35.8
> 2- 3 days	27	06	22.2
Total	144	67	46.5

In maximum number of cases Chemical analysis of the viscera and body fluid like blood showed positive for a definite poison when survival time is within three days and all of them belong to group -4. Most cases which showed negative for chemical analysis, belonged to Group-3 i.e diagnosis based on the stomach wash, that was collected during treatment (Fig 4 & 5)

DISCUSSION

Poisoning in India is a challenge to both clinical and medicolegal practice. Role of clinician is not only diagnosis and treatment but also to preserve evidence like stomach wash, vomitus, empty bottles etc, and also providing information to the Police and facing cross-examination in the court. Unscrupulous use of medical knowledge by the treating physician may initiate the hunt for non-existent assailant or result in escape of the actual guilty. Postmortem diagnosis of poisoning cases basically depends upon history, Hospital records, postmortem findings and detection of toxic substance in the body fluid and or viscera. Out of those except history, all the above-mentioned variables vary with the survival time of the person after consumption of the poison.

Out of total 348 cases of poisoning deaths, insecticide was the commonest agent being responsible for 77% deaths. Our findings were similar with findings of others [3,4 &5]. But the study in other countries [6,7] showed medicinal drugs as common agent causing poisoning deaths. This can be attributed to the fact that nature of poisoning deaths varies from region to region and depends upon the availability and knowledge of the local population about the poisonous properties of the agent. In all the poisoning cases relevant samples were sent to Forensic Science Laboratory for chemical analysis and final opinion was kept pending till report was produced by the investigating officer for final opinion. Out of all cases, in 40 cases the police for final opinion did not yet produce report. The cases where chemical examiner report was pending were excluded from the further study in grouping of postmortem diagnosis. In 62 cases chemical report of the viscera showed negative for poison. Similar incidence is also observed by other [8]. Out of total 268 cases of insecticide poisoning, only in 67 cases, stomach contents smell like kerosene and in all these cases the agent is organophosphorous. This may be due to that in many of the organophosphates insecticides; petroleum derivative like aromax is used as solvent [9]. In all cases, kerosene like odour was present in stomach content maximum upto 3 days (survival time of the victims). After 3 days not a single case of organophosphorous poisoning showed kerosene odour in stomach content. During those three days

Fig. 4

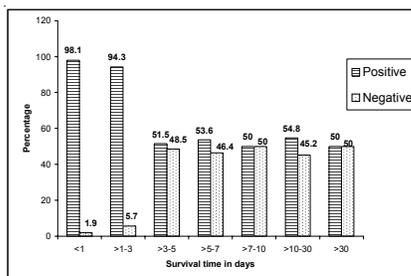
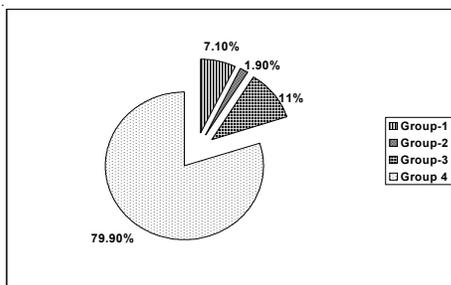


Fig. 5



a total of 144 organophosphorous poisoning deaths occur. On analysis of kerosene odour with survival time in those 144 cases, in 75.6% of cases, the odour was present upto 12 hours, there after in these cases kerosene like odor gradually decreased as the survival time increased. This can be explained on the basis that as the survival time increases the poison may pass on to the lower intestinal tract, and get absorbed into the gastric mucosa. In some cases, the odour may be present upto 2-3 days because of incomplete gastric lavage and associated unconsciousness of the victim after consumption that leads to decrease in gastric motility. Apart from kerosene smell of stomach content, other postmortem findings suggestive of a poison were present in few cases but not significant to compare with survival time. On analysis of chemical examiner's report of viscera and blood in relation to survival time, it was seen that in maximum number of cases chemical analysis report showed positive for a poison within first three days of survival. There after if the person survived for more than 3 days, chance of detection of poison in viscera and blood reduced to almost 50%. This may be because during the period of survival, the poison is excreted or is completely metabolized to a byproduct that is no longer demonstrable during analysis [2]. After 3 days survival if death occurs due to poisoning and chemical analysis report of viscera comes negative, the diagnosis usually depends upon the analysis report of stomach wash, hospital records or history. In India particularly in rural areas, when a person consumes poison, in many of the cases it is reported late to the Primary Health Centre and usually doctor of the Primary Health Centre refers the case to higher hospital without any initial treatment, giving reason that antidote is not available. This leads to further delay and poison gets absorbed and even if stomach wash is done in higher hospital it usually comes negative. As such, if the person survives for few more days and then dies, the diagnosis solely depends upon Hospital records, history given by the police or relative, and sometime correlating pathological changes in the organ due to poison. In 28 cases postmortem diagnosis were made based upon hospital records and or postmortem findings (Group 1&2 in Fig. no 2). For simplifying the postmortem diagnosis it is divided into four groups. Most of the

victims were diagnosed under 3 and 4 group showing positive for poison/s in stomach wash and or body tissue, which is more authentic as far as legal point of view, is concerned. As per Sec 293 of the code of Criminal procedure [10], the report that is signed by chemical examiner upon any matter or things duly submitted to him for examination or analysis, that report may be admitted in evidence without requiring the officer concerned to be examined in Court of law to prove the report.

In every case of poisoning deaths, there is always expectation of the police or victim's relative that autopsy surgeon should be able to give beyond doubt, whether person was poisoned or not at the time of autopsy. Same time it may be associated with allegation, complaints, denials and tendency to have desired result. As far as Group 3&4 are concerned the responsibility of making diagnosis of poisoning rests upon the chemical examiner's report and seldom is a matter of much concern. But difficult arises as regards Group 1&2 where the autopsy surgeon has to rely on hospital record, history and postmortem findings in order to make diagnosis. Moreover, cases with positive postmortem findings and history but negative chemical examiner's report are also not uncommon. At the same time toxicological analysis can be prolonged and there may be considerable lapse of time. Therefore, in order to overcome all these difficulties, instead of keeping the opinion pending in every instance of poisoning death, if there is definite history, postmortem findings and hospital record suggestive of a particular poison, the preliminary cause of death can be given so that it will be helpful to the Investigating Officer, relative and to the society at large. Further, it is now high time to establish separate toxicological wing in the District Hospital and Departmental Toxicological Laboratory in the casualty of district and teaching Hospital, so that diagnosis can be made at much more ease.

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INTERMEDIATE SYNDROME IN ORGANOPHOSPHOROUS POISONING

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ABSTRACT

One hundred and fifty three cases of Organophosphorous poisoning cases presented to Kasturba Hospital, Manipal, India during a 2 year period (2001- 2002), out of which 45 cases (29.4%) had features of Intermediate Syndrome. Largest number of victims were in the age group of 21-30 years (37.7%). Males predominated (71.1%). Methyl Parathion was the commonest compound (57.7%). Respiratory muscle weakness was the most common manifestation seen (84.4%) . Mortality was 22.3%.

Key Words: Insecticide, Intermediate Syndrome, Organophosphorous, Poisoning

INTRODUCTION

Organophosphorous insecticides are used extensively in horticulture and agriculture. Because of its easy availability organophosphorous poisoning is a significant cause of morbidity and mortality in developing countries including India.

In organophosphorous poisoning, three well defined clinical phases are seen:

1. Initial acute cholinergic crisis characterised by muscarinic manifestations.
2. Intermediate syndrome
3. Delayed neuropathy

This research lays emphasise on the intermediate syndrome.

The term 'intermediate syndrome' was first coined by Senanayake from Srilanka in 19871 but intermediate syndrome was first described by Wadia² as type II paralysis in 1974.

It was called as intermediate because it appears after the acute cholinergic phase but before the expected onset of delayed neuropathy. The cardinal features of this syndrome are cranial nerve palsies, weakness of neck flexors, proximal muscle weakness and respiratory muscle paralysis which usually develops between 24 to 96 hours of ingestion of the poison³.

Organophosphorous compounds produce significant pesticide related illness and deaths in developing countries like India. There is, thus, a need to determine exact extent of the problem and to develop appropriate strategies to manage these cases with available resources in these countries.

The present study was undertaken to find the incidence of intermediate syndrome in cases of organophosphorous poisoning in this part of the world so as to develop data for this region.

MATERIALS AND METHODS

The present study was undertaken at Kasturba hospital, Manipal, which is a tertiary care teaching hospital situated in coastal karnataka, South India. The cases were studied retrospectively for a period of two years (2001-2002). The necessary information regarding age, sex, nature of the compound, features, outcome, time taken for recovery etc were obtained from the hospital files from the Medical Records department of Kasturba hospital, Manipal. The data obtained was tabulated and analysed.

RESULTS

During the two year period (2001-2002), one hundred and fifty three cases of

organophosphorous poisoning were admitted in Kasturba Hospital, Manipal, out of which 45 cases developed the features of intermediate syndrome which formed the material for the present study. Incidence of intermediate syndrome was 29.4%. 21-30 years was the commonest age group affected (Table I). 32 victims(71.1%) were males and remaining 13 victims (28.9%) were females. Methyl parathion was the most common compound(Table II). Respiratory muscle weakness was commonly seen(Table III). Ten patients died (Table IV). Time taken to recover from the manifestations was 3-12 days.

Table 1
Age distribution of the victims

Age(years)	No.of cases	Percentage
11-20	7	15.5
21-30	17	37.7
31-40	13	28.9
41-50	4	8.9
51-60	3	6.7
61-70	1	2.2

Table 2
Organophosphorus compound causing intermediate syndrome

Compound	No of cases	Percentage
Methyl parathion	26	57.7
Monocrotophos	3	6.7
Phosphamidon	1	2.2
Quinalphos	1	2.2
Dimethoate	2	4.4
Unknown	122	6.6

Table 3
Manifestations

Features	No of cases	Percentage
Respiratory muscle weakness	38	4.4
Neck muscle weakness	14	31.1
Proximal muscle weakness	12	26.6
Cranial nerve palsy	7	15.5

Table 4
Outcome of the cases

Outcome	No of cases	Percentage
Survived	35	77.7
Dead	10	22.3

DISCUSSION

The present series attempts to analyse the manifestations of intermediate syndrome in cases of organophosphorous poisoning.

There are several postulations regarding the mechanism of intermediate syndrome. Wadia[2] had suggested that persistence of nicotinic effects due to lack of early use of oximes may be responsible for the paralysis.

Gadoth and Fischer[4]attributed the late onset paralysis to the release of organophosphates from the adipose tissue, acting on the nicotinic receptors.

Senanayake[1] felt that the neuromuscular junctional dysfunction is the predominant factor in the pathogenesis of intermediate syndrome.

The incidence of intermediate syndrome in the present study was 29.4%. It varied from 5.4% to 47% in various other reported works[5-8]. 21-30 years was the commonest age group to be affected. This finding is in concurrence with the findings of other workers[1,5]. The occurrence of intermediate syndrome was more in males. Similar findings were observed in Srilanka[1] and Bangalore[5].

Methyl parathion was the commonest compound implicated in causing intermediate syndrome. Similar finding was observed in Bangalore[5]. Fenthion was the compound commonly involved in one of the study[1].

Respiratory muscle weakness was the most common manifestation seen in our study. Cranial nerve palsy was commonly seen in the work reported from Srilanka1 and the involvement of proximal muscles predominated in other studies[2,5].

Since this is a retrospective research, the clinical manifestations could not be co-related with the quantity of the poison consumed, because of paucity of the relevant information.

A mortality of 22.3% was observed which is comparable with the data available from Vellore6.

Other studies mention it to vary from 10.5% to 41.6%[1,2,5].

Time taken for recovery from the manifestations varied from 3-12 days. It took 72 hours for complete recovery in one of the study[2.]

In our series neck muscle weakness was the first manifestation to recover followed by cranial nerve palsies and proximal muscle weakness. Respiratory muscle weakness was the one which recovered last.

The high incidence of intermediate syndrome in organophosphorous poisoning in the present study emphasises the need for careful monitoring of these patients. Mortality from respiratory paralysis can be prevented by early recognition of the syndrome and prompt ventilatory support. The muscles of respiration are the last to recover and this fact should be borne in mind while weaning the patient from the ventilator.

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IS OSSIFICATION OF STERNUM AT ALL A VALUABLE GUIDE FOR DETERMINATION OF AGE AT MIDDLE AGE GROUP?

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ABSTRACT

In spite of stringent rulling on compulsory birth and death registration there are many cases that do not have a birth certificate even today. Forensic Pathologists often required to estimate the chronological age of a subject biologically for various reasons. It is particularly a increasing problem with advancing age above 25 yrs. As from around 25 years untill old age there is no dramatic events as eruption of tooth or the appearance of ossification center.

Key Words : Sternum, Ossification.

INTRODUCTION

Sternal ossifications is taken as a guide for determination of higher age most commonly to fix up retirement age, when ossification of xiphisternum with body is taken as around 40 years and manubrium with body as about 60yrs.

Forensic Pathologists need to be extra careful and more cautious in determination of retirement age i.e 58-60 yrs. For any wrong estimation there may be too early termination of one's productive life putting the person in extreme phsycolgical and financial misery as most often retirement age controversy arises in to the poor illiterate or little literate factory workers and office staff.

MATERIAL AND METHODS

In this present study, Sternums are collected from cadavers during autopsy at N.R.S Medical College mortuary, Kolkata and Calcutta police morgue attached to Medical College, Kolkata and studied in the following ways,

1. Dry bone prepared from dissected sternum
2. Longitudinal section of freshly dissected sternum through midline and two paramedian section half centimeter from midline on either side.

In both cases age is selected above 25 years of age to reduce the gap to suit our required range and also to avoid excessive bony pieces due to non fusion of sternal body segments.

Evidence of fusion

1. Dry bone
 - a. Complete separation of bony pieces as Manubrium and body without attached xiphoid-No fusion
 - b. Any degree of ossification at manubrio-corporal or Xiphisterno-corporal junction-Fusion
2. Longitudinal section of fresh bone:

a. At Manubrio-Corporal junction

- i. Full thickness creamy white cartilage at Manubrio-Corporal junction-No fusion
- ii. Thinning of cartilage or complete disappearance of cartilage -evidence of fusion

b. At Corporo-Xiphisternal junction by serial section of Xiphisternum from tip to the body

- i. If cuts smoothly -No fusion
- ii. Cuts with much resistance and grittiness Evidence of Ossifiation

Fusion of Manubrium and body (corpus) is taken as $M + B$

Fusion of Xiphisternum and body (corpus) is taken as $B + X$

Fusion of Manubrium, Body (corpus) and Xiphisternum $M + B+X$

RESULTS AND ANALYSIS

Table-1
Showing age group wise and sex wise distribution of total cases

Group	I	II	III	IV	V	VI	VII	VIII	IX
Age(yrs)	25-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66->70
Male	36	45	38	30	38	42	38	36	26
Female	32	33	36	36	34	22	30	26	18
Total	68	78	74	66	72	64	68	62	44

Table-2
Showing comparison of fusion activity at different sites only as isolated cases in the group with total distribution of cases age Group Wise

Age group	Age in yearsNo. of cases			Fusion activities	No. of cases	And	Percentage (%)
	M+B	B+X	M+B+X				
I	25-30	68	6	8.82	0	0	0
II	31-35	78	22	28.20	4	5.12	0
III	36-40	74	22	29.72	6	8.10	6
IV	41-45	66	28	42.45	5	7.57	16
V	46-50	72	32	44.44	5	6.94	18
VI	51-55	64	24	37.5	10	15.62	18
VII	56-60	68	26	38.23	6	8.82	28
VIII	61-65	62	17	27.42	4	6.45	35
IX	66->70	44	8	18.2	2	4.55	30

Table 3
showing comparison of total incidence of M+B And B+X cases agegroupwise in percentage (%)

Group	age in yrs.	M+B cases	B+X cases
I	25-30	8.82	0
II	31-35	28.20	5.12
III	36-40	37.82	16.2
IV	41-45	66.69	31.81
V	46-50	69.44	31.94
VI	51-55	65.62	43.74
VII	56-60	79.41	50
VIII	61-65	83.87	62.9
IX	66- >70	86.38	72.73

Table-4
Showing incidence of Total fusion cases / No fusion cases agegroup wise inPercent

Group	Age in Yrs.	Fusion cases	No fusion
I	25-30	8.82	91.15
II	31-35	33.32	66.68
III	36-40	45.92	54.08
IV	41-45	74.26	25.74
V	46-50	76.38	23.62
VI	51-55	81.24	18.76
VII	56-60	88.23	11.77
VIII	61-65	90.32	9.68
IX	66->70	90.93	9.07

CONCLUSION

From our study in the population of West Bengal we can say that if there is fusion at Manubrio-corporal junction (M+B) age is above 28yrs, fusion at corporo-Xiphisternal (B+X) junction age may be above 32yrs. and fusion at both the sites (M+B+X) means age above 36yrs. No opinion is possible from the incidence of "NO FUSION". Therefore the Sternal data "Xiphisternum fuses with body at 40 yrs. and Manubrium fuses to the body by 60 yrs." is not reliable and erratic.

Forensic experts must be very careful and alertly cautious in giving opinion on age on the basis of Manubrio-corporal and corporo-Xipisternal fusion status, before it is too late to salvage our corroded credibility and respect whatever little we still have.

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PROBLEM/LESSON LEARNT DURING DEPLOYMENT IN HOT CLIMATE/DESERT WARFARE

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INTRODUCTION

With changing scenario, armored warfare, which conventionally was a winter event, can now happen at any time of the year. To keep troops and equipment apprised of the ground reality, an exercise was conducted in desert during peak summer. Medical cover was provided by us. The sick report is, discussed and analyzed with a view to reason learnt during desert warfare .

MATERIAL AND METHODS

This particular study was an exercise, therefore, the fact and figures are realistic with confidential data exposed.

Total Strength, to (1999).whom medical cover was provided: 1200.

Time of the year when exercise was conducted: May -June 2005.

Total duration: 15 days.

Temperature: 45-C (Average) Max 5~ C.

In late afternoon severe sand storm was a regular feature with velocity more than 32km/hour

Severe Sun Glare was present.

There was no overcrowding.

RESULT

Diagnosis/Findings are all clinical, being a field area. Total-87 patients (Medical-66, Surgical-21)

MEDICAL		
	No	%
Loose Motion	28	32.18%
URTI with fever	20	22.98%
Irritation of eye	04	4.59%
Heat Cramps	05	5.74%
Scorpion Bite	02	2.29%
Skin Disease	02	2.29%
Urti Caria	01	1.14%
Miscellaneous	04	4.59%
Hospital Admission - 01 (Fever--Heat exhaustion)		

SURGICAL

	No	%
Laceration/Abression /Blunt Injury	12	13.79%
Pain Abdomen	03	3.44%
Pain Knee, Lbp,	5	5.74%

CONCLUSION

1. No case of Heat Stroke (HS) was encountered, in spite of environmental factors, like temperature, Sun Glare, wind velocity all very favourable, to precipitate HS [1] but because of stringent health education [2] programme which was carried out in form of repeated lectures right from Officers to men, including Commanders. Hand outs in bilanguage of dos and don'ts were also distributed ,
2. Single Case of heat exhaustion was seen, because, he was not acclimatized.
3. Loose motion (Gastrointestinal manifestation[3] one of the clinical features of High Environmental Temperature, was only 32.18%, as compared to 43%. It was ensured water at consumer end had chlorine content of 0.5-1 ppm.
4. Heat cramps[3] may be because of fatigue/ non-acclimatization.
5. Due to dust storm a regular feature there, sand particles finds its way to every organ. but in eyes it causes irritation, pain and redness.

LESSONS LEARNT

1. There is no substitute to Health Education.
2. Acclimatization is a must, like High altitude scheduled.
3. Protective clothing from insects/snake is a life saving measure.
4. Cold drinking water, should be provided, by local matkas, as per local tradition.
5. Protection gears for eyes should be constantly used, fancy Sun glasses are failure.

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ALUMINIUM PHOSPHIDE POISONING AUTOPSY FINDINGS

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ABSTRACT

At prospective study to observe the gross and histopathological findings in Aluminium Phosphide Poisoning was undertaken on medicolegal autopsy cases brought to the department of Forensic Medicine. Gandhi Medical College, Bhopal. The study was undertaken, as Aluminium Phosphide Poisoning has become the commonest poisoning in central India over the last few years. 50 chemically confirmed autopsy cases were included in the present study and were examined grossly in detail and samples of tissue from various organs were stained by haemotoxylin eosin and observed microscopically. Several gross autopsy findings have been observed and are included in this paper. The present study is the largest autopsy series reported on Aluminum Phosphide, which includes the histopathological findings of various organs. and observations made earlier by the workers have also been compared.

Key words: Aluminium phosphide, Autopsy findings, Poisoning

INTRODUCTION

Aluminum phosphide has been used as a pesticide since 1940s. Isolated accidental cases of fatal exposure of phosphine gas liberated from Aluminum phosphide have been reported in the literature in 1967 and 1980 from bulk shipment of wheat using Aluminum phosphide as pesticide (Ziipf K. et al 1967; Wilson R. et al 1980). In India, this poisoning was not known before 1980. The first case in India was reported in 1981 from M.G.M. Medical College, Indore (Kabra SG et al 1988). The incidence of the poisoning has been increasing steadily and it is now the commonest poisoning in Northern and Central regions of the country. In our center, over the last ten years (1993 -2002), the average number of autopsies annually has been 1751, of which 238 cases (13.6%) on an average (fig. 1) are associated with ingestion of a poison, about 120 cases being due to Aluminium phosphide poisoning. The magnitude of this poisoning

prompted us to undertake the present study.

MATERIAL AND METHODS

In the present study, 50 medicolegal autopsy cases of Aluminium phosphide were studied. All the Study cases were confirmed to be of Aluminum phosphide poisoning on chemical analysis of the viscera in the Forensic Science Laboratory. Ten control cases were selected in which the cause of death was either thermal or mechanical injuries. Efforts were made to obtain detailed and accurate history regarding the time and quantity of ingestion of Aluminum phosphide and the time of death. In hospitalized the patient were noted. Chemical analysis of the viscera was done and those cases where viscera was positive for alcohol or any other toxin was not included in the present study. The signs and symptoms observed in hospitalized and non-hospitalized patients and the treatment given to those who were hospitalized has been analyzed. Detailed external and internal examination of all the

study and control cases was undertaken. Histopathological examination of lungs, stomach, heart, spleen, liver, kidneys and adrenals was done by staining the slides with H & E staining.

OBSERVATIONS

In the 50 cases included in the present study, 25 were females and 25 were males, varying in age from 13 -60 years. They were predominantly housewives (32%) students (24%) farmers (20/0) laborers (6%) other skilled and semi skilled workers (16%) and unemployed (2%). The time of ingestion was mainly between 6 am-11 am (51%), between 12 noon to 6 pm (27%) and between 8 pm -midnight (22%). The amount of Aluminium phosphide tablets consumed could be ascertained approximately from the history given by the relatives of the deceased and this varied from half a tablet to 6 tablets. Average survival time in the hospitalized cases (28 cases) was 12.8 hours and in non-hospitalized cases (22 cases) was 2.6 hours. The survival time in study cases was found to vary between 1-47 hours and the post-mortem interval in study cases ranged between 1-48 hours.

On external examination during autopsy, the face was livid in 18% of the cases (n=39) and distinct bluish discoloration was seen in 22% of the cases (n=11). Froth was present around the nostrils in 12% of the cases (n=36). It was blood tinged in 68% of the cases (n=34). A distinct garlicky odour associated with Aluminium phosphide poisoning was present close to the body in 50% (n=25) of the cases. On internal examination, trachea was found to be congested in all the cases and froth was present in trachea in 36 cases (12%). Lungs on cut, were seen to be congested in all the cases and were edematous in 46 cases (92%). Small sized hemorrhages were typically observed in all the cases in the interlobular spaces and the margins of the lungs. On cut, frothy, dark haemolysed blood was observed to be coming out. The distinct pungent, garlicky odour of Aluminium phosphide was perceptible when the lungs were sectioned in 28 cases (56%). Stomach was found to contain grayish brown fluid or pasty material in 29 cases (58%). The distinct odour was perceived in 33 study cases (66%). Gastric mucosa showed slight congestion in 22 cases (44%) which were not hospitalized and congested in 28 cases (56%) which were hospitalized and gastric lavage had

been done as part of initial treatment. Sloughing of mucosa was also observed in all the cases, more in the fungal region. The gastric mucosal rugosities were obliterated and gastric lining appeared smooth in 8 cases (16%). Thinning of stomach wall in fundus region was appreciated when seen against the light in 36 cases (12%). Liver, spleen and kidneys were found to be congested.

On microscopic examination of lungs, 34 cases (68%) showed moderated congestion, 11 cases (22%) severe congestion and 5 cases (10%) showed mild congestion. Mild edema was seen in 30% of the cases, moderate in 54% and marked edema in 16% of the cases. Thickening of alveoli by haemolysed red cells and dilated capillaries was seen in 54% of the cases red hepatisation was seen in 18% of the cases and round cell infiltration around bronchioles in 12% of the cases. The stomach wall on microscopic examination was congested in 56% of the cases, which were hospitalized and in rest of the cases there was patchy submucosal congestion. Edema was observed in 68% of the cases with mild edema in 52%, moderate edema in 14% and marked edema in 2% of the cases. Necrosis of mucosa of fundus region was observed in almost all the cases (98%), while 48% of the cases showed necrosis in other areas of the stomach in addition to the fundus region. In 12% of the cases, round cell infiltration was seen up to the muscular layer. Kidneys were congested in all the cases. Necrosis and areas of degeneration and regeneration of tubular epithelium was seen in 78% of the cases.

Adrenals were dissected out and examined microscopically in 33 cases (66%) of which 24 cases revealed haemorrhagic necrosis. Fat depletion was observed in patches in 33% of the cases. Liver was congested in 44 cases (88%), mild fatty change was seen in 19 cases (38%) and areas of centrilobular haemorrhagic necrosis was seen in 10 cases (20%). Myocardium was congested in 36% of the cases, focal myocardial necrosis seen in 28% of the cases and round cell infiltration seen in 6% of the cases. Congestion in spleen was apparent in 82% of the cases. Splenic necrosis was seen in 20 cases (40%).

Comparison of histopathological findings of various organs in the present study with the previous studies on cases with Aluminium phosphide poisoning

S.No.Findings	Present study (1998-99)	Dalbir Singh et al (1989-94)	Siwach et al (1985-86)	S. Singh et al (1982-83)
	N= 50	N=25	N=25	N=6
01 Stomach				
a Congestion	56%	100%	100%	-
b Edema	68%	-	100%	-
c Necrosis of Mucosa	98%	-	100%	
d Round cell infiltration up to muscular layer	12%	-	-	-
02 Adrenal gland				
a Congestion	71%	49%	-	-
b Hemorrhagic necrosis	67%	-	-	-
c Area of fat depletion	33%	-	-	-
03 Liver				
a Congestion	88%	98%	100%	-
b Mild fatty infiltration	38%	16%	100%	50%
c Centrilobular necrosis	20%	40%	100%	17%
d Small granuloma	-	-	-	17%
04 Kidney				
a Congestion	100%	97%	76%	
b Necrosis, degeneration and regeneration of tubular epithelium	78%	-	76%	17%
05 Lungs				
a Congestion	100%	99%	100%	34%
b Oedema	92%	48%	100%	-
c Thickening of alveoli by haemolysed RBC and dilated capillaries	54%	-	100%	-
d Red hepatisation	18%	-	0%	-
e Round cell infiltration	12%	-	0%	-
06 Heart				
a Congestion	36%	48%	-	
b Focal myocardial necrosis	28%	48%	-	
c Round cell infiltration	06%	-	48%	-
07 Spleen				
a Congestion	82%	100%	-	-
b Necrosis	40%	-	-	-

DISCUSSION

Aluminium phosphide is marketed in India as tablets of Celphos, Quickphos, etc. It is available in small and large packs containing grayish-white tablets weighing about 3 gms each, containing 56% Aluminium phosphide and 44% aluminium carbonate, capable of releasing 1 gm of phosphine. Fatal dose of Aluminium phosphide is stated to be in the range of 150-500 mg/70 Kg by Chugh et al (1988). Mortality rate in clinical reports is stated to vary between 37-100% by different authors (Sepaha et al 1985, Saraswat et al 1985, Ram et al 1985, Khosla et al 1986, Chopra et al 1986, Kabra et al 1988, Siwach et al 1988, 1994, Mishra et al 1989, Chugh et al 1991, 1992, 1995).

Total number of autopsies and number of autopsies in which the cause of death was poisoning from 1993 to 2002

S.No.	Year	No. of autopsies	No. of deaths due to poisoning
01	1993	1572	195 (12.4%)
02	1994	1552	173 (11.1%)
03	1995	1630	190(11.7%)
04	1996	1847	166 (8.98%)
05	1997	1696	219 (12.9%)
06	1998	1998	286 (14.3%)
07	1999	1755	266 (15.2%)
08	2000	1796	295 (16.4%)
09	2001	1850	268 (14.5%)
10	2002	1815	319 (17.6%)
	Mean	1751.1	237.7 (13.6%)

First study of series of this poisoning was undertaken by S. Singh et al (1982-83) and included 6 medicolegal autopsies with limited histopathological study. A series of 80 medicolegal autopsies of the poisoning were studied by Siwach et al (1985-86) and histopathological cases. In the present study, 50 medicolegal autopsies of Aluminium phosphide poisoning were studied and gross and microscopic examination was done in all the cases (Fig. No.2). The male to female ratio and the age of the various studies are comparable to the present study.

The manner of death was reported to be suicidal in 87% of the cases by Dalbir Singh et al,

76% in a study by Chugh et al in a clinical study on 418 patients of this poisoning. As against these, in the present study the manner of death in all the cases was suicidal. In our study, a definite preponderance in the time of ingestion of the poison was observed with 51% of the cases with history of ingestion between 6 am and 11 am, 27% between 12 noon -6 pm and 22 % between 8 pm and midnight. It was also observed that the survival time after ingestion of Aluminium phosphide ingestion depended mainly on the availability of the medical facility and average survival time in hospitalized cases (56%) which was 12.8 hours in contrast to 2.6 hours in non-hospitalized cases (44%).

Gastric lavage was done in all the cases, which were hospitalized. On external examination during autopsy, face was observed to be livid in 39 cases of which 11 showed a distinct bluish discoloration. Garlicky pungent odour was perceived close to the body in 50% of the cases (n = 25). Other authors have not reported these findings. Froth was present around the mouth and/or nose in 72% of the cases (n = 36), of which it was distinctly blood tinged in 68% of the cases (n = 34). Typical odour of Aluminium phosphide was noticed when the lungs were sectioned in 56% of the cases (n = 28). Grey to greyish brown fluid or pasty material was seen in the gastric cavity in 56% (n = 28) cases with distinct garlicky pungent odour in 66% (n = 33) cases. This is likely to be encountered during autopsy in non-hospitalized cases and in hospitalized cases where gastric lavage could not be done and survival time was short. This finding is also not mentioned in other series, as they include only hospitalized cases and hence unlikely to be encountered. In the present study the mucosa of the stomach was relatively pale in cases, which were not hospitalized. The pale appearance may be attributed to the grey colour of the compound and only slight submucosal hemorrhage, which may be appreciated on examining the stomach wall in light. Sloughing of the gastric mucosa is more common in the fundal region and fundal thinning was observed in 72% of the cases (n = 36). The reason for the same is postulated to be due to the vapors of phosphine, which rise and get accumulated in the fundal region causing marked mucosal sloughing in this region.

These findings are also not mentioned in the available literature.

Number of poisoning cases by this compound have increased sharply over the past two decades to reach the present magnitude and require more extensive clinical and autopsy studies. It also requires an in-depth study to understand the predisposing factors; mechanism of action and to assess and formulate an appropriate treatment in these cases based on such a study.

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UNETHICAL RELATIONSHIP BETWEEN DOCTORS AND DRUGS COMPANIES

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ABSTRACT

Medicine is a noble profession. The primary aim of medical profession is to render service to humanity. Financial gain is a subordinate consideration.[1] But it has been observed globally that medical practitioners in conjunction with pharmaceutical companies are prescribing and thereby promoting unnecessary drugs just for the sake of monetary gains. This article reviews the salient aspects of the relationship between doctors and drugs companies and its future consequences.

Key words : Medical Ethics, Drug companies, Prescription, MCI, RMP

INTRODUCTION

The interaction between doctors and medical representatives (popularly known as MRs) is almost as old as the medical profession itself. The basic role of a medical representative is to apprise the doctor about his company's products including the drugs. There is nothing wrong in that as long as the ultimate beneficiary of this information is the patient. After all, continued professional development is an essential component of a good health care system. Even the Medical Council of India expects that every registered medical practitioner should try to up grade his knowledge and skill for the betterment of his patients.[2]

Unfortunately, there is often a conflict between the interests of the patient and those of the doctors as far as the drug promotion is concerned. WHO defines drugs promotion as all informational and persuasive activities by manufacturers, distributors to induce /influence the sale and use of medicinal drugs. Drug promotion has an important bearing on the rational use of drug; on drug -price control mechanism; on equity of drug distribution - all making it a central public health issue. Often, drug promotion strategies adopted by various drug companies are too attractive to be resisted by a doctor. This, in turn, places the interest of the doctors ahead that of the patients. Doctors, who are frequently in contact with medical representatives, are more likely to prescribe newer and expensive drugs of their favourite pharmaceutical companies to achieve

their selfish end i.e. to receive more and more financial gain from the companies as cutbacks. In our country, the doctors are held in high esteem by the gullible patients. They are considered second to 'Gods' by most patients. Therefore, doctors may prescribe expensive drugs of their favourite pharmaceutical companies with scant regard for the expense borne by the poor patients.[3,4]

Interaction between drug companies and doctors are pervasive. Relationships of doctors with drug companies begin when they are just medical students attending the various clinical OPD's and wards, continue during internship and residency training, and persist throughout their professional careers.

The Nature and Effect of the Relationships

The drug-companies interact with doctors in order to promote their medical products. They reach out to almost all concerned doctors to attain their goals. The doctors are compensated adequately in the form of gifts and other incentives by drug companies. Consequentially, both the parties are benefited from this interaction with potential consequences for patients. Few doctors may be morally so stout that they continue to prescribe those medicines that appear to be most beneficial as well as economical to their patients despite being in contact with so many drug companies. The aggressive marketing strategies by the companies just act as tools of information for them. But the prescribing behavior of a vast

majority of the medical community is palpably influenced by pharmaceutical companies. Many physicians believe that their interactions with drug-companies have educational value for themselves and also provide benefits for patients, because physicians are kept informed about available therapeutic agents and the poor patients can be given free drug samples provided by different companies. Some physicians contend that they themselves are invulnerable to any bias as a result of interaction with drug companies.[4,5]

There is a growing consensus among doctors that prescribing more expensive brands of reputed companies of which the quality is assured is far better than prescribing cheaper brands of unknown quality. This may be one of the reasons behind such shoddy prescriptions. But this cannot be generalized. It is open secret that the professional associations depend solely on pharmaceutical companies to sponsor their medical programmes viz., CME's, Conferences, Annual Meeting, Workshops etc. Many junior as well as senior physicians seek sponsorships or financial aids from these companies to attend national as well as International Conferences. Even pleasure- trips within the country and abroad for a few heavy-weight doctors and their immediate family members are arranged and funded by some pharmaceutical companies. The doctors, in turn, tend to reciprocate by prescribing medical products of these companies in blatant disregard to patient's welfare. In one study, it was found that there are many different ways by which drug companies relate directly or indirectly with doctors. These range from the seemingly trivial (e.g., the ubiquitous dispensing of gifts such as pens and writing-pads with drug names inscribed) to the much more fascinating gifts(e.g., the ghost writing of articles for teaching faculty, the payment of large sums in cash to prominent physicians who extol the virtues of company products and the support of lavish trips and entertainment for physicians who commonly prescribe company products) [5,6]

A majority of physicians don't consider it unethical to accept such gifts as receipt of pens, pen-stand, pads, calendars, drug samples, company funded lunch or dinner etc at which company's products are favourably mentioned.⁷

But acceptance of expensive gifts of

recreational value rather than professional activities is unethical according to them. Also, they concur not to support medical products of drug companies whose medical representatives furnish biased or self-serving information regarding their products. Even among those doctors who claim that they only prescribe medicines which are most beneficial to their patients irrespective of the fact that they are constantly visited and pressurized by pharmaceutical companies to prescribe their brands only - a substantial body of evidence suggests otherwise. Because when a gift is given, it imposes on a doctor a scene of indebtedness. As an upright man instructed in the art of healing, he may feel inclined to reciprocate resulting in shoddy prescriptions.[5]

As a consequence of the relationship between doctors and drug companies, the credibility of medical profession in the eyes of the patients and the public is ever on the decline.

If a patient gets to know that the doctor is prescribing medical advice on the basis of commercial influence he may lose trust and confidence in the doctor (which are the precursors to any successful treatment). In such a scenario, patients are more likely than doctors to believe that gifts may influence prescribing behavior that is morally inappropriate according to them.[3,4]

CONCLUSION

It is being realized more now than ever before that the interaction between doctors and drug companies should be contained within acceptable boundaries. It would be impracticable to ask the medical professionals to distance themselves from drug companies. The real challenge for the medical profession, drug companies and the Govt. is to formulate mutually acceptable guidelines to avoid certain egregiously unethical medical practice. The ultimate arbiter of this malpractice is of course the medical profession itself. It is for them to decide whether or not to accept the proffered information and gifts by drug companies. For that, medical students should be exposed to the marketing strategies of pharmaceutical companies and the methods to counter them. During MBBS course, the students should be instructed not to depend on drug companies for their professional advancement. As the doctors posted in rural or

remote areas are supposedly not aware of the latest trends in medical practice, they depend on the drug companies for product information. This problem can be obviated if more and more CME's are conducted in those areas by registered medical association so that they can keep pace with emerging medical technology. Professional associations should also strive hard to generate funds so that they can conduct their scientific programmes independently.

Mushrooming of drug companies is also responsible for this unethical medical practice. Since, one drug company in order to surpass another company brings out the same drug at much cheaper price, compromising the quality of the drug. If the retail price and the quality of the drug is regulated and standardized by the Govt. the unethical practice of drug companies can be put in check. But before that we have to understand the dynamics of Indian drug bazaar which not only involves the doctors and the drug companies but also the go-in-betweeners like chemist and medical representatives, etc. But then, all said and done, the only pragmatic approach to dealing with this unethical practice is for doctors not to accept anything of financial value from drug companies. Till date apart from the American Medical Association and others, the Indian Medical Association has also expressed its concern over it and made an appeal to the medical community not

to accept expensive gifts from pharmaceutical companies.

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COLOR BLINDNESS: FORENSIC PERSPECTIVE

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ABSTRACT

Color vision deficiency is a condition in which certain colors can not be distinguished, and is most commonly due to an inherited condition. Being color blind does keep one from performing certain jobs and makes other difficult. Compared to persons with normal color vision, they have some trouble differentiating between certain colors, but the severity of the color deficiency is variable. Color blindness is normally diagnosed through clinical testing- Ishihara color test is one of the most common tests used. It is mainly useful for quick screening. From a practical stand point though, many protanomalous and deuteranomalous people breeze through life with very little difficulty doing tasks that require normal color vision but in some professions a normal color vision is a necessary requisite. This article focuses on the forensic perspective of abnormal color vision and future research and guidelines for assessing an individual for colour vision.

Key words: Color Blindness, color vision test, Deficiency, road traffic accident, forensic scientist.

INTRODUCTION

Colour blindness is a condition in which ability to distinguish some colors and shades is less than normal. It occurs when the colour sensitive cone cells do not properly pick up or send the proper colour signals to the brain. It is most commonly due to an inherited condition or acquired by diseases of the optic nerve or retina. These colour problems are linked to the X chromosome and are almost always passed from a mother to her son. Prevalence of impaired colour vision in males is 8% and only 0.5% in females[1].

Although it must have existed for centuries, the first case on record was discovered in the practice of Dr Tuberville in 1684. Nearly a hundred years later an English chemist by the name of Dalton, who was colour blind himself, published the first accurate description of the condition[2].

The advent of the information age brought with it an increasing importance of colors. Colour coded computer information, colour printers, colour applications for safety, colour comparison test mechanism and other needs are driving increasing

changes in the occupational requirements for colour vision.

Sweden was the first country to pass a law forbidding the employment of any man upon a rail road until he passed the color vision test.

CLASSIFICATION OF COLOUR VISION DEFICIENCY

Protanomaly	Red Weakness
Deuteranomaly	green Weakness
Tritanomaly	Blue Weakness
Protanopia	Red Deficiency
Deuteranopia	Green Deficiency
Tritanopia	Blue Deficiency
Achromatopia	Absolute colour blindness

In a normal trichromat, three wavelengths are required to match a given reference wavelength. Dichromacy occurs when there are only two cones functioning. Monochromats and achromats only need one wavelength to match the reference colour.

A mild colour deficiency is present when one or more of the three cones function "poorly". A more

severe colour deficiency is present when one of the cones does not function at "all" or is missing.

Red green deficiency is by far the most common form of colour blindness. The scientific basis for the same is that, DNA sequences of the red and green receptor gene are so similar, that it is easy for mistakes to occur during the development of egg and sperm, as genetic material is replicated and exchanged between chromosomes.

Those with a less common type have difficulty distinguishing blue and yellow. In very few cases, colour deficiency exists to an extent that no colors can be detected; only shades of black, white and gray are seen.

OCCUPATIONAL REQUIREMENTS

The use of colour extends to the work environment, and so it affects job and careers which require some degree of colour identification. These careers vary in the extent of reliance on colour vision⁴.

Occupation requiring perfect colour vision e.g. is:

- Forensic scientist
- Driver
- Armed forces
- Color matcher in textile, paints & cosmetics.
- Electrical work
- Navigation

Occupation where good colour vision is desirable, but defective colour vision would not necessarily cause a handicap, e.g. are:

- Accountant
- Administration
- Architect
- Builder
- Draughtsman
- Metallurgist
- Physiotherapy

Occupation where defective colour vision may be an asset, e.g.:

- Camouflage detection

OBJECTIVES OF COLOUR VISION TEST

- As a screening test to separate those with defective colour vision from those with normal vision.

- As a qualitative diagnostic test to classify the type of colour defect (whether proton, deuteron, tritan).

- As a quantitative test to indicate the extent of the colour defect (whether mild. medium or strong)

It is important to be able to determine the type and the extent of any defect for several reasons, like:

- What are the risks to the employee in performing this job if they have colour vision deficiency?
- What would the consequence be of the most serious colour judgement error?
- Can 'work around' be developed to reduce these risks to acceptable levels.
- Will these colour defects affect the overall efficiency of performance in a serious manner.
- Can the work be redesigned efficiently to eliminate colour judgement requirements?

FORENSIC OUTLOOK

Defective color vision - role in accidents

In every case of road traffic accident and railway accident, the investigation officer should be diligent for color vision of victims and accused as the driver might have circumvented the route of detection at the time of medical vision testing, or the condition might have progressed after medical examination or developed anew subsequent to recruitment.

Importance of color vision for forensic professionals

Forensic scientists, who are involved in crime scene investigation, collection of trace evidences, laboratory testing and interpreting results, should have good color vision as any defect will seriously hamper their functioning in the respective roles.

Forensic medicine persons who are conducting post mortem should have good color vision as various parameters like color changes in contusion, abrasion (healing of wounds) etc. are based on color changes. Most importantly histopathologists should be having good color vision as their job involves interpretation where color differentiation is imperative.

EPILOGUE

It would seem to be obvious that a condition of colour blindness must be very dangerous, when

it exists in persons responsible for the lives of others on railroads and air. But at the same time due care should be given to the job profile of a person while assessing him for the colour vision, as his colour vision deficiency would not necessarily cause a handicap in that particular organization.

In India Ischiara pseudoisochromatic tests are used for screening the colour vision but it is not a qualitative or quantitative test. The ideal test should provide qualitative as well as quantitative details so that extent of the colour defect is known.

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MEDICAL TERMINATION OF PREGNANCY (AMENDMENT) ACT, 2002 AN ANSWER TO MOTHER'S HEALTH & 'FEMALE FOETICIDE'

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ABSTRACT

Human groups have, since early times, developed attitudes against the willful destruction of a foetus. At the same time, they have also recognized its permissibility in exceptional circumstances. Abortion raises a variety of medical, legal, ethical, and social issues. Indian Law recognizes the foetus as a special aggregation of cells with a potential for independent life and in this way protects the rights of 'unborn child'.

This paper deals with issues related to abortion laws, reasons for their enactments, amendments and failure to implement, misuse by quacks, with special reference to The Medical Termination of Pregnancy (Amendment) Act, 2002, and Rules & Regulations, 2003. Thus, an attempt to answer for related questions either not discussed earlier or not answered effectively and clearly so that problem of increased rate of maternal mortality & morbidity' and 'female foeticide' could be dealt with effectively.

Kew Words: Abortion, Approved, Consent, Conception, Miscarriage.

INTRODUCTION

Abortion Through the Ages

Foeticide was prohibited and classified as murder, equal to neglect of Vedas, Incest, and Drinking of Spirituous Liquors. Man even considered a woman as murderer of her Husband or of Brahmin or as an 'Outcaste' who had undergone abortion. The Buddhist, who condemned the destruction of life, laid down that Bhiku "who intentionally destroys a human being by way of abortion, is no Samana and no follower of Sakeyaputra". As per Gandhi Ji "abortion was more in violation of the principle of the 'ahimsa' than the artificial birth control which was morally blameworthy". The 'Holy Quran' prohibits the killing of child. Astray have gone those who stupidly kill their children without knowledge and deny to themselves of what Allah has blessed them with. The Didache, an authoritative source of Christian Law, considered abortion, as a grievous sin and was included in the 'Ten Commandments', which contain the forbidden acts. Every Human being including the 'unborn child' in the womb of its mother receives the right to life directly from the Almighty God but not from parents, society or any other authority.

Ethical Aspect of Abortion

Similarly, the 'Hippocratic Oath' (in one of its versions) forbid physicians to prescribe or perform abortions and it based on the concept that human life begins at conception. The Declaration of Geneva, 1948 & the Declaration (Appendix-1) by doctors at the time of registration before the State Medical Council, oath of Medical Ethics in PoInt-31 maintained the same sanctity of life as "I will maintain the utmost respect for human life from the time of conception".

What is 'Female Foeticide'?

Any act of destruction of female foetus amounting to female foeticide shall be regarded as professional misconduct on the part of the physician leading to penal erasure besides rendering him liable to criminal proceedings[1] (Chapter VII, Point 7.6, 7.15).

Statistics of Abortion

The actual worldwide incidence of abortion is not known. Estimates range from 30-55 million a year or about 40-70 per 1000 women of reproductive age, with an abortion ratio of 260-450

per 1000 live births[2]. In India it has been computed that about 6 million abortions take place every year of which four million are induced and two million spontaneous[3].

Induced termination of pregnancy whether in hands of skilled or unskilled persons are always fraught with health hazards, leading to increased incidence of 'maternal mortality' and 'morbidity' especially when performed in 'unsafe' & 'unhygienic conditions'. An ICMR bulletin puts the unofficial figure at 11 million and almost half the maternal deaths in the 15-19 age groups are due to 'unsafe abortions'. The number of these deaths could drop dramatically with increased contraceptive use. "Where pills and other contraceptives were made widely available, maternal deaths caused by abortions declined by 56 percent between 1989 and 1997" -New York Times report in Russia [4]. Where abortions are legal and statistics relatively accurate, the mortality ratio ranges from 1 to 3.5 per 100,000 abortions in developed countries[5]. In India, mortality is reported to be 7.8 per 1000 "random abortions"[6]. This could be attributed to that most of the abortions are illegally induced. Data indicate that the seventh and eighth week of gestation is the optimal time for termination of pregnancy[7]. Studies indicate that the risk of death is seven times higher for women who wait until the second trimester to terminate pregnancy [8].

What is 'Abortion'?

'Abortion' is defined in so many ways as follows

The term 'abortion' is derived from the Latin word 'aboriri', which means "to get detached from the proper site" [9]. In medical usage, 'abortion' means: "the termination of pregnancy before the period of viability" or "expulsion or extraction of all or any part of the placenta or membranes, without an identifiable foetus, a 'live born infant' or a 'still born infant', weighing less than 500g, but in the absence of known weight an estimated length of gestation of less than 20 completed weeks (130 days or less) calculated from the first day of the last normal menstrual period, may be used". It is a term referring to the birth process before the 20 completed week of gestation[10] or "destruction of life after conception and before birth"[11]. 'Miscarriage' is synonymous with 'abortion' and consists in the expulsion of the 'embryo-foetus' at any time before it reaches full growth. Legally,

'miscarriage'[12] means the premature expulsion of the product of conception (an ovum, embryo or a foetus) from the uterus, at any time before the full term is reached. Law recognizes the foetus as a special aggregation of cells with a potential for independent life and in this way protects the rights of an unborn child such as:

- The right to inherit,
- The right not to be harmed by drugs, and
- The right to bring a tort action (through legal representatives) [13].

Current Scenario of the Problem

In recent years, in view of increased number of 'female foeticide' leading to change of male to female sex ratio and increased rate of maternal mortality & morbidity, need was felt for amendments in abortion law. More than 100000 women in India who die annually during pregnancy and childbirth, 10000, deaths are due to 'unsafe abortions'. Currently there are 9806 private hospitals approved for abortions[14]. If statistics are anything to go by, the rich seem to be murdering their daughters. While the overall sex ratio in the country seemed to have improved from 927 to 933 in last decade as per 2001 Census, the overall sex ratio of the 0-6 years population of children has shown a decline from 945 to 927. Desegregations of the Census data revealed the disturbing trends of very poor sex ratio among the rich and literate. Earlier, it was thought that female foeticide and unwantedness of girls was more among the poor and the illiterate[15], Prosperity, intellectual or otherwise does not necessarily mean a change in social attitudes towards gender bias. A critical review of MTP Act was also emphasized these aspects [16].

Chronology of Events of Abortion Laws

The provisions regarding abortion law in the IPC[12] were enacted, more than a Century ago. These were drafted at that time keeping with the then British Law on the 'abortion'. The MTP Act, 1971 though appears to be enacted for control of population of India but the provisions were actually enacted to provide for the termination of certain pregnancies by the Registered Medical Practitioners (RMP) for protection and preservation of the lives of women.

Under the provisions of different IPCs[17], abortion was made a crime for which the mother as well as the alleged abortionist could be punished, except in the circumstances where it had to be performed in order to save the life of the mother, This was very strict law in terms of punishment, but it was very difficult to implement, in the lack of evidences and non-availability of witnesses. These changes in abortion law are made in conformity with Shantilal Saha Committee's recommendations in August 1964, 1966 and Declaration of Oslo-1970 of WMA.

After the enactment of the principal Act, latest amendments were done in 2009, while rules were framed for the first time in 1972 [20], amended in 1975 [21], 1977 [22] and recently in 2003 [13]. In 1975 regulation were introduced for the first time [23] and recently amended in 2003 [24]. Latest amendments are based on the recommendations of the 'expert group committee' formed in 1997, and suggestions of the National Women's Rights Commission (as a measure to prevent cases of 'female foeticide') along with the experience gained in the implementation of the MTP Act.

Aim & Objectives of Amendment

- To make the MTP Act, 1971, more relevant to the current scenario of the India.
- To remove provisions which were discriminatory to women (practice of 'female foeticide').
- To provide strict & enhanced punishment for the violations of the provisions of the Act.
- To save the RMPs from the purview of the IPC.
- To legalize termination of pregnancy on various socio-medical grounds.

These amendments are done in Sections: 2, 3, 4, and 5 as follows:

Regarding 'Mentally ill Person'

Much needed amendment regarding substitution of term "lunatic" with "mentally ill person" is done to make it in conformity with the recent law on mental health. Prior to its substitution, Sec, 2 (b) read as: "lunatic has the meaning assigned to it in Sec.3, of the old law on mental health [27], "Mentally ill person" means a person who is in need of treatment by reason of

any mental disorder other than mental retardation [19], thus, gives broader meaning to the term.

Regarding 'Consent'

Consent of Women

In case of a 'major' woman i.e. who has attained the age of 18 years, consent in writing in 'Form C' (Rule 9) is required before MTP [13].

Consent of Guardian in Writing: 'Guardian': person having the care of the 'person of a minor' or a 'mentally ill person' {Sec.2 (a)}

a. In case of a 'minor', i.e. less than 18 years of age, {Sec. 4 (a)}

b. In case of 'mentally ill person' even she has attained the age of 18 years [19].

No pregnancy shall be terminated except with the consent of the pregnant woman {Sec. 4(b)} [19], needs explanation. Why 18 years of age for consent? Why not 12 years? Questions may be raised, and answers appear to me that because of age of marriage' is 18 years for female, and also to discourage sexual intercourse outside the institution of marriage. Mere statement of woman in writing that she having attained 18 years of age is sufficient, i.e. no proof of age is required.

Court's Views

The MTP Act does not confer or recognize any right on any person to perform an abortion or termination of pregnancy. Even the pregnant woman cannot terminate the pregnancy except under the circumstances mentioned in the Act. Even during the 'first trimester', the woman cannot abort at her will and pleasure, There is no question of "abortion on demand". Sec.3 [18] is only an enabling provision to save the RMP from the purview of the IPC. Court further added that "termination of pregnancy under the provision of the Act, is not the rule and it is only an exception" [25].

A two Judge Bench of the Madras High Court, in its landmark judgement held that "a minor girl has the right to bear a child" [25,28,29]. No doubt the court is bound to presume, as the expression used is "shall be presumed". But such presumption can be rebutted on the facts. Even if it is presumed that the pregnancy is caused by rape, there is no

question of anguish caused by such pregnancy in the pregnant woman particularly when the girl was very keen to continue the pregnancy and bearing the child. Hence, the continuance of the pregnancy will not cause any injury to her mental health[25].

Confidentiality of Records: {Regulations 4 (6)} 24

The Consent in 'Form C' (Rule 9) [13], together with the 'Certified Opinion' 'Form-I' [13], the intimation of termination of pregnancy shall be placed in an envelop, sealed by the RMP(s) by whom such termination of pregnancy was performed, until that envelop is sent to the head of the hospital or the CMO of the District, it shall be kept in the safe custody of the concerned RMP(s) as the case may be. On every envelop there shall be noted the Serial Number assigned to the pregnant woman in the admission register Form-III (Regulation-5) [24], the name of the RMP(s) by whom the pregnancy was terminated, and such envelope shall be marked "secret". Every envelope shall be sent immediately after the termination of the pregnancy to the head of the hospital or owner; on receipt of the envelope, keep the same in safe custody.

Not only maintenance of confidentiality of record, assurance to the patient for the same is more important. Abortion, being a social taboo, is one of the most important reasons for pregnant woman to contact 'Quacks' in 'unsafe' and 'unhygienic' conditions. Thus, leading to increased incidence of, 'mortality' and 'morbidity' of pregnant women.

Privileged Communication: (Point 7.14) 1

Regulations [23, 24] imposing the restriction on the disclosure of the information contained in admission register to any person except:

- To the Chief Secretary to the Govt. in the case of departmental or other enquiry.
- To a Magistrate of the First Class within the local limits of whose jurisdiction the approved place is situated, in the case of an investigation into an offence.
- To the District Judge within the local limits of whose jurisdiction the approved place is situated, in case of suit or other action for damages.

The RMP shall, on the application of an employed woman whose pregnancy has been terminated, grant a certificate for the purpose of enabling her to obtain leave from her employer.

Note: any such employer shall not disclose this information to any other person because the employer is restricted from disclosing the information as to the MTP of his female employee to any person.

Grounds for MTP: {Sec. 3 (2), (i), (ii), (3)} [18,19] (Point 7.15) [1]

When

- The continuance of the pregnancy would involve a risk to the life of the pregnant woman, or
- Risk of grave injury to her physical or mental health; or
- There is a substantial risk that if the child were born, it would suffer from such physical or mental abnormalities as to be seriously handicapped,
- Where, any pregnancy alleged by the pregnant woman to have been caused by 'Rape',
- Where any pregnancy occurs as a result of failure of any device or method used by any married woman or his husband for the purpose of limiting the number of children.
- Where any pregnancy is alleged by the pregnant woman to have been caused by 'rape', or occurs as a result of failure of any device or method used by any married woman or her husband for the purpose of limiting the number of children.

The anguish caused by such unwanted pregnancy presumed to constitute a grave injury to the mental health of the pregnant woman. In these cases account may be taken of the pregnant woman's actual or reasonable foreseeable environment (Explanation-I&II) [18, 19]. Pregnant woman's allegation is sufficient to do MTP on this ground.

Who can do MTP?

Any 'RMP' with following qualifications and / or experience [13]

- If he has completed six months of 'House Surgency' in Gynaecology and Obstetrics {Rule-4 (b), (i)} [13]

- If he had experience at any hospital for a period of not less than one year in the practice of Obstetrics and Gynaecology. {Rule-4 (b), (ii)}
- Who holds a Post Graduate Degree or Diploma in Gynaecology and Obstetrics. {Ru1e-4 (d)}
- If he has assisted a RMP in the performance of 25 cases of MTP out of which at least five have been performed independently, in a hospital established or maintained, or a training institute approved for this purpose by the Government, {Rule 4 (c)}. But this training would enable him to do only 1st trimester terminations i.e. up to 12 weeks of gestation {Rule 4 (c), (i)}. -

The term "RMP" used in this Act have different meanings at different places, Sec. 2 (d) 18, Sec. 2(h) I. In other words, a doctor, whose name has been entered in a State Medical Register and who has such experience or training in Gynaecology and Obstetrics as prescribed in Sec.4 (a, b, c, d).

Experience & Training: (Sec. 4) [13]

- Up to seven Weeks.
- Up to 12 Weeks MTP, {Sec. 2 (d)}.
- 12 to 20 Weeks MTP, {Sec. (2) (a, b, c)}.

Where pregnancy may be terminated? (Sec. 4)

- a. A hospital established or maintained by government, or
- b. A place approved by 'District Level Committee' (D.L.C.).

Provided: that the D.L.C. shall consist of 3 to 5 members including the Chairperson.

Approval of Place: (Rule-5) [20]

- Up to Seven Weeks, conservative with -RU-486 (Mefipriston & Misoprostol).

Who can prescribe 'RU-486'?

Any 'RMP', [1,13,18,19] may prescribe it at his Clinic,

Provided: such RMP has access to a place, approved and display such certificate of access at some conspicuous place obtained from the owner of the 'Approved Place'.

Up to 12 Weeks MTP:

Place may be approved with following facilities: {Rule-5 (I) (ii)}

- Gynaecology Examination Table / Labour Table,
- Resuscitation and Sterilization Equipment,
- Drugs and Parental Fluids,
- Backup facilities for treatment of shock, and
- Facilities for Transportation.

Up to 20 Weeks MTP:

Place may be approved with following facilities: {Rule-5 (1) (ii) a, b, c}

- An Operation Table and
- Instruments for performing Abdominal or Gynaecological Surgery;
- Anaesthetic Equipments, Resuscitation and Sterilization Equipment; and
- Drugs and Parental Fluids for Emergency use, as notified by Government of India from time to time.

Procedure for Approval

Complicated procedure of approval and bureaucracy was supposed to be one of the important reasons for "unsafe abortions" in 'unhygienic conditions' and 'unapproved places', now simplified. Power of approval is shifted from state level to the District level. Application in "Form-A" (Rule-5 (2), addressed to CMO of the District, who may Verify / Inspect / Enquire and after satisfying himself, recommend the approval of such place to the "District Committee" having at least three members. District Committee after consideration approves such place and issues a 'Certificate of Approval' in "Form-B". {Rule-5 (6)} [13]

Provision of 'District Level Committee': {Rule-3} [20]

Composition

One member shall be the Gynecologist / Surgeon / Anesthetist, and other members from the local medical profession, NGOs and Panchayat Raj Institution of the District (3-5 members), at least one of them shall be a woman.

Tenure

For Government Member two calendar years, and Non-Government Member shall be not more than two terms (i.e. maximum 4 years).

Display of Certificate

It should be conspicuously displayed at the place to be easily visible to persons visiting the place. {Rule-5 (7)} [13]

Duty of District CMO

In case of death, or injury to a pregnant woman or unsafe and unhygienic condition, he may call for any information or may seize any article, medicine, ampoule, admission register or other document, maintained, kept or found at the place of MTP. {Rule-6 (2)} [13]

Who can be 'Punished for Violation'?[19]

- Termination of pregnancy by a person, who is not a RMP. The possession by RMP of experience or training in Gynaecology and Obstetrics i.e. provisions of Sec.2, (d) shall not apply (Sec. S (2) (Explanation- 2) .
- Whoever terminates pregnancy in a place that is 'unapproved' (Sec. 5 (3) .
- Any person, being 'owner' of a place that is not approved, and doing or allowing the termination of pregnancy at such place (Sec. 5(4) .

The expression "owner" means any person who is the administrative head or otherwise responsible for the working or maintenance of a hospital or place, by whatever name (DM, MS, DP etc.) called. {Sec.5 (4) Explanation- 2} .

What is the 'Punishment'?[19]

Termination of pregnancy in violation of provisions of the Act 19 is an offence punishable with Rigorous Imprisonment (R.I.) for a term which shall not be less than 2 years but which may extend to 7 years. {Sec.5 (2), (3), (4)}

Note: It is important and worth wise to mention here that it is now a cognizable offence for which a police officer can arrest a doctor for violations without warrant.

Violation of Regulations [19]

If a person willfully contravenes or willfully fails to comply with the requirements of any regulation made punishable to 'One Thousand Rupees'. {Sec.7 (3)}

SUMMARY & CONCLUSION

Effective implementation of changed laws in letter and spirit, both by law enforcing agencies and medical fraternity. Surprise visits by District Committee members to ensure effective implementation of these laws. Authors and editors of books covering topics on 'abortion', especially of Forensic Medicine, Community Medicine and Obstetrics & Gynaecology should include recent changes in these laws. Examiners in these subjects should ask questions in theory and viva-voce examinations in their respective subjects on new provisions of 'abortion laws'. Ensuring full confidentiality to patients so that they can come to approved places instead of going to 'quacks' in the 'unsafe' and 'unhygienic' places in the fear of social stigma attached to abortions. Creating awareness about new laws among medical fraternity, law enforcing agencies and public about benefits of these laws by organizing symposium, seminar, workshop, etc. NGOs and mass media should play their much-needed role in both creating awareness and exposing conducts of 'quacks'.

The ultimate aims of these amendments (2002) are: To eliminate the incidence and prevalence of abortions by: Untrained persons (quacks); and in Unsafe & unhygienic conditions, so that reduction in the 'maternal mortality & morbidity' could be achieved and crime of 'female foeticide' dealt effectively.

Thus, by following these suggestions we all can contribute our role towards society in reducing 'maternal mortality' and 'morbidity' and can prevent wastage of pregnant women's strength, health and above all life. Effective implementation of these laws can also contribute in preventing most heinous crime against humanity i.e. 'female foeticide'.

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BONES UNVEILED GRUESOME MURDER

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ABSTRACT

A bundle of bone in a carton was sent to the Deptt. of Forensic Medicine, Guwahati Medical College for autopsy. Police suspected that the bones belonged to a young boy of Guwahati who was kidnapped and ransom demanded.

Systematic examination revealed that the bones belonged to a single human being, sex was male and the age was ascertained to be between 16 to 18 years. The stature was calculated from long bones to be 160.4 cm \pm 3.9 cm. The skull showed one ante mortem incised wound over the right parietal bone involving both the tables. The time since death was estimated to be 1 to 2 years.

The skull, scapula, hip bone and one femur were sent to State Forensic Science Laboratory for Superimposition, DNA typing and Chemical analysis. Superimposition could not be carried out and report of DNA typing not received. Chemical analysis gave negative test for common poisons. Opinion regarding the cause of death was given subsequently as coma resulting from homicidal incised wound of the skull.

The autopsy report, corroborative evidences and subsequent investigation by the police confirmed the suspicion of police.

Key Words : DNA Typing, Bones.

Case Report

A bundle of bones were sent to the Deptt of Forensic Medicine Gauhati Medical College Guwahati on 23rd of April 2001 By the Police for autopsy. Police suspected that the bones belong to a boy from Guwahati who was kidnapped for ransom around two years back.

History of the case

As per the statements of the police and the relatives of the deceased accompanying the case property, the suspected boy was kidnapped around two years back for ransom. The boy died of some natural disease after around three months of his kidnapping, said one of the kidnappers who also led the police to the spot from where police in presence of the magistrate dug out the skeletal remains buried around one and half feet under the ground. Remnants of a gamocha (a sort of towel) and a stripped T shirt were also recovered along with the bones.

Findings during Autopsy

A bundle of bones found packed in a carton.

All the bones were devoid of any muscles or ligaments found separated from one another, except a few pieces of the skull bones which were attached to one another. All the bones were dry and grayish white in colour.

On examination found the following:

Skull bones- all separated, except the left parietal, left temporal, and portion of the occipital, which were found attached together, right maxillary bone with 1st and 2nd permanent molars attached and with space for the 3rd molar, left maxillary bone devoid of any attached teeth, mandible having the lateral incisors, canine, both the premolars, 1st and 2nd molars and space for the 3rd molar in left side and the permanent canine, 1st and 2nd permanent molars and space for the 3rd molar. Both the femurs were present, the length being 42cm (in Hepburn osteometric board), both the hip bones- epiphyseal union of both the ischeal tuberosity and the iliac crest were yet to be completed. Left humerus, right ulna, right radius and upper part of the left ulna all were found separated. Both the scapulae were

found with complete epiphyseal union of the coracoid but the acromion processes were yet to be fused. Sacrum was found without the coccyx, the upper two segments yet to unite. Apart from these, there were two clavicles, 11 vertebrae and a total of 17 ribs, 9 from the left and the rest 8 from the right side.

The epiphyseal union of the bones around the lower end of radius and ulna were yet to be fused, but there was complete epiphyseal union of bones around the lower end of humerus and upper end of radius and ulna.

Angle of the mandible was everted and the shape of the bone was V shaped with broad ascending ramus.

In hip bones: Obturator foramina were large and oval, ilia were high and vertical in anatomical position with deep anterior surface, ischio-pubic index being 80.

Injury: An incised wound measuring 5 cm x 0.2 cm was found involving both the tables on the right parietal bone extending from the right parietal eminence up to the lambdoid suture in right side, blood clots were found adherent to the cut margins.

After recording the findings, the skull, one scapula, one hip bone and one femur along with a photograph of the missing boy were sent to the State Forensic Science laboratory for superimposition, DNA typing and toxicological analysis. The toxicological analysis gave negative test for common poisons and personal identification by superimposition could not be done due to incomplete nature of the skull.

The final opinion was given as

- The skeletal remains were of human origin of one and of same individual.
- Sex was male
- Age of the individual was above 16 years and below 18 years.
- Height of the individual was approximately 160.4cm ± 3.9cm.
- The time since death was approximately between 18 to 24 months.
- Death of the person was due to coma resulting from the ante mortem incised wound of the skull described which was caused by sharp

cutting weapon and homicidal in nature.

Photographs

RECONSTRUCTION OF SKULL BY ENDOCRANIAL GROOVE - A CASE REPORT

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ABSTRACT

Identification of an individual is one of the requisites in establishing the corpus delicti. Here, we discuss a case of establishing corpus delicti based on the continuance of the vascular groove on the endocranial surface, by matching two pieces of skull bone that were recovered at the crime scene and preserved at autopsy.

Key words: Cranial groove, identification, fragmented skull.

INTRODUCTION

Identification is an essential requirement for any medicolegal investigation as the mistaken identity may pose a problem in delivering the justice. Identification of a living person or a dead body is very important, because identity is a part and parcel of corpus delicti, which helps in connecting the criminal to the crime.

Identification of human skeletal remains is a critical matter and is required when the body is decomposed, mutilated or skeletonised to the point where customary means of identification are rendered uncertain or impossible. The determination of race, sex, age, and stature of the bone gives valuable information in establishing the identity of a person.

Another skill that is receiving increasing attention is the reconstruction of skeletal remains to produce a physical likeness of the deceased individual. Reconstruction of skull is required for the reproduction of facial contour and superimposition, which may be helpful in the identification of a missing person[1,2,3]. Skull reconstruction is also required for doing craniometry and determination of race, sex and age. Reconstruction of fractured pieces of bone also helps in proving the corpus delicti in a case where the fractured pieces were missing from the main bone.

Reconstruction of the skull is done by approximating the fractured ends of bone and its proper alignment. Sometimes, the edges of the bony pieces recovered are destroyed due to the natural decaying process or due to activity of scavenging animals. This may lead to difficulty in matching the bony pieces based on the approximation of the edges. We report a case of reconstruction of skull pieces based on the continuance of the vascular grooves present on the endocranial surface, thereby establishing the corpus delicti.

CASE REPORT

Two persons while traveling in a motorcycle were assaulted by a group of persons with deadly weapons and one person was killed on the spot. The body was sent for medicolegal autopsy. During examination, the autopsy doctor observed comminuted fracture of skull vault with missing of some fragments. At the request of investigating officer, the autopsy surgeon preserved few pieces of fractured skull. Later, a piece of bone was recovered by the investigating officer near the crime scene. The piece of bone recovered from the crime scene and those preserved at autopsy were sent to the Office of State Medicolegal consultant, Department of Forensic Medicine and Toxicology, Kasturba Medical College, Mangalore for an expert

opinion regarding whether the pieces of bone recovered at autopsy and crime scene belonged to the same person.

On examination, the pieces of bone recovered at autopsy and crime scene were found to be of human origin. The piece of bone recovered at the crime scene was irregular in shape with few attached hair and was soiled with mud. The edges of the bone were irregular with a brownish black coloured stains. The bone pieces preserved at autopsy consisted of 3 pieces of bone, irregular in shape, more or less equal in size. One piece of bone preserved at autopsy closely approximated with the piece of bone recovered from the scene of crime. This was confirmed by the continuance of the vascular groove on the endocranium of both pieces.

DISCUSSION

The identification of skeletal, badly decomposed, or otherwise unidentified human remains is important for both legal and humanitarian reasons.

In general, the nature of the human remains and physical evidence that a forensic anthropologist must examine for relevant information ranges from a single bone to an entire skeleton. If all or most of the skeleton is recovered, even when badly broken up into small pieces, it can be reconstructed in the laboratory[4]. When fragmented skull bones are available, it can be reconstructed by approximating the fractured ends. If they belong to same skull, it will properly align. But when the edges of bone are destroyed due to natural decaying process or by animals, the approximation will be difficult.

The endocranial surface of the middle cranial fossa is grooved by the middle meningeal vessels. The groove starts at the foramen spinosum and runs forwards by dividing into frontal and parietal branches. The frontal branch runs upwards and forwards to the region of the inner surface of the pterion, where it is often converts into a canal. It then runs upwards and backwards on the inner surface of the parietal bone. The parietal branch runs backwards first on the squamous temporal and then on the parietal bone[5].

The endocranial grooves are supposed to be unique for each individual. These grooves become

deeper and margins become sharper with advancing age[6]. Even if the edges of the skull pieces are destroyed, these endocranial grooves are protected from destruction. The fragmented pieces of skull can be matched by approximating the fractured ends and looking for the continuance of these grooves.

CONCLUSION

Identification by matching the missed fragments of bone is essential in the establishment of crime in any medicolegal investigation. Vascular grooves present on the endocranial surface are useful in matching the dismembered pieces of skull. It is therefore important that the field investigator must recover all the mutilated parts or skeletal remains that are present at the crime scene, no matter how small or seemingly insignificant they may appear to be.

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HIDDEN WEAPON (BLADE OF A KNIFE) IN A CASE OF HOMICIDAL STAB WOUND-A CASE REPORT

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ABSTRACT

A case of Homicidal stab wound to the chest was autopsied at Department of Forensic Medicine & Toxicology, Pt. J.N.M. Medical College, Raipur (C.G.). The blade of a knife (on exploration of the track of the stab wound), was found in situ within the chest cavity, with tip of knife being thrust in one of the thoracic vertebral body. The handle of the weapon was missing. The metallic blade was not visible from outside. Right lung and heart have sustained injuries along the track of the wound. The tip of the weapon has cut and was present in situ in 0.5 cms depth of the vertebral body. Beside stab wound only two contusions on back and one abrasion on forehead were present on the body.

Key Words: Homicide, Stab wound, Knife

INTRODUCTION

Dead body of an average built male was brought for autopsy with the history that the deceased had abused father of one of the two assailants and the assailants had allegedly attacked him with some sharp weapon and a wooden log. The victim died on the spot.

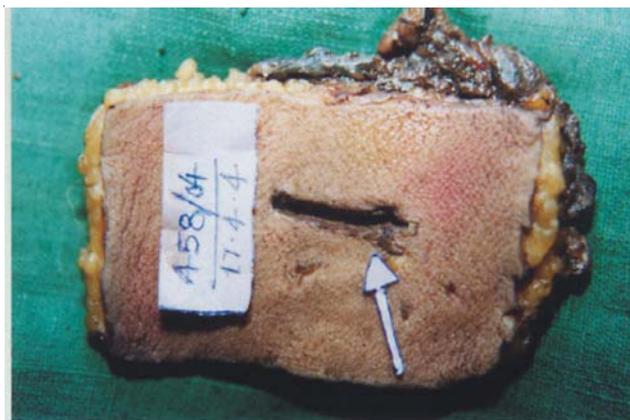
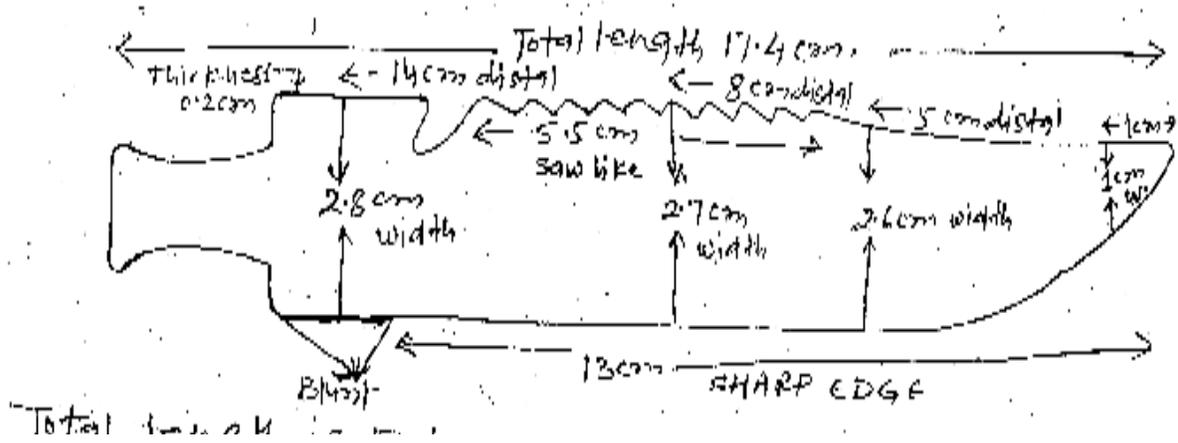
Full blown rigor mortis had already set in when the autopsy was under taken and hypostasis too was fixed on back. The half T-shirt and underneath baniyan worn by the deceased had 2.7 cm long sharp cut effect corresponding to underlying stab wound on back of right chest wall, the sharp cut showed downward extension effect of 1.3 cm & 1 cm length over T-shirt and baniyan respectively. The margins of sharp cut and the adjacent areas of the T-shirt and baniyan were smudged with blood, which at places showed clotting effect also. Brownish dust was sticking over shirt and full pant worn by the deceased more on back. The clothing were in situ and except for described already, were found intact.

A reddish impact abrasion of 3x1.5 cm size was present over forehead on left side. Two red contusions were present on back of right side chest in transverse plane. The upper one was 17 cm below tip of shoulder & 10 cm right to midline and 10x8 cm in size, while lower one was at the level of

11th thoracic vertebra and was just right to midline and 7x5 cm in size. Underneath the subcutaneous tissues and muscles were reddish ecchymosed however the rib cage was found intact.

Single obliquely transverse stab wound was present on back of right side of chest wall nearly 3 cm below the upper contusion already described but medial to it (6 cm right to midline) situated in the 9th inter costal space. The wound was 2.8 cm x 1 cm. size. The wound was situated at the height of 4'6" from feet while height of deceased was 5'8". Lower end was broad and was extended downwards for 0.5 cm which showed serration effect. The other end was narrow. On introduction of probe, the wound is directed posterior to anterior, right to left and slightly below upwards and is 12cm deep. Blood was coming out of the wound. On introduction of probe, some metallic object was found to be present in side (along the track). On opening the chest cavity from the front, a metallic knife blade was found insitu in the right thoracic cavity with the tip placed at 9th thoracic vertebral body level. The weapon after cutting inter costal muscles and right pleura has cut the base of right lung. and then had given a cut to the vertebral body of 9th thoracic vertebra of 1 cm length with 0.5 cm depth.

Tissues of posterior mediastinum from 9th



thoracic vertebra to posterior aspect of heart were showing red ecchymosis with extensive hematoma and were cut. The pericardium was cut on posterior aspect, corresponding with through and through 1x0.2 cm cut on the posterior aspect of right atrioventricular junction and area just below it in obliquely vertical direction. Whole of the track of wound was extensively echymosed. Partially clotted blood was presents in chambers of heart and pericardial cavity. Right and left thoracic cavities contained partially clotted blood of one and half litre amount respectively. The rest of the visceral organs were pale and healthy.

The weapon recovered insitu from right thoracic cavity was a 17.4 cm long metallic knife blade. One of the edges is sharp up to 13 cm length from tip, then it became blunt. The width of blade at 1 cm, 5cm, 8cm. and 14 cm away from tip was 1 cm, 2.6 cm, 2.7cm and 2.8 cm respectively. 5.5 cm length of the blunt edge of the knife was serrated (saw like). Hence maximum width is 2.8 cm. Whole of the article is soaked with blood.

The weapon and clothings were sealed and handed over to Police Constable concerned after the autopsy.

The autopsy surgeon opined the death to be due to shock and haemorrhage as a result of stab injury to the chest and homicidal in nature.

DISCUSSION

The recovery of weapon of assault in side the body is rarely reported in literature. None parts of the weapon of assault i.e. knife was visible from out side in the present case. How ever, it was on exploration of right thoracic cavity that it was discovered. The stab wound present on skin showed serration effect on lower margin near extended end, which corroborated with serrated margin of the weapon. It is proposed in the present case that when the weapon was thrust in side the chest cavity, it went on cutting and piercing the structures of thoracic cavity including lung and then made sharp cut to the 9th thoracic vertebral body and then was deflected anteriorly on to the posterior aspect of heart. While attempt was made to withdraw the weapon the handle of it was

detached, may be due to getting stuck in one of the internal structures or imperfect fitting of handle with blade. A part of the blade might have been projecting out side, which when the deceased fell down on the ground in supine position arguably tilted on right side, got thrust in side, in the process might have extended one of the edges of the stab wound over the skin as described. The weapon could not deviate/ displaced upwards / downwards as it was limited by ribs. The assailant then fled away from scene of crime with handle of the weapon. The pattern of hypostasis corroborated the supine position of the body for considerable period. The two contusions on back were caused by hard, relatively heavy and blunt object with more than 5cm width and more than 7 cm length. Except for another abrasion over forehead, no other injuries were present over the body surface. The characteristics of the single stab wound and other injuries made the opinion regarding the nature of death to be quite easy i.e. homicidal. Ordinarily presence of injuries to be caused by two distinctly different types of weapons suggests involvement of more than one assailant which was later confirmed by history and circumstantial evidences.

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LACERATION OF THE HEART WITHOUT SIGNIFICANT EXTERNAL INJURY -A CASE REPORT

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ABSTRACT

In a case of vehicular accident the heart was found lacerated, when there were only some scratch abrasions on the chest externally without fracture of the ribs or sternum. This case is reported to highlight the possibility of a serious fatal internal injury without significant external injury in the chest.

Key words : Blunt force injury, laceration of heart

INTRODUCTION

Vehicular accidents are very common in Manipur because of poor traffic rules, congested road users and poor road conditions. Fatal injuries are commonly encountered. In this case, a fatal laceration of the heart was found in Postmortem examination (PME) without much external injury in the chest.

CASE REPORT

On 17-9-03, at 1.40 pm, one 18 yr old Meitei boy of 5-1/2 feet weighing 53 kg and of average build was brought for PME at the mortuary of Regional Institute of Medical Sciences, Imphal. He was the driver of a scooter who met with a self-accident on the same day at 10.20am. Soon both the driver and pillion rider succumbed to their injuries and died at 10.30am in a Mission hospital.

POSTMORTEM FINDINGS

External

There were multiple small-lacerated wounds with abrasions on the right side of face over an area of 16cmX4cm, red in colour. Multiple scratch abrasions were present on the front of the neck and left side upper part of the chest upto the level of 2nd rib, over an area of 20cmX9cm. There were also multiple scratch abrasions over the sternum and the medial half of the right side front of chest,

over an area of 28cmX 14cm. Multiple small abrasions were present on the anterolateral aspect of left forearm, 32cmX8cm and on the front of left thigh, 39cmX16cm.

Internal

Patchy extravasations of blood in the muscle of anterior chest wall were present. There was no fracture of ribs or sternum. Laceration 8cmX2cm, cavity deep of right ventricle of heart on the anterior surface was present, along with laceration of pericardium. Contusion 2cmX1cm on the apex of the heart was present. About 3.5litres of blood was present in the thoracic cavity. There were some patchy contusions on the hilar and the interlobar regions of both lungs. Both the coronary arteries were thoroughly examined after transverse dissection and found to be patent.

From the findings, it can be concluded that the death was due to shock and haemorrhage resulting from the laceration of the heart produced by blunt force injury to the chest, accidental in nature.

DISCUSSION

In a study of thoracoabdominal injuries in fatal road traffic accident in NE Delhi, injuries to the chest and abdomen combined proved to be the most fatal as most of the victims died on the spot. Usually lung and heart involvement was seen in the chest with or without fracture of ribs. The injuries to the

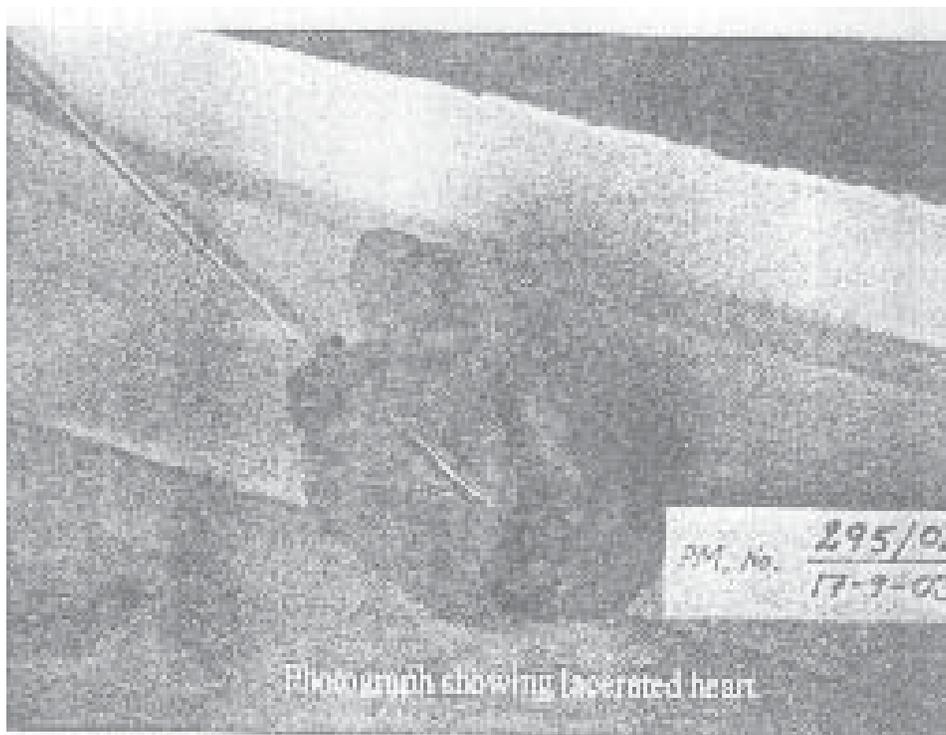
heart and lungs could be due to the impact of these organs ; to the solid rib cage and shearing force to the hilum of the lungs and heart by the impact of the moving vehicle, in victims without causing any rib fracture 2.3. The extensive laceration of the heart without fracture of the sternum or ribs could be explained by the above factors. Since the victim in this case was driving the scooter, he could have impacted against the ground when he was thrown over, which was somewhat, accounted for by the multiple scratch abrasions on the chest. We can also discuss one medicolegal aspect that whether the rupture of the heart had occurred spontaneously just before accident. The heart is liable to rupture spontaneously following myocardial infarction from obstruction of a coronary artery by thrombosis, embolism, spasm, etc. Such rupture nearly always occurs over lateral, anterior or posterior wall of left ventricle in or near the apex; it can sometime occur in right ventricle or in the auricles. Such rupture is usually small and single[4]. But in this case it is clearly traumatic because the coronary arteries were patent, pericardium was lacerated and there was a contusion near the apex of the heart.

Conclusion

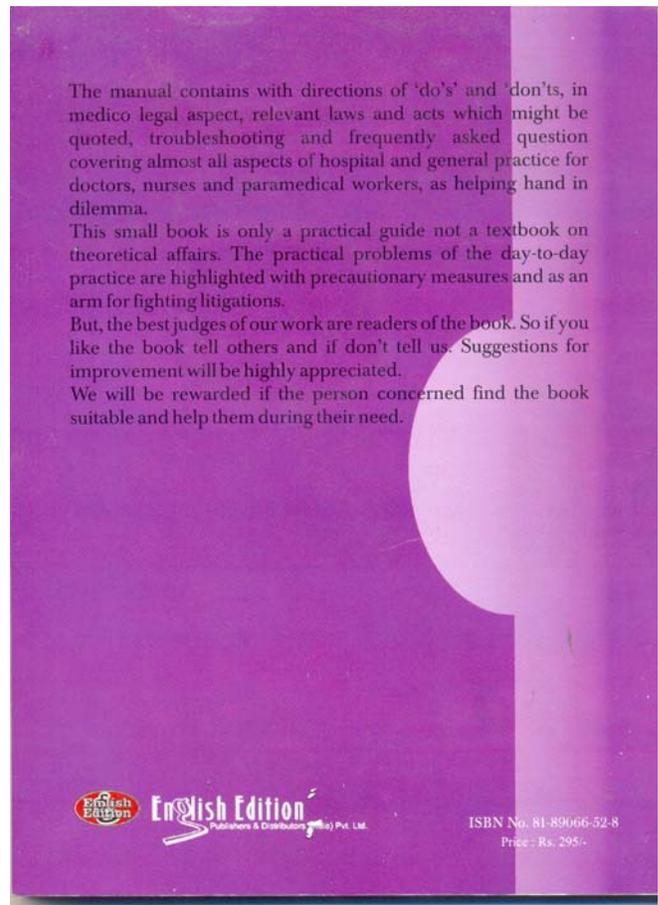
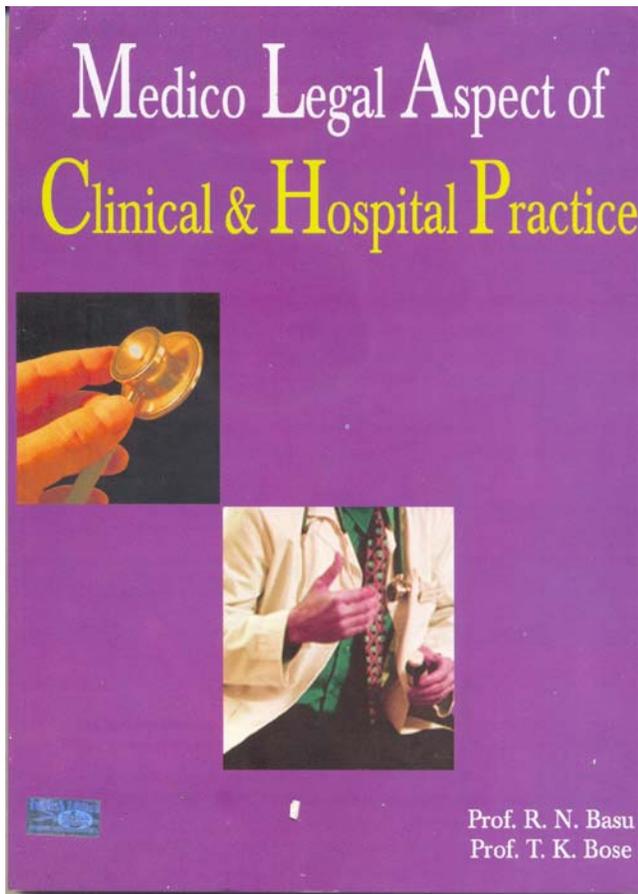
Vehicular accidents are a daily occurrence in today's congested traffic. The case report highlights the possibility of fatal internal injury without significant external injury to help in the prompt management of such cases.

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BOOK REVIEW



MEDICOLEGAL ASPECTS OF CLINICAL AND HOSPITAL PRACTICE

By

Professor RN Basu and Professor TK Bose

This manual has been created by two eminent personalities of medicolegal field who have a vast experience accumulated in the years spent on working and teaching to the students. They know in detail the problems faced by the doctors, nurses and other paramedics while practicing their specialties. This book shows beautifully their acumen to the details of the problem and their solutions. By taking, the clues from this book all concerned will find it useful. It will help them to avoid being unnecessarily dragged in the courts. After learning from this book, practitioners will find it comfortable to practice without fear.

Dr. R.K. Gorea

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Unpublished original manuscripts, written in English should be sent to:
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The journal accepts a range of articles of interest, under several feature sections as follows:

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Statistics: Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such

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2. Mukherji JB. Forensic Medicine and Toxicology. 1st Ed. Calcutta: Academic Publishers; 1981. p.72.

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