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From the Desk of Editor-in-Chief

I am thankful to the members of Punjab Academy of Forensic Medicine & Toxicology (PAFMAT) for giving me the opportunity to serve on this new responsibility as Editor-in-Chief of the Journal of this academy of Forensic Medicine Specialists and Medico Legal Consultants of the state of Punjab.

As member of the founder team and first vice president of PAFMAT, afterwards I have the privilege to serve the Academy as President for two consecutive terms and twice as General Secretary and I tried my best to uplift the academy and fulfill the desired aims and objectives and I hope to perform better on this new assignment with active support of all of you and under able guidance of the senior members.

Cited with Copernicus and many other citing bodies notably safetylit, worldcat library, J-Gate & WHO Hinary and its availability on the net at www.pafmat.com, indianjournals.com and drbhullar.pafmat.com, now it is one of the best platform for forensic experts to share their scientific research and publications at the national & international level and an easy access to the contributions of the fellow experts of forensic medicine and the allied specialties. Adding a new feather to its cap, the Journal has been covered by Elsevier products (Scopus) since February 2011 for which Dr AD Aggarwal deserves a special credit.

Before I place on record my sincere thanks to Dr Anil Garg, Joint-Editor & Webmaster of PAFMAT for his sincere efforts for timely release of this issue of the journal, my mentor and Founder Editor-in-Chief Prof. RK Gorea for his vision and precious advice for compiling it with professional approach, the contributors of the scientific articles for this issue and the financial supporters, I wish to prepare and release the coming issues in a time frame manner and humbly request the future contributors to send the scientific articles much in advance so that the editorial team has ample time to review the articles and ensure the timely release of the coming issues.

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EDITORIAL

HEAVY METAL POLLUTION: ROLE OF FORENSIC TOXICOLOGIST

Abstract: Heavy metal environmental pollution especially with toxic metals from a variety of sources leading to cumulative and serious health hazards in human beings is the cause of concern for all today. In the absence of any proper medicine to treat acute as well as chronic poisoning, only preventive precautions like safe drinking water and food, avoiding direct or indirect exposure to the sources, early detection and measures to avoid further exposure of the poisoning, public awareness campaign and using mass media for wide publicity of various informative and awareness programmes, are some of the important parameters for the policy makers and future planners including the medical professionals, forensic toxicologists, health organizations and the NGOs to deal with this international public health problem.

Key Words: Pollution, Toxic Metal, Anthropogenic, Cadmium, Arsenic, WHO, Minamata Disease, Mercury, Chromium, Forensic Toxicologist.

For the first time in his entire cultural history, man is facing one of the most horrible ecological crisis—the problem of pollution of environment especially with toxic metals, which sometime in the past was pure, virgin, undisturbed, uncontaminated and basically quite hospitable for him. Today, the cry of "Pollution" is heard from all the nooks and corners of the globe and it has become a major threat to the very existence of mankind on the planet earth. Heavy metal pollution affects flora, fauna and other abiotic components of the ecosystem. Metal leads to various metabolic alterations and undesirable changes, which in many cases may cause severe injury and health hazards.

There are several factors like human population explosion, unplanned urbanization, deforestation, profit oriented society and technological advancement etc., whose cumulative effect is responsible for the origin of pollution crisis on the earth. The ecological crisis of environmental pollution has been blamed on different things and one of the major things is the pollution due to metals in the environment.

Toxic metal pollution can be a much more serious and insidious problem, as these are intrinsic com-

ponents of the environment. At high concentrations, all the metals are toxic to animals and plant both. Metals are omnipresent in the environment occurring in varying concentrations in parent rock, soil, water, air and all biological matter. Moreover, metals are also released into environment from a wide spectrum of anthropogenic sources such as smelting of metallic ores, industrial fabrication and commercial application of metals, agro-chemicals pesticides as well as burning of fossil fuels. These metals are redistributed in the biosphere and dispersed in the air, soil, water and consequently in human beings through food chain bio-magnification causing chronic ailments.

Metals are significant to human because some of them are most important trace elements as a cofactor in various metabolic enzymes and constituents of cells. However, increased concentration of these metals can affect mineral and enzyme status of human beings. Humans can be affected directly by air, water and soil metal pollutants as well as indirectly through contaminated food supplies. In recent past, a large number of silent epidemics have been reported due to metal contamination, which is escalating day by day.

In 1947 an unusual and painful disease of rheumatic nature was recorded in the case of 44 patients from a village on the banks of Jintsu River, Toyama prefecture, Japan. During subsequent years it became known as 'itai-itai' disease (meaning 'ouch-ouch') in accordance with the patients shrieks resulting from painful skeletal deformities. Cadmium induced disturbances in calcium metabolism accompanied by softening of bones; fractures and skeletal deformations take place with a marked decrease in body height up to 30 cm.

The importance of arsenic as a health hazard, which is also known as 'slow killer' is now well recognised. A major outbreak of arsenic poisoning occurred in young children in the summer of 1955 in Japan. The intoxication stemmed from the consumption of dry milk powder to which arsenic contaminated sodium phosphate had been added as a stabilizer.. Epidemiological studies on children, living in the vicinity of a coal power plant in Czechoslovakia where coal that was used contained about 1000-1500 g arsenic per tonne, showed respiratory symptoms and hearing loss. Long term ingestion of arsenic contaminated drinking water produced gastrointestinal, skin, liver and nerve tissue injuries. In the 1970s, international agencies headed by the UNICEF began pumping millions of dollars of aid money into Bangladesh for tube-wells to provide "clean" drinking water. According to the World Health Organization, the direct result has been the biggest outbreak of mass poisoning in the history. Up to half the country's tube-wells, now estimated to number 10 million, are poisoned. According to the report's author, Allan Smith of the University of California, Berkeley, the scale of the disaster is "beyond Bhopal; beyond Chernobyl." So far as we know there is no medicine available for chronic arsenic toxicity. The only treatment is safe water, nutritious food and time.

Mercury (Hg) is considered to be highly toxic metal for living organisms. Even at very low concentration, Hg and its compounds present potential hazards due to enrichment in food chain. Poisoning by methyl mercury compounds presents a bizarre neurological picture as observed in large-scale outbreaks in Japan, China, Iraq and various parts of the world. This disease was known as Minamata disease and after extensive investigations it was revealed in 1959 that the deaths were caused by the consumption of the fish and other foodstuffs contaminated with methyl mercury.

In 1960 fatal incidents of lung cancer were reported from the Kiriyama factory of Nippon-Denki concern on the Islands of Hokkaido; Medical warnings were issued that inhalation of dust containing Chromium in high oxidation states (IV) and (VI) was associated with malignant growth in the respiratory tract and painless perforation in nasal septum among trivalent and hexavalent states being the most stable and common in terrestrial environments. An incidence of catastrophic heavy metal poisoning was reported from highly toxic Cr (VI) contained in untreated slimes and factory wastes. The largest chromium consumer in Japan, the Nippon chemical industries has deposited approximately 530,000 tonnes of uninduced slimes and wastes containing hexavalent chromium around Tokyo and in the neighbouring Chiba pre-fecture..

Lead is the number one environmental poison amongst the toxic heavy metals all over the world, causing serious health hazards to humans, especially to young children. In a developing country like India, lead poisoning remains a serious problem. The full impact of lead poisoning on the health of children and adults is becoming clearer to most countries, and many governments have begun to take action. Significant health and economic benefits have been realized by those countries which have developed lead prevention programs.

Lead was a key component in face powders, rouges, and mascaras; the pigment in many paints ("crazy as a painter" was an ancient catch phrase rooted in the demented behaviour of lead-poisoned painters); a nifty spermicidal for informal birth control; the ideal "cold" metal for use in the manufacture of chastity belts; a sweet and sour condiment popular for seasoning and adulterating food; a wine preservative perfect for stopping fermentation or disguising inferior vintages; the malleable and inexpensive ingredient in pewter cups, plates, pitchers, pots and pans, and other household artefacts; the basic component of lead coins; and a partial ingredient in debased bronze or brass coins as well as counterfeit silver and gold coins.

The Romans were aware that lead could cause serious health problems, even madness and death. However, they were so fond of its diverse uses that they minimized the hazards it posed. Romans of yesteryear, like Americans of today, equated limited exposure to lead with limited risk. What they did not realize was that their everyday low-level exposure to the metal rendered them vulnerable to chronic lead poisoning, even while it spared them the full horrors of acute lead poisoning.

A British military unit stationed in Hong Kong, was overtaken by acute lead poisoning and suffered from severe vomiting intestinal cramps and circulatory disorder. The source was traced to lead chromate, which had been used to improve the colouration in curry powder. Analysis revealed a lead content of 1.08%. Since this spice is effective in many countries it should be subject to government control.

The extent of the growing crisis in contamination of the environment and food chain by endocrine disrupting chemicals is reflected by the growing list of health advisories regarding eating fish and wildlife which would serve as a warning that similar bioaccumulation and effects are occurring in

people as in fish and wildlife.

A recent report by the National Research Council found that 50% of all pregnancies in the U.S. are now resulting in prenatal or postnatal mortality, significant birth defects, neurological conditions, or chronically unhealthy babies. Approximately, 250,000 U.S. children are born each year with birth defects diagnosed at or shortly after birth.

The toxic metals mercury, lead, and cadmium have also been found to have reproductive and endocrine system disrupting effects. Aluminium has been found to cause Alzheimer's disease in human beings reported from several parts of the world. Exposure to relatively low levels of these chemicals have been documented to have had catastrophic effects on populations of Beluga whales, alligators, turtles, mink, otters, bald eagles, osprey, cormorants, terns, herring gulls, migratory birds, chickens, lake trout, chinook and coho salmon, etc. throughout the U.S. and Canada.

Heavy metal pollution is more common than one can think. To many people, heavy metal pollution is a problem associated with areas of intensive industry. However, roadways and automobiles now are considered to be one of the largest sources of heavy metals. Zinc, copper, and lead are three of the most common heavy metals released from road travel, accounting for at least 90 of the total metals in road runoff. Lead concentrations, however, consistently have been decreasing since leaded gasoline was discontinued. Smaller amounts of many other metals, such as nickel and cadmium, are also found in road runoff and exhaust.

About half of the zinc and copper contribution to the environment from urbanization is from automobiles. On the road surface, most heavy metals become bound to the surfaces of road dust or other particulates and enter the soil or are channeled into a storm drain. Whether in the soil or aquatic environment, metals can be transported

by several processes.

Metal behavior in the aquatic (streams, lakes and rivers) environment is surprisingly similar to that outside a water body. Streambed sediments exhibit the same binding characteristics found in the normal soil environment. As a result, many heavy metals tend to be sequestered at the bottom of water bodies. Some of these metals will dissolve. The aquatic environment is more susceptible to the harmful effects of heavy metal pollution because aquatic organisms are in close and prolonged contact with the soluble metals.

According to the report of an Interregional Workshop on Environmental Health Impacts from Exposure to Metals held on June 1-3, 2005 in Simla, India, heavy metals represent an environmental hazard because once the metals enter the environment they cannot be destroyed. Therefore it is critical to assess the distribution of these metals in the environment and their health hazards. Severe heavy metal contaminations have been reported in South-East Asia; arsenic contamination of groundwater in major parts of Bangladesh, lead in gasoline in Indonesia, cadmium contamination of rice fields in Thailand, and mercury contamination from small scale and industrial gold mining activities in Indonesia and from medical instruments breakage in India. These represent but a few cases of the occupational and environmental risks due to heavy metals that are of importance to us.

The objectives of the workshop and the recommendations for the medical professionals, forensic toxicologist, NGOs and policy makers for prevention of heavy metal pollution, can be summarized as:

1. All health professionals and the policy makers must be sensitized on public health dimensions of environment and human health impacts of various metals.
2. Regional case studies of human health

exposure to metals should be presented in specific settings like households, workplace, and health facilities and in the community at large.

3. Success stories in terms of reducing and preventing human exposure to metals must be presented on the appropriate platform.
4. A framework to develop and implement national and regional action plan for public health interventions and collaboration, addressing human exposure to metals, must be identified.
5. Identification of preventive approaches.
6. Implementation of risk assessment methods.
7. Aiming priority health interventions at the most vulnerable groups; children, women, workers.
8. Ensuring higher standards of validation and quality control of laboratories.
9. Engaging industry to develop cost effective alternatives.
10. Stronger role and involvement of public interest NGOs and academia.
11. Calling for a global regulatory instrument for toxic metals.
12. Networking at national, regional and global levels.
13. A stronger commitment from the WHO.

References:

1. Rai UN, Amit Pal: Health Hazards of Heavy Metals: Vol. 8; No.1;2002, Reproduced From EnviroNews of ISEB India
2. Heavy Metal Pollution Is More Common Than You Think (Conservation Currents, Northern Virginia Soil and Water Conservation District, March 2005)
3. Report of an Interregional Workshop Simla, India.

Dr DS Bhullar, MD

ORIGINAL RESEARCH PAPER

RADIOLOGICAL AGE ESTIMATION FROM MANUBRIO-STERNAL JOINT IN LIVING POPULATION OF PUNJAB

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Abstract

Determination of age is very important in circumstances when exact date of birth is not known or is under dispute. In the developing world recording and storing date of birth was not perfect previously. Determining the age in living persons in middle aged and old people is relatively cumbersome after the eruption of third molar as the factors available for observation from which age can be determined are vague with little statistical data regionally. To overcome these shortcomings fusion of Manubrio-sternal joint is studied to find out its value in determining the age in middle and old people. Radiograph of this joint was done in 192 people with known exact date of birth with a valid proof of date of birth.

Key Words: Age determination; Manubrio-sternal Joint, Sternum, Radiological appearance

Introduction:

In India, there was no perfect way to record age previously. Many people do not have documentary evidence as a proof of their age. So, forensic experts are frequently consulted about determination of the exact age in the middle as well as old age people in civil as well as criminal cases. Whatever details available for age determination is based on the western population and that too from only dead bodies. There is little data available from Indian population. So when ever forensic experts are consulted for age determination, they usually opt for dental, skull as well as sternum radiographs in middle as well as old population. Radiographic appearance of sternum may be different from autopsy appearance of the sternum. So that data available from corpses is difficult to apply on living people for age determination and comparison. So this study was designed to get radiographic examination of lateral view of sternum from living person of Punjab whose exact age is available from birth records and note the fusion or non-fusion of Manubrio-sternal joint.

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Different workers are giving different opinion on the basis of fusion of manubrio-sternal joint [1-10] Parikh mentioned that the manubrium unites with the body in old age, at about 60 years [1].

Mathiharan and Patnaik are of the opinion that the manubrium rarely unites, except in old age [2]. Das studied ossification from sternum obtained from the cadavers during autopsy and concluded that if fusion at manubrio-corporal junction age is above 28 years, therefore, the sternal data "Manubrium fuses to the body by 60 years, is not reliable and erratic [3].

Glaister mentioned that in advanced life, the Manubrium is occasionally joined to the body by bone, although only the superficial parts of the intervening cartilage is converted into bone [4]. Jit and Bakshi studied about time of fusion of the human mesosternum with manubrium & xiphoid process in sterna obtained from 772 male and 208 female subjects from Punjab, Haryana and Chandigarh (India) varying in age from 5 to 85 years. Complete fusion of manubrium with the mesosternum was seen at 21 years or above in both sexes; though non-fusion could be seen even in a person above 60 years of the age [5,6]. Reddy and Krogmann mentioned, "The manubrium fuses with the body in old age [7, 8]. Gatzoulis et al in Gray's Anatomy edited that the Manubrio-sternal joint is usually symphysis, which ossify in old aged. In 10% of all over 30 years, the manubrium is joined to the

sternal body by bone, but the intervening cartilage may be only superficially ossified; it is in the aged that this is complete [9]. Gautam stated that the fusion of Manubrium with the body of sternum begins after the age of 40 and completed after the age 50 years [10]. The main objective of the study is to determine the range as well as mean age of fusion of Manubrio-sternal joint.

Methods:

The present study comprised of 192 subjects between the age group of 35-65 years. The cases were selected from the easily available general population to us: patients admitted in wards, their relatives and police personnel visiting the hospital, Patiala

The cases were radiologically examined for the lateral view of sternum after obtaining their written consent. Then status of fusion of Manubrium with the body of sternum was studied showing complete fusion and others (having no fusion, partial fusion and doubtful fusion).

Only those cases were selected where proof of exact date of birth was available. The cases showing any disease or damage in respect to anterior chest wall were not considered. Cases with poor quality of X-ray films due to over shadowing of the breast tissue or any other factor were discarded.

Result:

The total of 192 cases was studied. 30 cases were discarded because of lack of good x-ray exposure or breast overshadowing. The study cases were divided into age groups as follows: -

- " 35 - 40 years
- " 41 - 45 years
- " 46 - 50 years
- " 51 - 55 years
- " 56 - 60 years
- " 61 - 65 years

Discussion:

The present study is compared with the study conducted by Jit et al [5] as shown in table 3.

The present study is also compared with the study conducted by Gautam et al [10]. The present study shows 7.69, 9.09, 8.69 percent of complete fusion respectively in males and 33.3, 0 and 0 percent of complete fusion respectively in females in 35-40, 41-45, 46-60 age group where as the complete fusion is absent in both male and females as per Gautam et al. In present study in 51-55 age group in males complete fusion is seen in 12.5 % cases while in Gautam et al study it was 20% while both studies in female shows absent complete fusion in this age group. In present study in 56-60 age group in males complete fusion is seen in 14.29 % cases while in Gautam et al study it was 33.3 % while in female group, complete fusion was seen in 25 % cases as compared to absent complete fusion in Gautam et al study. In present study in 61-65 age group in males complete fusion is seen in 38.89 % cases while in Gautam et al study it was 40 % while in female group, complete fusion was seen in 37.50 % cases as compared to 33.3 % complete fusion in Gautam et al study.

Conclusion:

The earliest age of fusion of the Manubrium with the body of the sternum as per present study was 37 years in males and 35 years in the females (Since our first group was 35 to 40 years). The latest age of fusion of the Manubrium with the body of the sternum as per present study was 65 years in the both males and in the females (Since our last group was 60 to 65 years, which shows overall fusion of approximately 40%). From the present study, it was concluded that at the age group of 60-65 years, only 40% of population is showing fusion at Manubrio-sternal Joint by lateral view radiography. In rest of 60% of population, still the fusion is incomplete. So, Forensic Experts should be cautious while labelling the age of patient below 60 or 65 years on the basis of fusion of Manubrio-sternal Joint and vice versa.

Acknowledgement:

I want to humbly thank the almighty God and volunteer cases that kindly consented for this research.

Table No 1 Showing distribution of cases according to sex and age

Each age group has more than 25 Cases

Table no 2 Showing relation between fusion of Manubrium with body of sternum according to age and sex

Table 3 Showing comparison of different studies showing complete fusion of manubrium with body of sternum with relation to age and sex

indicates that Jit et al [5] made 36 to 40 for both male and females

indicates Jit et al [5] made > 41 age group for females. Note: Percentage is calculated

Sex-wise per group.

References:

1. Krogman WM; The human skeleton in forensic medicine. Charles C. Thomas: 1962; 215.
2. Glaister J; Rentoul E; etc. Medical jurisprudence and toxicology. 12thed; E & S Livingstone Ltd: London, 1966; 71.
3. Jit I; Bakshi; etc. Time of the human mesosternum with manubrium and xiphoid process. Ind J Med Res 1986, 83, 322-31. PMID: 3733193
4. Jit I; Kaur H; etc. Time of fusion of the human sternabrae with one another in northwest India. Am J PhysAnthropol 1989, 80(2), 195-202. PMID: 2801911
5. Gautam RS; Shah JV; etc. The human sternum-as an index of age & sex. J Anat Soc India 2003, 52(1), 20-3.
6. Das SK. Is ossification of sternum at all a valuable guide for determination of age at middle age group. J Indacad forensic med 2005, 27, 31-33
7. Parikh CK; Personal Identification. Parikh's textbook of medical jurisprudence, forensic medicine and toxicology, 6thed; C.B.S. Publisher and Distributors: New Delhi, India, 2006; 2.10.
8. Mathiharan K; Patnaik AK;etc. In Modi's medical jurisprudence and toxicology; 23rded;Lexis Nexis: New Delhi, India, 2006; 286.
9. Reddy KSN; Identification. The essentials of forensic medicine and toxicology; 27thed; KSaguna Devi: India, 2008;70.
10. Gatzoulis MA; Standring S; etc. Gray's Anatomy- the clinical basis of clinical practice; 40thed; Churchill Livingstone Elsevier: Spain, 2008; 922.

USE OF VITREOUS HUMOR IN COMPARISON TO USE OF ROUTINE VISCERA FOR CHEMICAL ANALYSIS IN SUSPECTED POISONING CASE

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ABSTRACT

Poisoning is a global problem, and its incidence and trends vary from place to place. Poisoning or drug abuse has become a serious problem in India. It has gradually increased in the last 5-10 years. Correct diagnosis of poisoning has to be made in the living as well as when the person is dead, both for treatment and medico-legal purposes. The most important proof of poisoning is the detection of poison in the excretions like vomit, urine and blood during life, while it is detected in the contents of stomach and bowel and tissues of the body, after death.

In a dead body, one of the better samples to complement blood is vitreous humor, because it is less likely to degrade quickly, and is fairly easy to collect at autopsy. The role of vitreous humor as a suitable sample for chemical analysis in the detection of all kinds of poisoning cases was studied in the alleged cases of poisoning subjected to medico-legal autopsy at the mortuary of Government Medical College and Hospital, Chandigarh, in the present study; as also the co-relation of vitreous humor findings with Chemical Examiner's/ CFSL's report using routine viscera for chemical analysis.

Key Words: Suspected Poisoning, Chemical Analysis, Vitreous.

Introduction

According to the National Centre for Health Statistics, poisoning is the third leading cause of death, after motor vehicle and firearm injuries, resulting in a death rate of more than 7.2 per 100,000 populations. [1] As per W.H.O, over 3 million acute poisoning cases, resulting in about 20,000 deaths, occur annually worldwide.[2] Of these, more than 90% occur in developing countries. The exact incidence of poisoning in India remains uncertain, but it is estimated that about 1-1.5 million cases of poisoning are reported annually.[3] Common agents in India, appear to be pesticides, sedative drugs, corrosives, alcohol, plant poisons and household poisons. Of late, aluminum phosphide has emerged as the substance of choice for suicides, particularly in North India. [4]

The field of Forensic Toxicology also developed over a period of time. With the invention of new technologies, detection of poison from the body via various secretions and viscera has become possible. Autolytic and putrefactive changes limit the selection and utility of specimens. The

reliability and relevance of any analytical toxicology result is determined in the first instance by the nature and the integrity of the specimen(s) submitted for the analysis. [5] Collection of specimen must be standardized to minimize it to site variability and should if available include a peripheral blood sample and at least one other specimen. Urine and vitreous humor are good specimens to complement blood. [6]

Another mode of detection of poisoning is via analysis of vitreous humor (VH). Vitreous humor is a soft, transparent and visco-elastic gel comprising a complex network of biologic molecules, mainly collagen and poly hyaluronic acid. [7] Vitreous humor has advantages over blood and CSF, most obvious of which is the ease of sampling as it is isolated and well protected anatomically. It is usually preserved postmortem, even in cases of severe head trauma and is less subject to contamination and putrefactive changes than the blood and CSF. Furthermore, chemical changes occur at a slower rate in vitreous humor than in blood and CSF. [8] It has been used for the detection of certain poisons in the past like alcohol

and opioids but its role in the detection of other poisons like pesticides, germicides etc. has not yet been assessed. [9-11] Its use as an alternative sample matrix for determination of drugs has been recently reviewed by several workers who found that it can be used when blood is not available or is badly denatured. [12]

Material and Methods

This study was carried out in the Department of Forensic Medicine and Toxicology, Government Medical College and Hospital, Chandigarh, in association with Central Forensic Science Laboratory, Chandigarh, (CFSL). All cases of poisoning brought to the department for medico-legal autopsy were the subjects of the study. However, those having past history of eye or orbital trauma, any history of eye surgery or those having significant history of posterior segment disease; were excluded from the study.

After a thorough postmortem examination, the routine viscera were sent for toxicological analysis to CFSL, Chandigarh; and other respective State Forensic Science Laboratories. Vitreous humor was also included and was collected by aspiration using a 5-ml syringe with a 20"-gauge needle. Suction was applied gradually and slowly to withdraw all extractable vitreous humor by a sclera puncture made on lateral canthus of each eye, taking care to avoid tearing of any loose tissue fragments surrounding the vitreous chamber. Only the clear fluid was used for the study and samples contaminated with tissue fragments were discarded. The sample was kept in an icebox to preserve it and transported to the CFSL, Chandigarh on the same day. In the CFSL, vitreous humor samples were subjected to Gas chromatography Mass Spectrometry using Trace-DSQ 2005 automated analyzer (Thermo Fennigen). In this method, the samples were first analyzed by Gas chromatography and then separation made by controlling flow rate of carrier gas, temperature etc. [13] The samples were then

subjected to spectroscopic analysis to identify poison. The reports of the vitreous humor analysis and the Chemical Examiner/ CFSL were analyzed and co-related. Diagnostic values of their findings were compared.

Results

The study includes 56 cases of suspected poisoning that were autopsied in the mortuary of the Department of Forensic Medicine and Toxicology, Government Medical College and Hospital, Chandigarh. Sixteen cases were excluded from the study because of contamination of vitreous, or having history of eye trauma/ eye surgery or posterior segment disease.

Aluminium phosphide poison was detected in maximum victims 18(45%), followed by Organo-phosphorous 5 (12.5%) cases, Chlorocompounds and Benzodiazepines in 2 cases each (5%), ethyl alcohol with insecticide in 2 (5%) cases, ethyl alcohol alone in 1 case (2.5%). Reports for 8 cases (20%) had not been received by the department up to the end of the study period. Poison was not detected in 2(5%) cases.

On analysis of the vitreous humor, and comparing the results with those obtained from the Chemical Examiner's, it was found that of the 32 samples for which the reports had been received by the department, organophosphorus compounds were detected in 5(16%) cases, chloro-compounds, benzodiazepines and ethyl alcohol in combination with an insecticide were detected in 2(6%) cases, each. It was not possible to detect any poison in 20(63%) cases.

When the Vitreous humor samples of those cases for which the chemical examiner's report was not received in the department, were analyzed, it was found that chloro-compounds, ethyl alcohol, organophosphorus and ethyl alcohol in combination with insecticide were detected in 1 case each; while it was not possible to detect any poison in 4 cases. On the whole, aluminum phosphide was not detected on analysis of the vitreous humor sample, though it was possible to detect the other compounds.

TABLE 1 (a-f) showing Diagnostic Values of findings using routine viscera and vitreous humor (n=30)

$$\left\{ \begin{array}{l} \text{Sensitivity} = \frac{\text{True Positive}}{\text{Total numbers}} \times 100 \quad \text{Specificity} = \frac{\text{True Negative}}{\text{Total numbers}} \times 100 \end{array} \right\}$$

TABLE 1 a - For Aluminium Phosphide poison

		Routine Viscera		
		+	-	
Vitreous Humor	+	0	12	12
	-	18	0	18
		18	12	30

Sensitivity – 0%

Specificity – 0%

TABLE 1 b - For Organophosphorus poison

		Routine Viscera		
		+	-	
Vitreous Humor	+	5	0	5
	-	0	25	25
		5	25	30

Sensitivity – 100%

Specificity – 100%

TABLE 1 c - For Ethyl alcohol

		Routine Viscera		
		+	-	
Vitreous Humor	+	1	0	1
	-	0	29	29
		1	29	30

Sensitivity – 100% Specificity – 100%

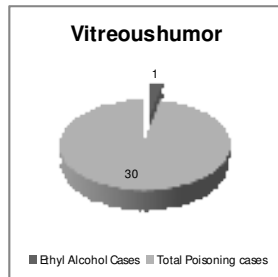
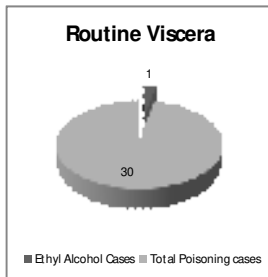


TABLE 1 d - For Chlorocompounds poison

		Routine Viscera		
		+	-	
Vitreous Humor	+	2	0	2
	-	0	28	28
		2	28	30

Sensitivity – 100%

Specificity – 100%

TABLE 1 e - For Benzodiazepine poison

		Routine Viscera		
		+	-	
Vitreous Humor	+	2	0	2
	-	0	28	28
		2	28	30

Sensitivity – 100%

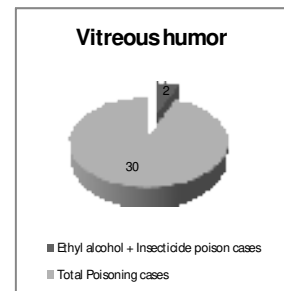
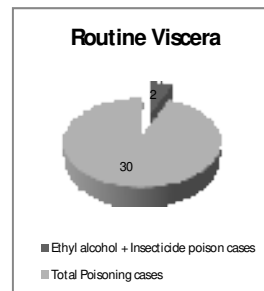
Specificity – 100%

TABLE 1 f - For ethyl alcohol + insecticide poison

		Routine Viscera		
		+	-	
Vitreous Humor	+	2	0	2
	-	0	28	28
		2	28	30

Sensitivity – 100%

Specificity – 100%



Discussion

Among the other body fluids, several factors make vitreous humor very useful for postmortem diagnosis: production of this fluid is a vital phenomenon; it is well protected from putrefaction, charring or trauma, and it demonstrates good chemical stability.[9] Vitreous humor is the aqueous gel located in the posterior cavity of the eye between the lens and retina. It is generally less subject to postmortem changes because of its compartmentalization, and may be present in

decedents even when other biological fluids are not available. [14] Postmortem vitreous humor analysis is widely used in forensic pathology applications due to its relative stability, compared with postmortem cerebrospinal fluid or blood.[15] Caplan et al analyzed vitreous humor concentration of ethanol and compared it with the blood levels and found that even a blood level of as less as 50mg% of ethanol can be detected in vitreous humor in 90% of the cases[9]. Similar studies have been done by Lin et al and Scott et al, where they analyzed vitreous humor sample for free codeine, morphine etc. [10,11]

Our findings shows that the detection of poison in routine viscera was found to be associated with the type of poison while the specificity and sensitivity using vitreous humor for detection of poison was found to be 100% in cases of Organophosphorus, Ethyl alcohol alone, Ethyl alcohol with insecticide, Chloro-compounds and Benzodiazepines.

Moriya et al reported that cerebrospinal fluid and vitreous humor were specimens of choice to detect organophosphates and carbamates from postmortem samples. [16] Jablonski and Sybirska also studied ethyl alcohol, opiates, barbiturates and benzodiazepines in intraocular fluids. [17] They also found that intraocular concentration of these compounds were as credible as the results from the blood samples.

Conclusions

The specificity and sensitivity using vitreous humor for detection of poison was found to be 100% in cases of Organophosphorus, Ethyl alcohol, Ethyl alcohol with insecticide, Chloro-compounds and

Benzodiazepines.

Aluminum phosphide was not demonstrated in the vitreous humor through GCMS method on accounts of limitation of this technique. However, rests of the poisons were easily detected in the vitreous humor through this method thereby proving its reliability and suitability for the detection of poisoning.

References

1. Fingerhut LA, Cox CS. Public Health reports, May- June 1998: Internet search on Poisoning mortality 1985-1995 dated 15 July 2003.
2. Kumar A, Vij K. Trends of poisoning in Chandigarh: a six-year autopsy study. *Journal of Forensic Medicine & Toxicology* 2001; 18(1): 8-11.
3. Sharma BR, Sharma V, Harish D, Vij K. Suicides in Northern India: causes, method used and prevention. *Med. Sci Law* 2003; 43(3): 21-29.
4. Sharma VK, Satpathy DK. Incidence of Alphas poisoning: its analysis and interpretation. *Journal of Forensic Medicine & Toxicology* 1999; 16(2): 20-25.
5. Flanagan RJ, Connaly G, Evans JM. Analytical toxicology: guidelines for sample collection postmortem. *Toxicol Rev*, 2005; 24 (1): 63-71.
6. Drummer OH. Requirements for bioanalytical procedures in postmortem. *Analytical and Bioanalytical chemistry*. 2007; 388 (7): 1495-1503.
7. Mulla A, Lorne MK, Kalra J. Vitreous Humor biochemical constituents. *Am J Forensic*

- Med Pathol 2005; 26(2): 146-9.
8. Ross AJ, Paul AH, Brett G. Determination of Post mortem interval by sampling vitreous humor. *Am J Forensic Med Pathol* 1997; 18(2): 158-62.
 9. Caplan YH, Levine B. Vitreous humor in the evaluation of postmortem blood ethanol concentration. *J Analytical Toxicol* 1990; 14: 305-7.
 10. Lin DL, Chau YC, Kai PS, Robert H, Reng LL. Distribution of morphine, codeine and 6-acetyl morphine in the vitreous humor. *J Analytical Toxicol* 1997; 21: 258-61.
 11. Scott KS, Oliver JS. Vitreous humor as an alternative sample to blood for the supercritical fluid extraction of morphine and 6-acetyl morphine. *Med Sci Law* 1999; 39(1): 77-81.
 12. McKinney PE, Philips S, Gomez HF, Brent J, Macintyre M, Watson WA. Vitreous humor cocaine and metabolite concentration: do postmortem specimens reflect blood levels at the time of death. *J Forensic Sci* 1995; 40(1): 102-7.
 13. McCurdy WC. Postmortem specimen collection. *Forensic Sci Int.* 1987; 35(1): 61-5.
 14. Helper BR, Isenichmid DS. *Drug Abuse Handbook*, S.B.Karch, Ed. CRC Press, Boca Raton, FL, 1998, pp 873-889.
 15. Coe JI. Postmortem chemistry update: emphasis on forensic application. *Am J Forensic Med Pathol.* 1993;14:91-117.
 16. Moriya F, Hashimoto Y. Comparative studies on tissue distributions of Organophosphorus, Carbamate, and Organochlorine pesticides in decedents intoxicated with these chemicals. *J Forensic Sci* 1999; 44(6): 1131-1135.
 17. Jabłoński C, Sybirska H. Use of intraocular fluid in the medico-legal practice in diagnosing fatal poisoning with various psychoactive substances. *Arch Med Sadowej Kryminol.* 2002 ; 52(2):85-97.

A RETROSPECTIVE STUDY OF MEDICO LEGAL CASES PRESENTING IN THE EMERGENCY OF RAJINDRA HOSPITAL PATIALA IN THE YEAR 2009

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Abstract

Retrospective study of medico legal cases was done in the Emergency Department of Rajindra Hospital Patiala in year 2009 as per their type, age & sex. Total 32012 cases were presented in the Emergency department out of which 4836 cases were medico legal cases. Data thus collected analyzed statistically.

Keywords

Medicolegal cases, Assault, Road traffic accidents, Poisoning

Introduction

Homicide is one of the oldest crimes in human civilization. For every person who dies as a result of homicide many more are injured and suffer from a range of physical, mental, sexual and reproductive health problems. There has been global increase in homicide and it causes over 500,000 deaths per year worldwide. Homicide places a massive burden on national economies, costing countries billions of dollars each year in health care, law enforcement and lost productivity. In addition homicide results in significant personal, social and economic loss. [1,2] Accidents today are among the leading cause of death. In some countries road traffic accidents are number one cause of deaths; especially in many parts of the world particularly the more highly industrialized nations. The alarming increase in morbidity and mortality owing to road traffic accidents over the past few decades is a matter of great concern globally. Road accidents have become a serious health hazard throughout the world by killing and crippling thousands of persons each year. Traffic accident is an endemic disease which affects mainly young people. A middle aged male is more likely to die from injuries received in traffic accident than from any other cause and motor vehicle accidents are single leading cause of death. Worldwide the number of people killed in road

traffic crashes each year is estimated at almost 1.2 million, while the number injured could be as high as 50 million.[1] Death due to poisoning is no exception. It has increased gradually in the last 5-10 years and it represent major epidemic of non communicable disease of the present country. WHO estimated that the world wide incidence of acute pesticide intoxication has doubled during 1970s-1980s[4]. Ingestion of poison is a common medical emergency. Acute pesticide poisoning, particularly in developing countries is frequent and thus has a great importance in public health. The increase in poisoning incidence can be blamed to the rapid in the field of science and technology and vast growth in the industrial and agricultural sectors [3].

The exact incidence of this problem is uncertain but as per WHO, three million acute poisoning cases with 2,20,000 deaths occur annually worldwide particularly among agricultural workers. This figure could be just the tip of the iceberg since most cases of poisoning actually go unreported, especially in third world countries [5].

Material & Methods

The present study was conducted in the Emergency department of Govt. Medical College & Rajindra Hospital Patiala. Data thus collected from

the medico legal cases presented in the emergency in one year from 1st January 2009 to 31st December 2009 according to their type, age & sex was analyzed statistically.

Observations

Retrospective study of medico legal cases was done in the emergency department of Rajindra Hospital Patiala in year 2009. Total 32012 cases were presented in the emergency dept out of which 4836 cases were medico legal cases which constitute 15.10% of the total cases. 1089 cases were non medico legal cases (NON MLC) are those cases who having injuries on their body but not suspicious i.e. injury caused while playing, working at home, slipping of bike etc. Table 1 shows that out of total 4836 MLC cases males outnumbered females, males were 79.75% and females were 20.25%. The male to female ratio was 3.9

Table 2 shows that the maximum number of cases were of assault 2274(47.02%) followed by road RTA 1995(41.25%), poisoning 255(5.27%) and burn cases 185(3.83%) etc. As shown in table 3, the most common age group involved in both the sex was 21-30 years followed by 31-40 years and the least age group involved 0-10 years. Male female ratio is 4:1. Table 4 shows that maximum cases of RTA were belongs to 21-30 years in both the sexes followed by 31-40 years and the least age group involved 0-10 years. Male female ratio is 4.9:1.

As shown in table 5, the most common age group of poisoning cases in both the sexes was 21-30 years followed by 31-40 years in males and 11-20 years in females the least age group involved 0-10 years. . Male female ratio is 1.9

As shown in table 6, the most common age group of burn/electric burn cases in both the sexes was 21-30 years followed by 31-40 years in males and 11-20 years in females the least age group involved >50 years. Male female ratio is 1.2:1.

Table 1: Sex wise distribution of medico legal cases

Sex	No. of cases	%age
Male	3857	79.75
Female	979	20.25
Total	4836	100

Table 2: Incidence of various types of medico legal cases

Medico legal cases	Total no.	%age
Assault	2274	47.02
Road traffic accidents	1995	41.25
Poisoning	255	5.27
Burn/ electric burn	185	3.83
Railway accidents	34	0.70
Sexual assault	9	0.19
Fire arm	8	0.17
Hanging / strangulation	2	0.04
Drowning	1	0.02
Brought dead	73	1.50
Total	4836	100

Table 3: Age & sex wise distribution of assault cases

Age	Male		Female	
	No.	%	No.	%
0-10	4	0.22	4	0.88
11-20	282	15.48	39	8.60
21-30	697	38.28	160	35.32
31-40	388	21.30	118	26.04
41-50	264	14.50	74	16.33
>50	186	10.21	58	12.80
Total	1821	100	453	100

Table 4: Age & sex wise distribution of road traffic accidents cases

Age	Male		Female	
	No.	%	No.	%
11-20	274	16.51	37	11.01
21-30	543	32.73	101	30.05
31-40	346	20.86	61	18.15
41-50	249	15.00	59	17.56
>50	198	11.95	49	14.60
Total	1659	100	336	100

Table 5: Age & sex wise distribution of poisoning cases

Age	Male		Female	
	No.	%	No.	%
11-20	27	16.26	20	22.47
21-30	78	46.99	43	48.31
31-40	35	21.08	18	20.22
41-50	12	7.23	2	2.25
>50	11	6.63	4	4.50
Total	166	100	89	100

Table 6: Age & sex wise distribution of Burn/ Electric burn cases

Age	Male		Female	
	No.	%	No.	%
11-20	14	13.46	17	20.99
21-30	40	38.46	45	55.55
31-40	26	25.00	12	14.82
41-50	15	14.42	3	3.70
>50	2	1.93	2	2.47
TOTAL	104	100	81	100

Discussion

Every unnatural death represents a tragic waste of human life and resources, whether accidental, suicidal or homicidal. Homicide is one of the oldest crimes in human civilization. For every person who dies as a result of homicide many more are injured and suffer from a range of physical, mental, sexual and reproductive health problems. There is a steep rise in the vehicular accidents in the present era due to urbanization and tremendous growth in road transport sector. Population explosion is a catalyzing factor for increased number of accidents. Accidents just do not happen but are caused. The causes in given situations may vary. Since accidents are multi-factorial hence call for an inter-sectoral approach, to both, prevention of accident and care of the injured. Since accidents are multi-factorial, epidemiological techniques are especially useful for their study and control. Out of total 32012 cases, medico legal cases (MLC) were 4836 which constitute 15.10% of the total cases. Out of total 4836 medico legal

cases (MLC) male were 3857(79.75%) and females were 979(20.25%). In the present study, males outnumber females in ratio of 3.9 in all ML Cases, however this ratio is 4 in assault cases, 4.9 in RTA cases, 1.9 in poisoning cases and 1.2 in burn cases. . These results concurrence with the studies conducted by various authors [7,8,10,12,13].The most common age group involved in all type cases was 21-30 years and the maximum cases were in the age group of 11-40 years in both the sexes. The maximum numbers of victims were young adults. In assault cases maximum age group involved in both the sexes was 21-30 years. Bhullar & Aggarwal[14] and Marri et al[2] shows similar results. In road traffic accidents cases maximum age group involved in both the sexes was 21-30 years. This study and its results concurrence with the studies conducted by various authors Singh H et al[6], Menon A et al[7], Choudhary BL et al[8]. In poisoning cases maximum age group involved in both the sexes was 21-30 years and its results concurrence with the studies conducted by various authors Gupta BD et al[5], Sharma BR et al[9]. In burn/electric burn cases maximum age group involved in both the sexes was 21-30 years and the studies conducted by Batra[12] & Tirpude et al[13] shows similar results.

Conclusion

The present study was conducted in the Emergency department of Govt. Medical College & Rajindra Hospital Patiala. Data thus collected from the medico legal cases presented in the emergency in one year from 1st January 2009 to 31st December 2009 according to their type, age

& sex was analyzed statistically.

The most common age group involved in all type cases was 21-30 years and the maximum cases were in the age group of 11-40 years in both the sexes. The maximum numbers of victims were young adults. Males outnumbered females in all type of cases.

References

1. WHO World Report on road traffic injury prevention. Geneva: WHO; 2004.p.3-29.
2. Marri MZ, Bashir MZ, Munawar AZ, Khalil ZH, Khalil IR. Analysis of homicidal deaths in Peshawar, Pakistan. J Ayub Med Coll Abbottabad 2006; 18 (4):30-33
3. Gorea RK, Dalal JS, Gargi J, Rai H. Pattern of Poisoning in Punjab. JPAFMAT 2001; 1:6-8.
4. Guloglu C, Kara IH. Acute poisoning cases admitted to a university hospital emergency department in Diyarbakir, Turkey. Human Exp Toxicol 2005; 24: 49-54.
5. Gupta BD, Hapani JH, Shah VN. Current trend of poisoning in Jamnagar -An experience of tertiary care teaching hospital. JIAFM 2006;28(3): 90-92.
6. Singh H, Dhatarwal SK. Pattern and Distribution of injuries in fatal road traffic accidents in Rohtak (Haryana) JIAFM 2004; 26(1): 20-23.
7. Menon A, Pai VK and Rajeev A. Pattern of fatal head injuries due to vehicular accidents in Mangalore. J Forensic Leg Med. 2008; 15(2): 75-7.
8. Choudhary BL, Singh Deepak, Tirpude BH, Sharma RK, Meel Veena, profile of road traffic accidents cases in Kesturba Hospital of MGIMS, Sevagram, Wardha, Maharashtra. Medico legal update 2005; 5 (4): 1-12.
9. Sharma BR, Harish D, Sharma V, Vij K. The Epidemiology of poisoning: An Indian View Point. J Forensic Med Toxicol 2002;19(2): 5-11.
10. Jain R, Asawa S, Ruia S. Status of poisoning in rural hospital in Maharashtra. J Forensic Med Toxicol 2001; 18(1):12-16.
11. Singh K, Oberoi SS, Bhullar DS. Poisoning trends in Malwa region of Punjab. JPAFMAT 2003;3:26-29.
12. Batra AK. Burn mortality: recent trends and sociocultural determinants in rural India. Burns 2003; 29(3) : 270-275.
13. Tirpude BH, Murkey PN, Pawar VG, Keche AS, Borkar JL, Singh KS, Shende SA, Zopate PR. Autopsy study of burn cases in MGIMS, Sevagram, Wardha. Int J Med Toxicol Leg Med 2008;10(2): 23-25
14. Bhullar DS, Aggarwal KK. Medico Legal Diagnosis & Pattern of Injuries with Sharp Weapons. Journal of Indian Academy of Forensic Medicine, 2007;29(4):112-114

A FLUORESCENT SURVEY OF DIATOM DISTRIBUTION PATTERNS IN SOME SMALL WATER BODIES (LAKES AND SAROVARS)

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Abstract

In the present study an attempt has been made to characterize diatom flora existing in eight water bodies, especially lakes and sarovars of few districts of Haryana, India. Diatoms play an important role in establishing the death due to drowning. Noticeable changes in the diversity of this botanical evidence can further be used in forensic investigation of drowning cases where drowning site is under suspicion. It happens particularly in those cases where drowning site is not available or body has been moved from one location of site to other. The observations of the present single season (winter) study have revealed noticeable qualitative and quantitative changes in diatom distributions. Purpose of this study was to help forensic scientist in understanding site specific distribution of diatom flora of a region and its role in solving drowning cases.

Key words: Water body, Diatoms, Drowning, Flora

Introduction

The diatoms are unicellular algae of class Bacillariophyceae of the kingdom Protista. They are found in both fresh and marine water. There are estimated more than 200 genera of living diatoms and approximately 100,000 species exists [1]. Usually similar types of diatoms exist in almost similar type of water bodies. Some local environmental factors including mineral contents (especially silicon) of water and soil, temperature, water stratification, pH and pollution linkage can bring notable variations in diversity of diatoms [2,3,4,5,6,7]. It has been found that, a noticeable change in the diversity of diatoms with respect to seasonal changes. Climatic conditions significantly help in the qualitative and quantitative distribution of diatoms in water bodies [7]. This of course is fortunate for the forensic investigator engaged in drowning investigations. Forensic biologist studies this botanical material (diatom) for establishing mode (ante-mortem/post-mortem), probable season of death and putative site of drowning.

In case of offering a positive opinion on ante-mortem drowning, the "Criterion of Concordance" was thought to be satisfactory [8]. If the Criterion of Concordance can't be followed then a minimal established limit i.e. 20 diatoms/ 100 µl of pellet (obtained from 10 gm of lung samples) and 05 complete diatoms from other body organs should be present [4]. The concordance of the individual diatom distribution from drowned body organs with the diatom species in water samples can also be an exploratory tool in the investigation of suspected drowning site [3,4,9,10,11,6].

The study of diatom flora from different types of water bodies and regions has direct forensic application. As the earlier studies have proposed that diatoms vary from one water body to another, which ultimately helps to generate Diatomological Maps and diagnosis of the particular drowning sites [4,6,7,12]. Only a few attempts have earlier been made in order to study the distribution pattern of diatom flora in term of forensic aspect in India [6,7,9,13,14]. So it was thought desirable to collect and analyze water samples from different types

of water bodies like lakes and Sarovars (religious and holy bath places) of Haryana (One of the Indian States) for diatom species distribution. Haryana state is richly wrapped with various rivers, canals and lakes. Being a tourist place it has several sacred places with lakes and

Sarovars (Holy bath places). It makes drowning very easy in this state. The present study has tested diatom distribution pattern in eight different water bodies of Haryana. We have recorded variations in the diversity of diatoms in different water bodies. Diatom profiles of the few selected water bodies have appeared to be slightly specific.

Materials and Methods

Eight different types of water bodies were selected from the whole Haryana state particularly those places which have either the tourist or religious attraction Map-1 and Table-1.

Collection of Water Sample

The samples from selected eight water bodies (coded as H-1 to H-8) stretching all over Haryana state were collected during the months of January and February in 2008. About one liter water sample was collected from the selected water bodies in properly labeled and sterilized plastic bottles along with this some scrapings and small stones from the edges of the water body. Map-1 and Table-1 show the name and location of the selected water bodies along with their districts respectively.

Extraction of diatoms from water samples

The bottles were shaken thoroughly before analyzing. The samples were analyzed with the help of 'Acid Digestion Method' [6]. About 50 ml of water sample was transferred into a sterilized 100 ml glass beaker and 10-20 ml of concentrated ni-

tric acid (HNO₃) was added to digest organic material of the samples. These samples were kept as such for two hours. Then the sample was centrifuged at 5000 rpm for 10 minutes in properly labeled plastic centrifuge tubes. The supernatant was pipette off leaving behind only a pellet containing diatom frustules at the bottom of tube. Pellet material was suspended in distilled water and centrifuged twice to remove all traces of acid.

Preparation of Slides

After the final centrifugation except for 1ml, the whole supernatant was discarded by using a sterilized dropper. The pellet along with 1ml of supernatant was stirred well and entire volume of the pellet suspension (1 ml) was aspirated using a Pasteur pipette and droplets of

the aspirate were poured over the five serially marked as (I-V) microscopic slides for each sample. Five permanent slides were prepared in order to avoid the skipping of any diatom species. This material was completely dried and mounted with help of DPX. Diatoms were examined with an optical compound microscope fitted with light source at magnification of

1500X oil immersion. Slides were fully scanned with help of microscope and representative images of the diatom were captured using a computerized photo-capturing device/camera (Q-Win Leica) fitted on microscope objective lens. Diatom species were identified on the basis of descriptions given by [3,15].

Results and Discussions

Since the samples were collected during the winter season, the climatic conditions were not favorable for the growth of diatoms therefore not good amount of diatoms could be found in all the

water bodies. The qualitative analysis has revealed 19 genera and more than 50 species of diatoms. Most of the diatom species belong to order 'Pennale'. *Navicula* and *Nitzschia* have been observed the most commonly occurring and dominating diatom genera. The identified diatom genera have been listed in Table-2 and photomicrographs of few diatom genera have been given in Table-3. A few diatoms could not be identified up to species level due to their poor photomicrographs.

Morphometric analysis of diatoms has revealed a notable variation in their size that ranges from 5 m to more than 100 m. Sizes of diatoms like *Synedra*, *Melosira* and *Nitzschia* were measured very large, while few species of *Cymbella* and *Cyclotella* were very small in size. Some diatom characteristics have been given in Table-4.

Distribution pattern of the diatoms revealed that *Navicula accurate*, *Navicula cincta*, *Navicula lanceolata*, *Navicula menisculus*, *Navicula oblonga*, *Navicula radiosa*, , *Nitzschia acuta*, *Nitzschia filiformis*, *Nitzschia fonticola*, *Nitzschia gracilis*, *Nitzschia palea*, *Nitzschia recta*, *Gomphonema gracile*, *Gomphonema olivaceum* were commonly seen in various water bodies, while few species of *Amphora*, *Cymbella*, *Cyclotella*, *Gomphonema*, *Synedra* and *Pinnularia* were sparingly distributed in few water bodies but not commonly present in all sites. Few diatoms like *Cavinula cocconeiformis*, *Surirella birostrata*, *Hantzschia amphioxys*, *Amphipleura sp.* and *Epithemia sp.* were characteristic diatoms of few water bodies because they were strictly restricted to them only.

Winter season declines the growth of diatom because the climatic conditions are not suitable for growth of diatoms [7] but few water bodies (H1, H4, and H8) had good population of diatoms. A significant diatom distribution has been observed in the present study. The water samples collected from Badkhal Lake and Jyotisar have produced

some characteristic diatoms. The overall distribution pattern of diatoms in all water bodies have been given in detail in Table-5.

Nature of the existed diatom flora and the effect of climatic conditions on its growth are found to be similar with the earlier observations made by the scientists particularly related to Indian region [6,9,13]. One of the scientists studied the Diatom flora of 'Chandola' and

'Kankaria' lakes of Ahmedabad and observed that varied populations of the diatoms were present due to the climatic, edaphic and biotic factors [13]. He reported *Eunotia*, *Fragilaria*, *Synedra*, *Navicula*, *Amphora*, *Epithemia*, *Nitzschia*, *Gomphonema*, *Pinnularia*, *Cymbella* and *Calonies* etc as preponderate diatom genera in this part of India.

Different small water bodies of Delhi (India) were surveyed for the study of diatom flora. Diatom genera like *Navicula*, *Nitzschia*, *Synedra* and *Pinnularia* etc were again found to be commonly occurring in most of these site [13]. Similarly three water bodies of Jaipur (India) were also studied for the assessment of diatom flora. With some noticeable difference, the diatom genera like *Synedra*, *Melosira*, *Diatoma*, *Geissleria*, *Achcanthidium* and *Rhicosphenia* were seen in these water bodies [6] but again *Navicula* and *Cyclotella* were observed as the most commonly found diatoms as in the our investigations.

A detailed and comparative survey of the diatom flora of ten different types of water bodies (like ponds, lakes, rivers and canals) of Punjab (India) was conducted in all the four seasons (winter, summer, spring and autumn) from 2005 to 2007, which revealed some common, seasonal, rare and site specific diatoms [7]. Analogous to our present observations, diatoms like *Navicula*, *Nitzschia*, *Cyclotella* and *Cymbella* have also been reported among the commonly found diatoms.

In other attempt, forty five species of diatoms have been reported in some water bodies of

Haryana in different seasons [14]. Observations of the present study have also revealed

similar findings but *Cyclotella* species were hardly seen in the water bodies chosen for the present study.

Conclusions

The objective of this preliminary study was to understand the distributional pattern of diatoms in different water bodies of Haryana, India. Recognition and study of regional distribution of indicator diatom species can be used in the assessment of drowning cases but to make diatoms more useful as tools, more accuracy is required. Results have shown that diatom diversity has been found slightly changed at few locations under similar conditions of temperature. It might have happened due to the difference in the geographical conditions that can affect the nutrient content of water for the growth of diatoms. Change in the diatom diversities in different water bodies can be very interesting and useful in forensic point of view. For making this study more useful, seasonal comprehensive survey in different seasons is needed to be conducted.

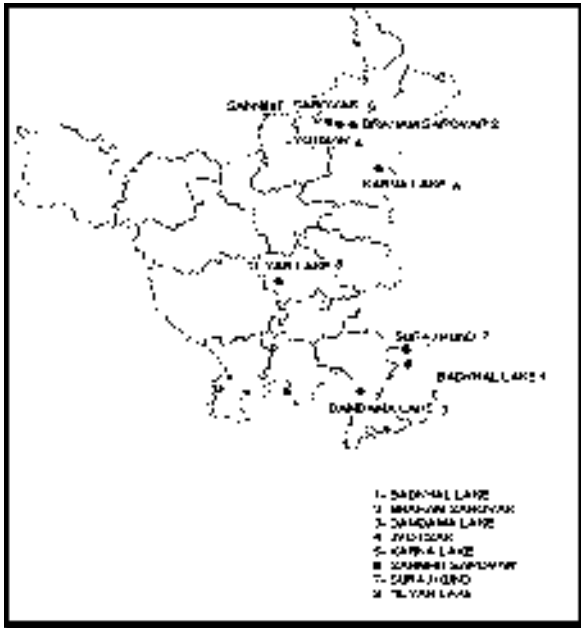
References

1. Round, EF, Crawford RM, Mann DG. The Diatom Biology and Morphology of Genera. Cambridge University Press, Cambridge, England; 1990: 7-20
2. Patrick R. Aquatic communities as indices of pollution. In: Indicators of Environmental Quality. Plenum Publishing Corporation, New York. 1970: 93-100.
3. Pollanen MS. The diatom test for drowning in Ontario. J Can. Soc. For. Sci.(1996: 29(4): 205-211.
4. Ludes B, Coste M, Tracqui A, Mangin P. Continuous River monitoring of the diatoms in the diagnosis of drowning. J For. Sci. 1996: 41(3): 425-428.
5. Trent G. Something in the Water. Law & Order. 2004: 52 (6): 92-93.
6. Singh R, Singh R, Singh R, Thakar MK. Diatomological studies from three water bodies of Jaipur. Ind Internet J For. Med. & Toxi. 2006: 4(3).
7. Thakar MK, Singh R. Diatomological Mapping of Water Bodies for the Diagnosis of Drowning Cases (Paper Accepted for publication in J. For. and Leg. Med. 2009.
8. Pollanen MS. Forensic Diatomology and Drowning. Elsevier Sci. P.O. Box 211, 1000 AE Amsterdam, The Netherlands. 1998: 125-147.
9. Tyagi G.D, Dogra TD, Dikshit PC. Diatoms of Delhi. J For. Med Toxi. 1985: 2 (3): 18-23.
10. AGO K, AGO M, AGO M, AGO O. The Distribution of Diatoms in Yoro The Yoronjima and Application of the Diatom Test for the Diagnosis of Death by Drowning in Open Sea Islands, Med. J. Kagoshima Univ. 2004: 56 (2): 25-29.
11. Horton BP, Boreham S, Hiller C. The development and application of a diatom based quantitative reconstruction technique in forensic science. J. For. Sci. 2006: 51(3): 643-650.
12. Ludes B, Coste M, North N, Doray S, Kintz P, Tracqui A. Diatom analysis in victim's tissue as an indicator of the site of drowning. Inter. J Leg Med. 1999: 112: 163-166.
13. Gandhi HP. The diatomflora of Chandola and Kankaria lakes. Nova Hedwigia VIII, $\frac{3}{4}$; Weinheim Verlag von J. Cramer, 1964.
14. Vinayak V, Goyal MK, Mishra V. Diatom test as a forensic marker in drowning cases: A study of seasonal genera diversity of

diatoms by continuous water monitoring. Paper presented at: XIX 2009. Proceedings of the XIX all India Forensic Science Conference, 2009, January 18-20, Gandhinagar, Gujarat : 371-373

15. Hartley B. An atlas of British diatoms. Bristol Biopress Ltd. 1996.

TABLES AND FIGURES



Map of Haryana Showing Selected Water Bodies

S.No.	Name and Type of the Water body	Code	District
1	Backhal lake	H-1	Faridabad
2	Braham Sarovar	H-2	Kurukshetra
3	Damdama Lake	H-3	Gurgaon
4	Jyotisar Sarovar	H-4	Kurukshetra
5	Karna Lake	H-5	Karnal
6	Sannihit Sarovar	H-6	Kurukshetra
7	Suraj Kund	H-7	Faridabad
8	Tilyar Lake	H-8	Rohtak

Table-1

Showing list of the Selected Water Bodies

- | | | |
|------------------------|-----------------------|--------------------------|
| 1. <u>Amphora</u> | 7. <u>Cymbella</u> | 13. <u>Navicula</u> |
| 2. <u>Aphipleura</u> | 8. <u>Epithemia</u> | 14. <u>Neidium</u> |
| 3. <u>Aulacoserira</u> | 9. <u>Eunotia</u> | 15. <u>Nitzschia</u> |
| 4. <u>Cavinula</u> | 10. <u>Gomphonema</u> | 16. <u>Pinnularia</u> |
| 5. <u>Cocconies</u> | 11. <u>Hantzschia</u> | 17. <u>Stenopterobia</u> |
| 6. <u>Cyclotella</u> | 12. <u>Melosira</u> | 18. <u>Surirella</u> |

Table-2: Showing list of the identified diatom genera

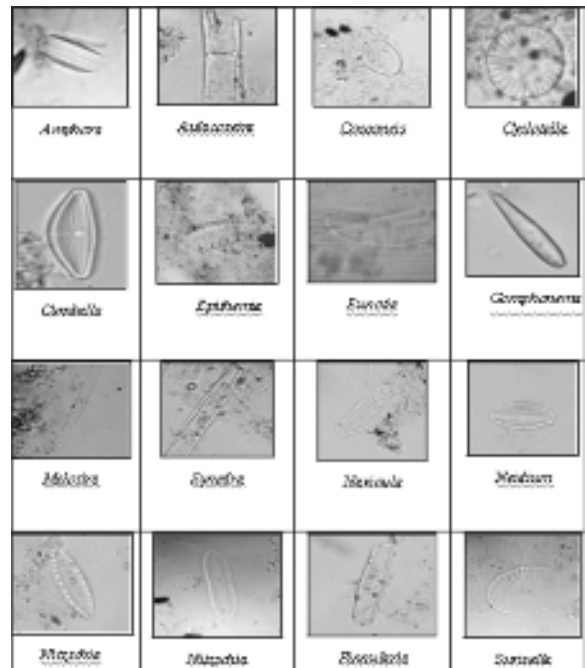


Table -3: Showing Photomicrographs of Some Diatoms

Large diatom	Small diatoms	Commonly found diatoms	Site restricted diatoms
Synedra	Cymbella	Cyclotella	Amphipleura
Melosira	Cyclotella	Cymbella	Epithemia
Amphipleura		Navicula	Hantzschia
Nitzschia		Nitzschia	Surirella
		Pinnularia	Cavinula
		Synedra	
		Melosira	
		Amphor	
		Gomphone	

Table-4: Showing some diatom characteristic

Diatom Genera	H-1	H-2	H-3	H-4	H-5	H-6	H-7	H-8
Amphora	-	-	+	-	-	+	+	-
Aphipleura	-	-	-	-	-	-	-	+
Aulacoseira	+	-	+	-	-	-	-	+
Cavinula	+	-	-	-	-	-	-	-
Cocconeis	-	+	-	-	-	-	-	-
Cyclotella	-	+	-	-	-	+	+	+
Cymbella	-	+	-	+	+	+	-	-
Epithemia	-	-	-	+	-	-	-	-
Eunotia	+	-	-	-	-	-	+	-
Gomphonema	-	-	+	-	+	-	+	+
Hantzschia	+	-	-	-	-	-	-	-
Melosira	-	-	+	-	-	-	-	+
Navicula	+	+	+	+	+	+	+	+
Neidium	-	-	-	+	-	-	-	-
Nitzschia	+	-	+	+	+	+	+	+
Pinnularia	+	+	-	+	-	-	+	-
Stenopterobia	+	-	-	-	-	-	-	-
Surirella	-	-	-	+	-	-	+	-
Synedra	+	-	-	+	-	-	+	-

Table-5: Showing distribution pattern of diatoms in different water bodies

PROFILE OF FATAL ASSAULT CASES IN PATIALA

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Abstract

A retrospective study examined homicidal death cases in the mortuary of Govt. Medical College, Patiala from January 2010 to September 2011. During this period there were 40 cases of homicidal deaths out of which males constituted 30 cases and females were the victims in 10 cases. The incidence of homicidal deaths was 3.40% of the total medico legal autopsies conducted during this period. The most common age group affected was 21-30 years in 35% cases followed equally by age groups of 11-20 and 31-40 years. It was the rural population that was mainly affected in 57.5% cases. The single most common fatal injury involved the head in 30% cases. The most common weapon of offence was blunt object in 52.5% cases.

Key Words: Fatal, Homicide, Assault, Death, Weapon.

Introduction

Human life is the most precious gift of God. Taking away the life of one human being by another is perhaps the most heinous crime that can be perpetrated by a man. Homicide or killing of human being by act, procurement, or omission of another human being is as old as civilization. Perhaps, blunt force injuries were the most primitive means of perpetuating physical violence or inflicting injury. There is one murder every sixteen minutes in India and for every person who dies as a result of violence many more are injured. The incidence of homicide is increasing and this is probably due to the rapid increase in population, industrialization, high level of unemployment, frustration, depression in everyday life, prevalent economic, social and political environment, insurgency, terrorism, drug addiction, easy availability of weapon etc. Rekhi[1]

Material and Method

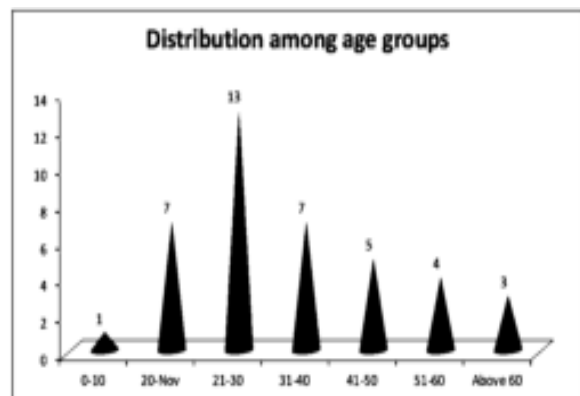
The study consisted of all the homicidal deaths which were brought to the mortuary of Department of Forensic Medicine and Toxicology at the Govt. Medical College and Hospital, Patiala, Punjab (India) from January 2010 to September 2011. A total of 40 cases of homicidal deaths were studied in relation to age, gender, rural/urban distribution, type

of weapon used and fatal injury.

Observations

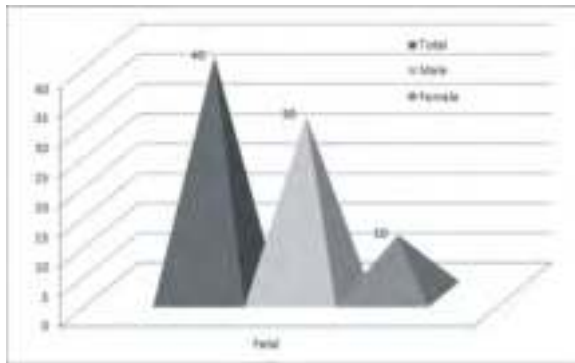
A total of 1175 post mortems were conducted in the mortuary of Govt. Medical College, Patiala from January 2010 to September 2011 out of which there were 40 cases of homicidal deaths. Figure 1 show that the most commonly affected age group was 21-30 years with 13 cases (32.5%). The least commonly affected age group was 0-10 year's age group with only 1 recorded case (2.5%).

Figure 1 showing distribution of cases among different age groups



From Figure 2 it is clear that males were the victims in maximum number of deaths i.e. 30 cases (75%) while the females were the victims in 10 cases (25%).

Figure 2 showing distribution of cases between both sexes



From Figure 3, it is clearly evident that most of the victims belonged to the rural background with 23 cases (57.5%).

Figure 3 showing rural/urban involvement

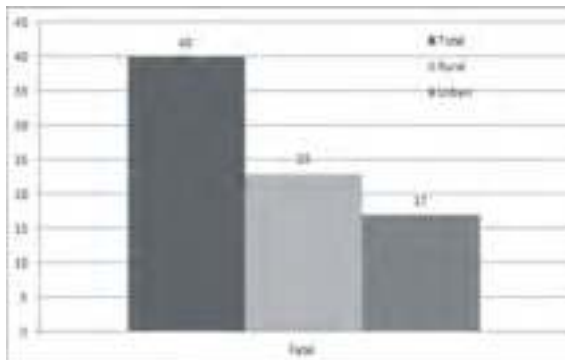
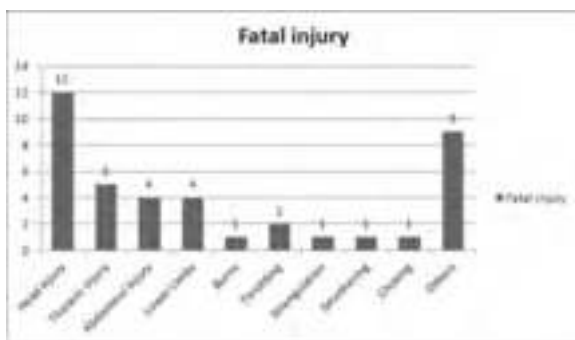


Figure 4 gives the cause of death based on the type of fatal injury. It was observed that head injury was the leading cause of death with 12 fatalities (30%).

Figure 4 showing the injury which produced fatal results



In majority of the cases the weapon of offence used was a blunt weapon i.e. 20 cases (50%) while sharp weapon was involved in 10 cases (25%) cases. The involvement of Firearms was in 5 cases (12.5%) and rest of the victims suffered injuries from more than one type of weapon.

Discussion

During the study period 1175 cases of medico legal autopsies were performed out of which homicide cases were 40 in number thus taking a share of 3.40% of the total medico legal cases load. This is in comparison with the studies conducted by Gupta[2] and Shivkumar[3] which showed the incidence of homicidal deaths out of total autopsies performed to be 5.9% and 4.76% respectively. As per the data of National Crime Records Bureau, the incidence of murders in Punjab is approximately 0.0031% population whereas for India it is 0.0026% population. The male to female ratio for Punjab is 3.24 and for India it is 2.80.

Our study showed that the most commonly affected age group was 21-30 years with 13 cases (32.5%) while the least commonly affected age group was 0-10 years with just 1 case (2.5%). A study done by Mittal[5] also showed that maximum number of victims belonged to the age group 21-30(31%) and the least affected were those in the 0-10 age group(4%). Our findings are in agreement with the findings of Gupta (2010) and Shivkumar [3] which showed the incidence in this age group to be 28.1%and 40% in this age group. Shivkumar[3] also showed that the incidence in extremes of age groups i.e. below 10 years and above 60 years was less than7.5%. During our study it was found that males outnumbered females as victims with 30 males (75%) and 10 females (25%). This is in comparison with the study conducted by Mittal[4] which showed males were 82.5% and rest were females. The findings of Vij[6] are consistent with our study with males forming the major case load i.e. 79.77%. A study done by Shivkumar[3] also showed that Males were predominantly affected (75%). Our study found a male

to female ratio of 3 which compares well with the state ratio of 3.24. In this study it was found that the rural population was mainly affected with 23 victims (57.5%). Our findings are in comparison with Mittal[4] who in his study also found that it was the rural population that was mainly affected. Shivkumar[3] found that all the homicide victims belonged to the rural area. It was found in our study that head injury was the single most important fatal injury. It was responsible for death in 12 cases (30%). The study result produced by Vij[6] also showed similar results with head injury as the major cause of death in 39.32% cases. According to Rekhi [1] the major cause of death was head injury in 60% cases. This study showed that the most common type of weapon used was a blunt weapon in 21 cases i.e. 52.5% cases. This finding is also in convergence with the findings of Mittal [4] who found that in 50.88% of cases of homicides, blunt weapon was used as weapon of offence. A study conducted by Ambade and Godbole[5] also showed similar results. It was found that blunt weapon was used in 41.1% homicides.

Conclusion

Our study showed that maximum number of deaths occurred in the younger age group i.e. 21-30 years and most of the victims were males. It can be explained by the fact that males are more prone to stresses of life as they are the ones who generally face the outside world and this age group is the most active period of one's life and ability to understand and cope with the surroundings also develops in this age. The rural population is probably more affected than the urban because of the lesser literacy rate. It is a well known fact that as the literacy level grows involvement in the crime decreases. As head is the most important part of the body it is not a surprise that it is the site of choice for the fatal attack.

References

1. Rekhi T, Singh PK, Nabachandra H. Study of homicidal blunt force injuries. J Forensic

Med Toxicol 2007; 24(2):3-5

2. Gupta A, Rani M, Mittal AK, Dikshit PC. A Study of homicidal death in Delhi. Med Sci Law 2004; 44 (2):127-32
3. Shivkumar BC, Vishwanath D, Srivastava. Trends of Homicidal Deaths at a tertiary Care Centre, Bangalore. J Ind Acad Forensic Med 2011;33(2): 120-124
4. Mittal S, Chanana A, Rai H, Dalal JS. Medicolegal study of mechanical injuries in culpable homicide (excluding deaths due to rash and negligent act). J Ind Acad Forensic Med 2005; 27(4): 226-230
5. Ambade VN, Godbole HM. Comparison of wound patterns in homicide by sharp and blunt force. Forensic Sci Int 2006; 156: 166-170.
6. Vij A, Menon A, Menezes RG, Kanchan T, Rastogi P. A retrospective review of homicides in Mangalore, South India. J Forensic Leg Med 2010; 17:312-315

BERRY ANEURYSM- A CASE REPORT

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ABSTRACT

Berry aneurysm is a saccular dilatation of a localized segment of an artery. The incidence of berry aneurysm is reported to be 2%. The most common site of berry aneurysm is the anterior cerebral artery. In the present study, a case of berry aneurysm is reported that is present along the junction of anterior cerebral and anterior communicating artery. This berry aneurysm was found during dissection of a cadaver in the department of Anatomy at Gian Sagar Medical College, Banur, Patiala. Berry aneurysm can remain asymptomatic but if ruptured, it can lead to sub-arachnoid hemorrhage and sudden death.

KEYWORDS: berry aneurysm, sub-arachnoid hemorrhage, sudden death.

INTRODUCTION

Dilatation of a localized segment of the arterial system is called an aneurysm. Morphologically, it can be saccular also known as Berry aneurysm, fusiform or dissecting. [1] Aneurysms occur most commonly at the junction of two arteries in the circle of Willis. Deficiency in the tunica media leads to weakness of the vessel wall resulting in its local dilatation. [2]

Incidence of berry aneurysm is 2% and the incidence of aneurysmal rupture is 6-12/100000 person years. The female: male ratio is 3:2 and the risk factors include atherosclerotic disease, family history and polycystic kidney disease. The size of berry aneurysm ranges from a few mm to cm. A berry aneurysm above 2.5 cm is called a giant aneurysm. [3] Aneurysms are thin walled and at risk for rupture. Rupture of aneurysms results in sub-arachnoid hemorrhage. Sub-arachnoid hemorrhage is characterized by sudden severe "thunderclap" headache, vomiting, neck stiffness, loss of consciousness, focal signs, epilepsy, coma and sudden death. In 95% cases CT scan of head is diagnostic. [4, 5]

CASE REPORT

A saccular/berry aneurysm was found at the base of the brain of a male cadaver, during routine dissection in the department of Anatomy at Gian Sagar Medical College, Banur, Patiala. This aneurysm was found at the junction of anterior

cerebral artery and anterior communicating artery. This site of berry aneurysm is the commonest of all. The aneurysm was un-ruptured and measured 1.2 cm in its biggest diameter.



Fig 1 Berry Aneurysm at base of Brain

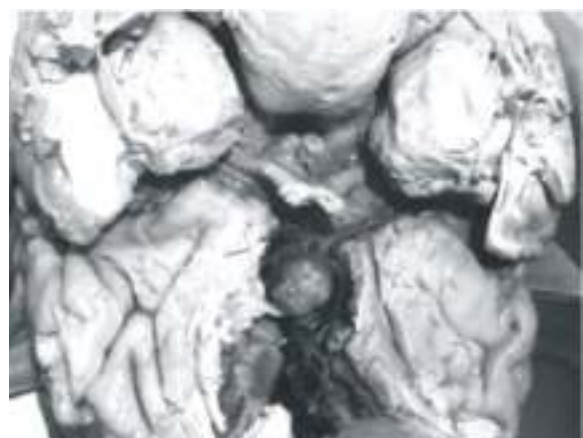


Fig 2 Berry Aneurysm at junction of Anterior Cerebral and Anterior Communicating Artery

DISCUSSION

An aneurysm is defined as an abnormally dilated segment of a blood vessel. Berry aneurysm is by far the commonest of all cerebral aneurysm. About 25% of cerebro-vascular deaths are due to ruptured berry aneurysm. Risk factors for berry aneurysm include chronic hypertension, smoking, female gender and African- American ethnicity. [6] Intracranial berry aneurysms are extremely rare in infancy. However a case of death due to a ruptured berry aneurysm has been reported in a 3.5 year old child. [7,8] In 25% of persons older than 55years, the berry aneurysms are silent.[9] Berry aneurysm can rupture at any time, during exertion or at rest. Rupture of berry aneurysm leads to sudden death due to sub-arachnoid hemorrhage. [10]

The incidence of SAH is 6-8/100000 person years, peaking in the sixth decade. Ruptured berry aneurysm accounts for a quarter of cerebrovascular deaths.[11]A retrospective autopsy survey of 583 cases of ruptured berry aneurysm revealed that most deaths occurred in home environment, without any precipitating factor and one fifth was sudden and unexpected in nature.[12]

CONCLUSION

Berry aneurysm occurring in 2% of population may remain silent or may rupture. If it ruptures, it leads to sub-arachnoid hemorrhage. The sub-arachnoid hemorrhage can lead to sudden death.

REFERENCES

1. Williams NS, Bulstrode CJK, O'Connell PR. Bailey & Love's- Short Practice of Surgery. 25th ed. UK, Edward Arnold; 2008: 918.
2. Snell Richard S. Clinical Neuroanatomy. 6th ed. Philadelphia: Lippincott Williams and Wilkins, 2006; 479.
3. Lindsay KW, Bone I. Neurology and Neurosurgery Illustrated. 4th ed. Toronto,

- Churchill Livingstone; 2004: 277-278.
4. Brunicaudi FC, Andersen DK, David RB, Timothy R. Billiar, David L. Dunn, John G. Hunter, Jeffery B Mathews, Raphael F. Pollock. Schwartz' Principles of Surgery. 9th ed. USA, Mc Graw-Hill Companies; 2010: 1534-1535.
5. Rengachary SS, Ellenbogen RG. Principles of Neurosurgery. 2nd ed. Toronto, Elsevier Mosby; 2005: 215-216.
6. Perry A, Brat DJ. Practical Surgical Neuropathology- a diagnostic approach. 1st ed. Philadelphia, Churchill Livingstone; 2010: 539.
7. Stehbens MD, Phil D. Intracranial berry aneurysms in infancy, Surgical Neurology. 1982; 18(1): 58-60.
8. Prahlow JA, Rushing EJ, Barnard JJ. Death due to ruptured berry aneurysm in a 3.5 year old child, American Journal of Forensic Medicine & Pathology. 1998; 19(4): 391- 394.
9. Rubin R, Strayer D. Rubin's Pathology- Clinopathologic Foundations of Medicine. 5th ed. Baltimore, Lippincott Williams & Wilkins; 2008: 1189.
10. Shkrum MJ, Ramsay DA. Forensic Pathology of Trauma. 1st ed. Totowa, New Jersey, Humane Press; 2007: 607-622.
11. Wardlaw JM, White PM. The detection and management of unruptured intracranial aneurysms, Brain. 2000; 123(2): 205-221.
12. Bowen D.A.L.L. Ruptured berry aneurysm: A Clinical, Pathological and Forensic review, Forensic Science International. 1984; 26(4): 227-234.

ACOUSTIC NEUROMA OF BRAIN - REPORT FROM A POST MORTEM CASE

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Abstract

Acoustic neuroma is a benign intracranial tumor of the myelin-forming cells of the vestibulocochlear nerve. It comprises 5-10% of all intracranial neoplasm in adults. Incidence peaks in the fifth and sixth decades and both sexes are affected. Incidence of acoustic neuromas in postmortem cases is 0.8%. The best tests to diagnose acoustic neuroma are audiometry and MRI scanning of the head with gadolinium contrast. Incidence of occult acoustic neuroma is as low as 1% in the literature. We are reporting a case of Acoustic neuroma of Brain in a post mortem case of a prisoner.

Introduction

The first fully documented postmortem description of an acoustic neuroma dates back to 1777 to Eduard Sandifort who was professor of pathology in Leiden (Sandifort E). The neoplasm may grow for years without causing symptoms and may be first diagnosed at post-mortem (Salvinelli et al, 1999). The most common site is glial neurolemmal junction of the eighth nerve which is usually within the internal auditory meatus. Clinical features include headache, vomiting, altered consciousness, unilateral or asymmetric hearing loss, tinnitus and dizziness.

Case History

As per post-mortem report, the deceased, a prisoner from Central Jail Ludhiana, was admitted in Rajindra Hospital Patiala for about one & a half month with the complaints of hemiparesis, vertigo, tinitis. He was a 32 year male and was operated upon for some brain tumour. Specimen of brain was received in this department for pathological examination.

Gross Findings: The brain had both cerebral

hemispheres along with cerebellum. It measured 17 x 13 x 10 cm and weighed 980 gm. On cutting, a cavity, 2 x 3 cm, was seen at the base of cerebellum. A grayish white area was seen in the wall of this cavity. Multiple sections were taken from grey white area (Figure 1).

Microscopic Examination

The sections showed glial reaction, lymphoid cells in collections. Along with a tumour tissue comprising of both hypo and hyper cellular areas of spindled nerve cells with nuclear pallisading, were present (Figure 2). At places varocay bodies were also seen consistent with schwannoma.

Others organs (lungs, kidney, spleen and liver) received, showed no gross or microscopic abnormality.

Discussion & Review of literature

Acoustic neuromas are non-malignant tumors of the eighth cranial nerve which arise most commonly from the Schwann cells of the inferior vestibular nerve (Komatsuzaki and Tsunoda, 2001). They can also arise within the labyrinth (Neff et al, 2003). They comprise about 6 percent of all intracranial tumors, about 30% of brainstem tumors, and about 85% of tumors in the region of the cerebellopontine

angle. A study by Leonard and Talbot showed 4 cases of acoustic neuroma in 883 postmortem cases with females representing 64% of cases (Leonard J and Talbot M, 1970). The vast majority of these tumours is sporadic and usually occurs in only one ear with no known risk factors. Rarely these tumours are associated with a genetic disease called Neurofibromatosis Type II. (Evans et al, 2005). Patients with Neurofibromatosis develop tumours at a younger age, usually have tumours on both sides and also have other manifestations, including benign tumors of the brain and duramater. When tumors are small they may give no symptoms or very subtle symptoms, such as a slight hearing loss or a noise in the ear. Large tumours may compress the brainstem and result in headaches and other symptoms of increased intracranial pressure.

The differential diagnosis includes other tumours arising in cerebellopontine angle (CPA) like meningiomas (3-13%), epidermoids (2-6%), lower cranial nerve schwannomas (1-2%) and arachnoid cysts (1%). Occasionally tumors in other locations such as the lung can metastasize to the CPA. Metastatic tumors usually grow rapidly leading to sudden hearing loss and facial nerve involvement leading to Bell's palsy.

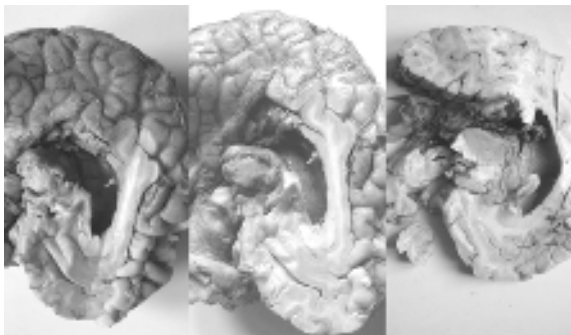
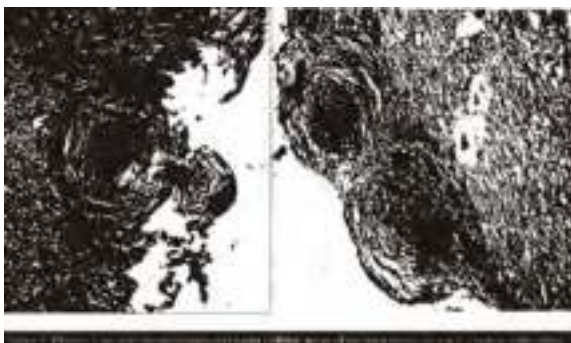


Figure 1: Grayish white area seen in the wall of this cavity



References

- 1 Evans DG, Moran A, King A, Saeed S, Gurusinghe N and Ramsden R (2005). Incidence of vestibular schwannoma and neurofibromatosis 2 in the North West of England over a 10-year period: higher incidence than previously thought. *Otol Neurotol* 26(1): 93-7.
- 2 Komatsuzaki A and Tsunoda A (2001). Nerve origin of the acoustic neuroma. *J Laryngol Otol* 2001 May;115(5):376-9
- 3 Leonard J and Talbot M (1970). Asymptomatic acoustic neurilemmoma. *Arch Otolaryngol* 91:117-124
- 4 Neff B, Willcox T and Sataloff R (2003). Intralabyrinthine schwannomas. *Otol Neurotol* 24: 299-307,
- 5 Salvinelli F, Trivelli M, Greco F and Linthicum F H (1999). Acoustic neuroma and meningioma. Histopathological aspect, a postmortem study on temporal bones. *European Review of Medical and Phamacological Sciences* (4) 221-24
- 6 Sandifort E (1777). De duram quodam corpusculo, nervo auditorio adherente; observationes anatomico-pathologicae, Book 1. P v.d. Eyk & D Vygh;:116-20
- 7 Tos M, Thomsen J and Harmsen A (1988). Is preservation of hearing in acoustic neuroma worthwhile? *Acta Otolarygol* : 452: 57-68

COMPARISON OF CRANIAL CAPACITY OF THE NON-TRIBAL WITH KEER TRIBAL POPULATION OF MADHYA PRADESH

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Abstract:

Cranial capacity is one of the most important components of the physical anthropometry, which is useful in differentiation of racial and sexual differences and indirectly reflects the brain volume in different populations. This study was carried out by using linear dimensions of head (Lee Pearson's formula) on 800 healthy 20 - 25 years old subjects (of which were 400 males and 400 females) from Keer tribe and Non-tribal population of Madhya Pradesh. The mean cranial capacity and SD in Non-tribal males and Non-tribal females were 1380.524 ± 94.633 cc and 1188.758 ± 91.164 cc respectively. The mean cranial capacity and SD in Keer males and Keer females were 1252.857 ± 70.989 cc and 1094.441 ± 81.289 cc respectively. This study has shown a significant ($p < 0.05$) difference between the same gender populations of Keer tribe and Non-tribal population, with the absolute values being higher in Non-tribal group than in Keer tribe group.

Key words: - Anthropometry; Cranial capacity; Skull; Sex; Tribe

Introduction:

Knowledge of cranial capacity is useful in differentiation of racial and sexual differences either a dry skull or of a living subject and may be important to the study and comparison of the crania of populations with various fundamental differences like geographic, ethnic, dietary, environmental etc (1). Cranial capacity, which is in close correlation with brain volume, reflects the racial characteristics and this has been thought to be one of commonest item in physical anthropological studies (1, 2). One of the most satisfactory methods for measuring cranial capacity of a dry skull with the help of water poured into balloon which introduced the cranial cavity through a foramen magnum (3, 4). Most of those available studies have been done on dry skulls using linear dimensions, packing methods or occasionally radiological methods. Only a few studies have been done on living subjects (4, 5, and 6). Although a few studies on the estimation of cranial volume do exist in the Indian literature,

these studies are based on examination of macerated skulls (3, 9, and 10) and living subjects (7, 8). An analysis of cranial capacity exposes another aspect of growth and development; and permits critical evaluation of unusually large, small or misshapen skulls (11).

Hence an attempt has been made in the present study to compare the cranial capacity of the Non-tribe and Keer tribe populations in Madhya Pradesh.

Material & method:

This study was carried out on four hundred healthy subjects of 20 - 25 years old (200 males and 200 females) Non-tribal individuals and four hundred healthy Keer tribe (200 males and 200 females) of Madhya Pradesh state, during 2005 - 2006. All the measurements were taken with the subjects sitting in chair, in relaxed condition and head in the anatomical position. In each subject following linear dimensions of the head were measured.

1. Maximum head length (L) (Glabella - Inion length).
2. Maximum head breadth (B) (measured between parietal eminences). 1 & 2 measured with spreading caliper.
3. Head height (H) (external acoustic meatus to the highest point of the vertex) using sliding caliper.

Each measurement was taken to the nearest millimeter at least three times and the average was considered for calculation. The magnitude of cranial capacity was calculated using Lee Pearson's formula given by Williams et al.

Males: $0.000337(L-11)(B-11)(H-11) + 406.01cc$
 Females: $0.000400(L-11)(B-11)(H-11) + 206.60cc$
 The data of each person was recorded and analyzed by SPSS 17 and MS Excel 2007. For comparison of the mean of cranial capacity 't' test was used.

Result:

The mean, SD of head length, head breadth and head height of both sexes in Non-tribal group are mentioned in Table: I. The mean cranial capacity and SD in males and females were $1380.524 \pm 94.633 cc$ and $1188.758 \pm 91.164 cc$ respectively. There was a significant difference between genders ($p < 0.05$).

The mean, SD of head length, head breadth and head height of both sexes in Keer tribe groups are mentioned in Table: II. The mean cranial capacity and SD in males and females were $1252.857 \pm 70.989 cc$ and $1094.441 \pm 81.289 cc$ respectively. There was a significant difference between genders ($p < 0.05$).

This study has shown a significant ($p < 0.05$) difference between the same gender subjects of Keer tribe and Non-tribal population, with the absolute values being higher in Non-tribal group than in Keer tribe group.

Table: I Showing various parameters of the head of 20 - 25 yrs. old Non-tribal group of Madhya Pradesh state of India.

Different parameters	Male		Female	
	Mean	SD	Mean	SD
Max. head length (mm)	191.270	6.903	178.720	5.577
Max. head breadth (mm)	145.615	5.908	138.740	6.123
Head height (mm)	130.025	7.206	125.475	6.023

Table: II Showing various parameters of the head of 20 - 25 yrs. old Keer tribe group of Madhya Pradesh state of India.

Different parameters	Male		Female	
	Mean	SD	Mean	SD
Max. head length (mm)	185.715	7.697	177.860	5.664
Max. head breadth (mm)	138.825	5.445	135.230	5.605
Head height (mm)	123.495	5.945	117.980	6.183

Discussion:

In this study estimated cranial capacity from Non-tribe group in males and females were $1380.524 \pm 94.633 cc$ and $1188.75 \pm 91.16 cc$ respectively and in Keer tribe group in males and females were $1252.857 \pm 70.989 cc$ and $1094.441 \pm 81.289 cc$ respectively. Estimated cranial capacity in this study of both Non-tribe and Korku tribe groups are lower than Mugla University students, Mugla Turkey (4). Estimated cranial capacity of Keer tribe group in current study is closely similar to the Bheel tribe group from the same geographic area, but cranial capacity of Non-tribe group is significantly higher than Bheel tribe group (8).

Hooton; (12) reported that the racial characteristics are best defined in the skull, cranial capacity being one of the most important parameter for determining the racial difference.

Hwang, et al; (2) observed that the mean cranial capacity and SD in an adult Korean males and females were $1470 \pm 107 cc$ and $1317 \pm 117 cc$ respectively.

Manjunath, KY; (1) observed that the mean cranial volume and SD in males and females were $1152.813 \pm 279.16 cc$ and $1117.82 \pm 99.09 cc$ respectively.

Another research in North of Iran by Golalipour, et al (5) reported the mean and SD of cranial capacity in Turkman's males $1420.6 \pm 85 cc$ and in $1227.2 \pm 120cc$ in females. The mean and SD of crania capacity in native Fars males $1369 \pm 142 cc$ and $1215.8 \pm 125 cc$ in female.

According to Acer, et al (4) the mean and SD of cranial capacity in the male and female students of the Mugla university, Mugla, Turkey were $1411.64 \pm 118.9 cc$ and $1306 \pm 162.9 cc$ respec-

tively. There was significant difference between genders ($p < 0.05$).

Mehrdad Nooranipour, et al (6) observed that cranial capacity and brain weight in an adult Iranian male were 1343.45 ± 102.37 cc (mean \pm SD) and 1390.47 ± 105.95 gm (mean \pm SD) respectively. Cranial capacity and brain weight in an adult Iranian female were 1163.02 ± 115.76 cc (mean \pm SD) and 1203 ± 119.8 gm (mean \pm SD) respectively.

Gohiya, VK,; et al (7) observed that mean and SD in males and females were 1380.52 ± 94.63 cc and 1188.75 ± 91.16 cc respectively in Madhya Pradesh geographic of the India. There was a significant difference between genders ($p < 0.05$).

Gohiya, VK; (8) observed that the mean cranial capacity and SD in Bheel tribe males and females were 1212.33 ± 72.323 cc and 1096.26 ± 88.825 cc respectively in Madhya Pradesh geographic of the India. There was significant difference between genders ($p < 0.05$).

Cranial capacity indirectly reflects the volume of brain, which is affected by gender, race, ethnic, geographical, biological and ecological factors.

We also conclude that cranial capacity and brain volume is being affected by the gender and race of the population as studied here in the geographic area of India.

References

1. Manjunath, KY: Estimation of cranial volume - an overview of methodologies. J. Anat. Soc. India; 51(1):85-91; 2002b.
2. Hwang Young-II, Hoon Kyung Lee, Choi Byoung-Young, Lee Kyu-Seok, et al: Study on the Korean Adult Cranial Capacity. Journal of Korean, Medical Scienc; vol. 10, No. 4, 239-242; August 1995.
3. Manjunath, KY: Estimation of cranial volume in dissecting room cadavers, J Anat. Soc. India; 51(2):168-172; 2002a.
4. Acer, N; Usamaz, M; Tugay, U & Ertekin, T. Int. J. Morphol., 25(1):65-70, 2007.
5. Gopalipour, MJ; Jahanshaei, M; & Haidari. K; Int. J. Morphol., 23(4):301-304, 2005.
6. Nooranipour M; and Farahani RM. Estimation of cranial capacity and brain weight in 18 - 20 years Old Iranian adults. Clinical Neurology and Neurosurgery; Vol.110 (10); 997-1002; Dec. 2008.
7. Gohiya. VK.; Shrivastva, S.; and Gohiya, S.; Estimation of cranial capacity in 20 -25 year old population of Madhya Pradesh, a state of India; Int. J. Morphol., 28 (4): 1211-1214, 2010
8. Gohiya. VK.; A comparative study of cranial capacities in Bheel tribe and Non-tribal population in age group 20 - 25 years old in Madhya Pradesh; J. Punjab Acad Forensic Med Toxicol; 10 (2); 90 -92; 2010.
9. Shukla, AP: A study of cranial capacity & cranial index of Indian skull. J. Anat. Soc. India., 15:31-5, 1966.
10. Routal RV; Pal GP and Bhagwat SS: Relationship between endocranial volume and the area of the foramen magnum. J.Anat. Soc.India; Vol. 33, No.3; 1984.
11. Haack, DC; and Meihoff; A method for estimation of cranial capacity from cephalometric Roentgnograms; Am. J. Phys. Anthropol., 34; 447 - 52, 1971.
12. Hooton,EA; A method of racial analysis. Science, 44:256, 1926.
13. Brash, J. C.Cunningham's Textbook of Anatomy. 1951; 9th Edition.New York, Oxford University Press, 1951.
14. Ernest Frazer J: The Anatomy of the human skeleton. 4th Ed. Reprinted 1946.
15. Chaturvedi,RP and Harneja. NK: Cranial capacity, facial angle and gnathic index in adult human skulls. J. Anat. Soc. India, 11:18-23, 1962.
16. MacDonell WR: A study of the variation and correlation of the human skull with special reference to English Crania. Biometrika; Vol. I, pp 408-4; 1904.
17. Thomas, IM; Janaliram, S; Rajangam, S & Amar DS: Cranial capacity of crania from Kamataalka. J. Anat. Soc. India 29(3):135-7, 1980.
18. Uspenskii SI: A new method for measuring cranial capacity. Technical Note, Am. J. Phys. Anthropol.; 22:115-118; 1954.
19. Williams, P.L.; Bannister, L.H.; Berry, M.M.; Collins, P., Dyson, M.; Dussek, J. E. & Ferguson, M.W. J. Gray's Anatomy. Soames, R.W. Edn. 38th. London, Churchill Livinstone, p612; 1995.

AN UNUSUAL FATAL INJURY DUE TO BURSTING OF THE COUPLING TYRE OF ELECTRIC GENERATOR A CASE REPORT

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ABSTRACT

At a construction site in the capital city of New Delhi, an electric generator developed some mechanical fault. Two mechanics were called to repair it. They repaired the generator and were testing the same, when the rotating coupling tyre made of hard rubber, mounted on coupling of the generator burst and fragmented into three pieces. The pieces acted as missile of which big two hit the mechanic who was standing nearby, over the right upper limb and right side of chest, and small piece hit the mechanic who had started the generator, sustaining only minor injuries. The injured mechanics were taken to the hospital. The mechanic with minor injuries was given first aid, while the other mechanic was immediately operated upon. However, he expired a day after the operation. Autopsy showed multiple lacerations of liver, along with compound fracture of right forearm bones.

KEY WORDS: Coupling, Tyre, Generator, Mechanic, Liver lacerations

INTRODUCTION:

An electric generator is a device that converts mechanical energy to electrical energy. A generator forces electrons in the windings to flow through the external electrical circuit. The source of mechanical energy may be a reciprocating or turbine steam engine, water falling through a turbine or waterwheel, an internal combustion engine, a wind turbine, a hand crank, compressed air or any other source of mechanical energy. The two main parts of a generator can be described in either mechanical or electrical terms. The rotating and stationary part of an machines called as rotor and stator respectively. The power-producing component of an electrical machine is named as armature which can be on either the rotor or the stator. There is another component of an electric machine called magnetic field which can be provided by either electromagnets or permanent magnets mounted on either the rotor or the stator.

A coupling is a device used to connect two shafts together at their ends for the purpose of transmitting power. The other purpose of the shaft couplings are to provide for misalignment of the shafts

or to introduce mechanical flexibility, reduce the transmission of shock loads from one shaft to another, protection against overloads, alter the vibration characteristics of rotating units and transmit the cent percent power. Couplings do not normally allow disconnection of shafts during operation, though there do exist torque limiting torque couplings which can slip or disconnect when some torque limit is exceeded. Even with proper maintenance, couplings can fail. The reasons for failure, other than maintenance, include improper installation, poor coupling selection and operation beyond design capabilities.

CASE REPORT

At a construction site in the capital city of New Delhi, an electric generator developed some mechanical fault. The generator was from a local firm, of electricity producing capacity of 62.KVA (Fig.1). Two mechanics were called to rectify the defect. One mechanic started the generator and other was standing nearby. Suddenly the rotating coupling tyre of the generator burst and fragmented into

three pieces. The speed of the rotator was 1500 rpm at that time (Fig.2, 3.). The two big pieces hit the person standing near the generator, on right upper limb and right side of chest, and small piece hit the person who had started the generator who escaped with minor abrasions. The injured mechanics were taken to the hospital. The mechanic with minor injuries was discharged after given first aid. The other mechanic on arrival to the casualty complained of chest pain on right side. He had a GCS of 15/15. His blood pressure and pulse were 110/60 mm and 96/minute respectively. On auscultation heart sounds and bilateral airway entry were normal. A bruise was present on the right side of chest in mammary region. Chest compression was positive and bony crepitus was present. There was compound fracture of shaft of right forearm at the junction of upper 1/3rd and lower 2/3rd. The patient was operated upon, and internal fixation of the fractured bones was done. However the next day patient condition deteriorated. His systolic blood pressure dropped to 70 mm Hg and pulse rate went up to 120/minute. The respiratory rate was 36/minute. The abdomen was distended and tender. Frank blood was noted on tapping. Immediate exploratory laparotomy done under general anesthesia had revealed multiple lacerations on the postero-superior aspect of right lobe of liver (segment VII&VIII) with active bleeding. Liver lacerations were repaired and packaging was done. The individual expired 3 hr after surgery.



Fig.1 (Electric generator)



Fig.2 (Coupling of the generator and the piece of tyre lying nearby)



Fig.3 (Two pieces of coupling tyre)

AUTOPSY FINDINGS:

The body was that of a 40-years-old average built male. Rigor mortis was present all over the body. The body was pale. Post-mortem staining was faintly distinguishable on back and dependent parts of the body except at pressure points. A contused abrasion, reddish brown in color of size (5x2) cm was present over the right side of chest 3 cm below the clavicle and 5 cm lateral to midline. An abrasion, reddish brown in color, in an area of (16x6) cm was present over the right side of chest 8 cm below the clavicle and 6 cm lateral to midline. A contusion, reddish brown in color, of size (4x2) cm was present over the right side of chest 4 cm below the clavicle and 1 cm medial to previous injury. Two Surgical stapled wound of size (11.5x2.5) cm and (12x3) cm, were present on right forearm with underlying surgical plate insertion due to frac-

tured shafts of radius and ulna on right side. A muscle deep lacerated wound of size (6x2) cm, with contused margins was present over anterior aspect of right forearm 3 cm above the wrist joint. Surgical laparotomy wound of length 24 cm, was present over the mid abdomen. On opening the abdomen, about 3000ml of partially clotted and fluid blood was present in the peritoneal cavity. Multiple lacerations were present over the right lobe of liver (Fig.4). All internal organs were pale. Toxicological analysis did not reveal presence of alcohol or drugs. The cause of death was hemorrhagic shock as result of injury to liver caused by blunt force.



Fig.4 (Lacerated Liver)

DISCUSSION:

Machinery-related fatalities are one of the leading causes of traumatic occupational deaths. The most common mechanisms of injury were being caught in or between parts of equipment, electrocution, and being struck by or against objects. Typical scenarios included cleaning a mixer or blender, cleaning a conveyor, and installing or disassembling electrical equipment.¹ Occupational fatalities due to contact with electricity account for approximately 9% of all deaths in the construction industry and is the fourth leading cause of death in this industry.² The majority of injury events occurred while persons were lifting, pushing, or pulling (21%), adjusting a machine (20%), or repairing a machine (17%).³

Pneumatically induced injuries relating to bursting of tyres are quite rare and are hardly reported in forensic literature. A case of pneumatically induced

facial and cervical injuries has been reported by Gilbert Lau (1995),⁴ where a mechanic sustained a penetrating mandibular injury, associated with atlanto-occipital dislocation, from the handle of a sledgehammer when the inner tube of a military truck tyre burst at the time of repositioning the locking rim of a fully inflated tyre.⁴ A similar case had been reported by Rautji et.al. (2003), where a 20 year old male driver of a heavy duty crane, was fatally injured while repositioning an ill fitted locking rim of a crane tyre. The inner tube of the crane tyre had accidentally burst, dislodging the loose iron-locking rim, which led to fatal head injuries to the individual.⁵

The case presented here is unique in nature and has not been reported in forensic literature. The hard rubber coupling tyre mounted on coupling of generator burst and fragmented due to wear or fatigue, as a result of continuous use or lack of maintenance. These rubber fragments acted as missile and hit the deceased with great speed. The resultant momentum of these pieces led to the fatal injuries to the liver.

REFERENCES:

1. Bulzacchelli MT, Vernick JS, Sorock GS, Webster DW, Lees PS. Circumstances of fatal lockout/tagout-related injuries in manufacturing. *Am J Ind Hyg Assoc* 2008 Oct; 51(10):728-34.
2. Janicak CA. Occupational fatalities due to electrocutions in the construction industry. *J Safety Res*. 2008; 39(6):617-21.
3. Gerberich SG, Gibson RW, French LR, Lee TY, Carr WP, Kochevar L, Renier CM, Shutske J. Machinery-related injuries: regional rural injury study--I (RRIS--I). *Accid Anal Prev*. 1998 Nov; 30(6):793-804.
4. Lau G. An unusual case of pneumatically-induced facial and cervical injuries—a case report. *Forensic Sci. Int.* 73(1995): 131-38.
5. Ravi Rautji, A Rudra, T D Dogra. An unusual fatal injury due to tyre burst: a case report. *Forensic Sci. Int.* 138 (2003): 111-13.

ESTIMATION OF AGE FROM THE RIB BY PHASE ANALYSIS AN AUTOPSY STUDY IN FEMALES

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Abstract

Determination of age and sex play a pivotal role in identification of unknown skeletal remains. Age estimation from the recovered bones has been studied and analyzed by many workers. In the present study the sternal end of fourth ribs were used for determination of age by direct observation. One of the great works on this subject was done by M.Yasar Iscan(1984) on white males. Many studies have confirmed the reliability of this technique on varied samples from different population. Present study is an effort to compare and test the application of the method developed by Yasar Iscan on a female population in the state of Kerala. The study is also compared with author's own work on male population of Kerala. The sample consisted of fourth ribs on right side from 85 females of known age and race. The ribs were assigned to one of nine phases (0 through 8) based on changes noted at the costochondral junction. Statistical analysis indicated that these changes were age related and applicable to females also.

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

Introduction

Age estimation of unidentified human remains is a considerable problem in medico legal practice. Currently Forensic and physical anthropologists use two methods for estimating age from skeletal remains of adults. The first method is based on the gross morphologic changes in bones like closure of cranial sutures, metamorphosis of pubic symphysis and degenerative changes in vertebral bodies. The second method is microscopic where the age estimation is based on osteon counting of lamellae per osteon and haversian canal diameter (1). But age determination from the sternal end of rib is probably one of the easiest and best methods.

In the present study, the sternal end of rib is used for determination of age by direct observation. The medial end of rib at the costochondral junction is examined with special

attention to depth and shape of the pit along with the walls and rim surrounding it. The advantages of using rib for determination of age are (a) the sternal end shows change throughout life.(b) age can be estimated even from a single undamaged rib and (c) the rib can be obtained easily without mutilating the body.

The existing method using sternal end of fourth rib was developed by M.Yasar Iscan et al (1984) on white males (2) and in white females (3). Later on the same method was applied by Oettle and Steyn (4) on South African blacks and Yavuz in Turks.(5) A large scale study using sternal end of fourth rib from 219 males in south Indian population (6) has proved that the method developed by Iscan et al is useful for Indian population also. However, no large scale study has been conducted to test the application of this method on female population of India especially in the state of Kerala. The present study used samples from 85 females of known age and results were compared with the study done by

Yasar Iscan(1984) on white males and the study by authors of Indian males.(6)

Materials and methods:

In the present study fourth rib from the right side of chest containing the costochondral junction was collected from 85 female bodies brought for postmortem examination during the period 15-10-2004 to 14-04-2005 at the Department of Forensic Medicine, Government Medical College, Trivandrum. Specimens were collected from only those cases in which exact age, sex and race were known. The specimens were separated from the body by cutting at two points i.e. three centimeter inner to and five centimeter outer to costochondral junction using a rib cutter without damaging the costochondral junction. The muscles attached to the ribs were cut using scissors. The portion of ribs were labeled and kept in water containers for three to four weeks. Thus the soft tissues could be removed from the bone easily. The remaining soft tissue and cartilages if any were removed by keeping the bones in boiling water for ten to fifteen minutes. Bones were thoroughly dried at room temperature and each rib was examined meticulously to ascertain the stage of morphological change. Based on metamorphosis of features the specimens were separated in to nine groups - phase 0 to phase 8.

These phases were developed based on the changes noted in the form, shape, texture and overall quality of costochondral junction of ribs and shown in TABLE-1. The phases were then statistically analyzed using the software SPSS (Statistical package for social sciences) 10.0 version.

Table-1: Phase changes on the costochondral junction of ribs. (2)

Phase 0 The articular surface is flat or billowy with a regular rim and rounded edges. The bone itself is smooth, firm and very solid.

Phase 1 There is a beginning amorphous indentation in the articular surface, but billowing may also still be present. The rim is rounded and regular. In some cases, scallops may start to

appear at the edges. The bone is still firm, smooth and solid.

Phase 2 The pit is now deeper and has assumed V- shaped appearance formed by the anterior and posterior walls. The walls are thick and smooth with a scalloped or slightly wavy rim with rounded edges. The bone is firm and solid.

Phase 3 The deepening pit has taken on a narrow to moderately U - shape. Walls are still fairly thick with rounded edges. Some scalloping may still be present but the rim is becoming more irregular. The bone is still quite firm and solid.

Phase 4 Pit depth is increasing, but the shape is still a narrow to moderately wide U. The walls are thinner, but the edges remain rounded. The rim is more irregular with no uniform scalloping pattern remaining. There is some decrease in the weight and firmness of the bone; however the overall quality of the bone is still good.

Phase 5 There is little change in pit depth but the shape in this phase is predominantly a moderately wide U. Walls show further thinning and the edges are becoming sharp. Irregularity is increasing in the rim. Scalloping pattern is completely gone and has been replaced with irregular bony projections. The condition of the bone is fairly good; however there are some signs of deterioration with evidence of porosity and loss of density.

Phase 6 The pit is noticeably deep with a wide U-shape. The walls are thin with sharp edges. The rim is irregular and exhibits some rather long bony projections that are frequently more pronounced at the superior and inferior border. The bone is noticeably lighter in weight, thinner and more

- porous, especially inside the pit.
- Phase 7 The pit is deep with a wide to very wide U - shape. The walls are thin and fragile with sharp, irregular edges and bony projections. The bone is lighter in weight and brittle with significant deterioration in quality and obvious porosity.
- Phase 8 In this final phase the pit is very deep and widely U-shaped. In some cases the floor of the pit is absent or filled with bony projections. The walls are extremely thin, fragile and brittle with sharp, highly irregular edges and bony projections. The bone is very light weight, thin, brittle, friable and porous. 'Window' formation is sometimes seen in the walls.

Results and discussion

The costochondral junction of the fourth ribs of 85 females were examined and graded using the phase analysis method as originally used by Yasar Iscan (2) .Each rib was placed in one of the phases extending from '0' to '8'.

Distribution of cases in relation to age intervals in the present study is compared with the study on white males (2) and Indian males (6) and is given in Table-2

Table-2: Frequency and percentage distribution of specimens by age intervals

Age group in years	Sample of Yasar Iscan et al on white males		Study on Indian males		Present study	
	Number of cases	Percentage	Number of cases	Percentage	Number of cases	Percentage
0-16	10	8.5	14	6.4	9	10.6
17-19	6	5.1	8	3.7	7	8.2
20-29	38	32.2	34	15.5	19	22.3
30-39	15	12.7	30	13.7	13	15.3
40-49	15	12.7	40	18.3	9	10.6
50-59	11	9.3	52	23.7	10	11.8
60-69	12	10.2	25	11.4	10	11.8
70 and above	11	9.3	16	7.3	8	9.4
Total	118	100	219	100	85	100

Maximum numbers of cases (22.3%) were from the age group of 20-29 years in the present study. In the original study by Yasar Iscan(1984) also it

was 20-29(32.2%).But in the study on Indian males it was from the age group of 50-59(23.7%)

The age wise distribution of cases according to phase analysis in the present sample was compared with that of Yasar Iscan et al and study on Indian male population. The results are given in Table-3.

Phase	Age range in sample of Yasar Iscan et al	Study on Indian males	Present study
0	-	-	8 months-16 years
1	17-18	17-24	17-22
2	18-25	20-29	22-29
3	19-33	28-38	31-39
4	22-35	37-47	40-48
5	28-52	40-58	51-59
6	32-71	33-70	50-66
7	44-85	56-69	60-100
8	44-85	54-84	Nil
Total	17-85	17-84 yrs.	8 Months-100 Yrs.

Table - 4 shows the number of cases in each phase and their percentage in all the three studies.

Table-4: Phase wise distribution of cases

Phase	Yasar Iscan		Study on Indian males		Present study	
	No. of cases	percentage	No. of cases	Percentage	No. of cases	Percentage
0	--	--	13	5.0	9	10.6
1	4	3.8	12	5.5	8	9.4
2	15	13.9	29	13.2	18	21.2
3	17	15.7	26	11.9	13	15.3
4	12	11.1	24	11.0	9	10.6
5	14	13	50	22.8	9	10.6
6	17	15.7	23	10.5	3	3.5
7	17	15.7	25	11.4	16	18.8
8	12	11.1	17	7.8	--	--
Total	108	100	219	100	85	100

The age range was found to increase down the table (Table-3). It was 5 years in phase-1 and 7-8 years for each phase till phase-5. Thereafter the age range showed a very high variability of 16 years in phase-6 and 40 years in phase -7.

Phase- 0 was found to include specimens up to the age of 16 years. The initial morphological changes (phase- 1) started to appear from the age of 17 years extending up to the age of 22, with a mean age of 19 years. In the study by Yasar Iscan

the mean age of phase 1 was 17.3 and in Indian males it was 20.17.

In the 16 specimens from the age group of 60-100 years, the morphological changes observed included in phase- 7 unlike male specimens (6).Phase-8 changes were not observed in any of the female ribs, even the rib from 100 years old female rib which showed changes pertaining to phase - 7 only.

Statistical analysis was done to find out the mean age and 95% confidence interval. The results are compared with the major studies and given in Table-5.

Table-5: Mean age and 95% confidence interval

Phase	Mean Age			95% confidence interval		
	Yasar Iscan	Study on Indian males	Present study	Yasar Iscan	Study on Indian males	Present study
0		10.77	8.11		6.8-14.8	3.8-12.4
1	17.3	20.17	19.00	16.5-18.0	19.1-21.2	18.0-20.0
2	21.9	24.69	25.11	20.8-23.1	23.8-25.6	24.0-26.3
3	25.9	33.81	35.08	24.1-27.7	32.7-34.9	33.4-36.8
4	28.2	43.96	45.11	25.7-30.6	42.6-45.3	43.4-46.8
5	38.8	51.60	55.11	34.4-42.3	50.3-53.1	53.5-56.7
6	50.0	51.74	59.33	44.3-55.7	47.8-55.6	49.7-68.9
7	59.2	63.60	74.69	54.4-64.1	62.2-65.0	69.0-88.3
8	71.5	71.71	-	65.0-78.0	65.8-77.7	-

The mean age was found to increase as the phase progressed. Mean age is less for phases-0 and 1 for females when compared to males. All other phases showed a higher value of mean age in the present study on females.

The width of 95 percent confidence interval was found to increase as age advances. In phase-1 the width was two years, showing a gradual rise till phase-5 attaining the maximum width of 19.2 and 19.3 in phases 6 and 7 respectively.

The CROSSTABS PROCEDURE was done for finding out the statistical significance of the distribution of the samples. They were analyzed according to the age and phases distribution and

the observations are shown in Table-6.

Table-6: Frequency distribution of phase by age intervals

	Age group in years								Total
	0-16	17-19	20-29	30-39	40-49	50-59	60-69	70 & above	
Phase 0	9								9
Row%	100								
Column %	100								
Phase 1		7	1						8
Row%		87.50	12.50						
Column %		100	5.26						
Phase 2			18						18
Row%			100						
Column %			94.74						
Phase 3				13					13
Row%				100					
Column %				100					
Phase 4					9				9
Row%					100				
Column %					100				
Phase 5						9			9
Row%						100			
Column %						90			
Phase 6						1	2		3
Row%						33.33	66.67		
Column %						10	22.22		
Phase 7							7	9	16
Row%							43.75	56.25	
Column %							77.78	100	
Phase 8									
Row%									
Column %									
Total	9	7	19	13	9	10	9	9	85

All the specimens belonged to a single decade in phases 2, 3, 4 and 5. The age groups twenty to twenty nine, fifty to fifty nine and sixty to sixty nine showed changes belonging to adjacent phases.

After statistical analysis using chi square test, the value obtained was 494.3 with a degree of freedom 49. Degree of freedom = (row-1) x (column-1). From these values P value was estimated and obtained as P= 0.000. This shows that age estimation from the phase changes of sternal end of ribs is significant in females as proved in males of Indian population

CONCLUSION

1. The initial morphological changes in sternal

- end of ribs started their appearance from 17 yearsonwards. The early phase changes did not extend into higher age groups.
2. The most rapid changes were seen in phases 1 to 4 with an interval of 5 - 8 years.
 3. The greatest variability was shown by phase-1 and phase-6
 4. None of the rib showed phase- 8 changes.
 5. Phase changes were delayed by about 2- 3 years in females when compared to males, in the initial phases and 11-17 years in the later phases.
 6. The phase analysis method was found to be useful in Indian female population, except in phase 6 to 8 where age can be determined only within a wide range.
6. Padmakumar K, Girish S, Geetha O, Age estimation from the rib by phase analysis- An autopsy study in males. Indian Internet Journal of Forensic Medicine and Toxicology, Volume.7, No: 3(2009) pp 79-86.

REFERENCES:

1. Ahlquist J, Damnsen O. A modification of Kersey's method for the microscopic determination of age in human bone. Journal of Forensic Sciences 1969; 14: 205-212.
2. Iscan M.Y, Loth S.R, Wright R.K, Age estimation from the rib by phase analysis: White males. Journal of forensic Sciences, Volume 26, No.4 Oct.1984 pp 1094-1104.
3. Iscan M.Y, Loth S.R, Wright R.K, Age estimation from the rib by phase analysis: White females. Journal of forensic Sciences, 1985 July; 30(3), pp 853-86
4. Oettle A.C.Steyn M.Age estimation from sternal ends of ribs by phase analysis in South African blacks, Journal of Forensic Sciences 2000 Sep; 45(5):1071-79
5. Yavuz M.F,Iskan M.Y,CologluA.S, Age assessment by rib phase analysis in Turks, Forensic Sciences International 1998, Nov 30; 98(1-2):47-54.

FORENSIC INTERPRETATION OF INJURIES / WOUNDS FOUND ON THE HUMAN BODY

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Abstract

Penetrating injuries of the body are most commonly the result of injury/wounds and are often associated with a range of potentially life threatening injuries. In every physical assault, no matter it led to death or not, the attacker had produced/left different types of marks in the victim's body that could be helpful to reconstruct the crime scene and guide to determine the cause of death. In the present study, we have demonstrated some examples of injuries/wounds found of the victim's body with illustrative photos. These provide a proper and useful data for the forensic crime scene investigators.

Keywords: Injuries, types of injuries and digital photography, crime scene reconstruction

INTRODUCTION

An injury is define as any harm, whatever illegally caused to any person in body, mind, reputation or property as per Indian Panel Code (Sec. 44). In forensic science, the injuries/wounds are produced by physical violence, which break of the natural continuity of any of the tissues of the living body [1]. Different types of injuries are summarized in Fig.1. Trauma is explained as an injury to the body caused by physical, mechanical or chemical factors, which may result in wounds or possible complications. The medical purposes, violence refers to either behaviour that result in injury or to the injury itself. This violence may result in both psychological and physical trauma [2]. In the present paper, the authors have tried to exemplify the physical character of the injuries/wounds, which have been caused with the help of different instruments/weapons. In the paper, illustrative photos of different injuries/wounds are reported for ready use in forensic community.

2. TYPES OF INJURIES/WOUNDS AND THEIR PHYSICAL CHARACTERISTICS:

Mechanical factors include the use of weapons or instruments such as knives, screwdrivers, scissors, razor blade, galss or guns and injuries results from

falls, traffic accident or domestic violence. Chemical factors include damage to tissue by acids, alkalis or poisons as in Fig.1. A wound/injury to the body occurs when the force applied to the body is greater than the body's ability to absorb such force. Injury mechanism refers to the various forces commonly associated with trauma (i.e., projectile, sharp, blunt, thermal and poly trauma). Accurate identification of mechanism is dependent on pattern recognition as well as the contributions of intrinsic and extrinsic factors that dictate the way wounds/injuries [3]. For example, similarly-shaped striking surfaces produce different patterns if they impact at different velocities, and typically high-velocity projectiles can be slowed in flight by an intermediate target. The injuries inflicted by mechanical force are generally divided into two categories as blunt and sharp forces. These may be more than one type of skin injury to the body and they may be localized and widespread. Sometimes, the absence of external injury to the skin or genitalia does not exclude the possibility of serious injury to the internal organs/body parts. We have tried to explain the different mechanical injuries as shown in Fig.2.

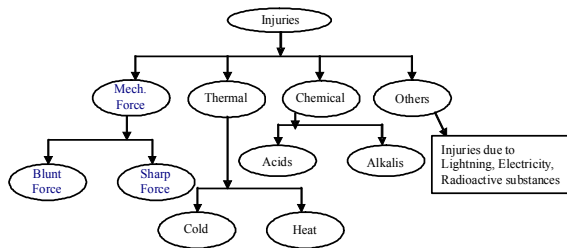


Fig. 1: Injuries due to physical violence

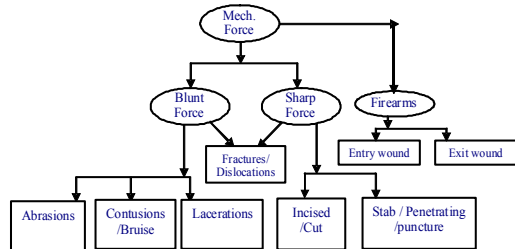


Fig. 2: Mechanical injuries are classified with specifications

- i) Blunt Force Injury: On the body due to blunt forces or instruments, these injuries are on skin and scratches, grazing, bruising are observed. These injuries are sub-categories as;
 - a) Abrasions: In this type of injuries the skin in which the outer layer of the skin is scaped off. Examples of the abrasions are scratches, grazing of the skin caused by dragging, imprint caused by belt/hunter/sticks.
 - b) Contusions/Bruises: This type of injuries occurs when blood vessels in the skin or internal organ are ruptured. A bruise heals by destruction and removal of the extravasated blood. The colour change is very variable, starts at the periphery and extends inwards to the center. At first its colour is red, after few hours to 3 days it converted in to blue on 4th days is changes into bluish-black. When bruising is extensive and deeply situated the colour takes longer time to appear externally.
 - c) Lacerations: Lacerations are tears or splits of skin, mucous membranes, muscle or

internal organs produced by application of blunt force or broad are of the body. Types of lacerations are split lacerations (crushing of the skin between two hard objects), stretch lacerations (overstretching of skin), avulsion, tears etc.

- ii) Sharp Force Injury: these are caused by cutting or stabbing the skin with sharp instruments/weapons such as knives, swords, tins, broken glass bottles, razor blade and tools (screw driver etc.). There are three types of sharp force injuries explain as under
 - a) Incised/cuts Injury: This type of wound is a superficial injury in which the size of the injuries on the surface is larger than the depth of the injuries generally made of razor blade, axe and swords.
 - b) Stab/Penetrating/Puncture Injury: This type of injury is produced from the penetration of pointed / sharp instruments/ weapons on to the depth of the body that is deeper than its length, generally knives, broken glass bottles and tools. The stab injuries may be single or multiple.
 - iii) Firearms Injury: They are usually recognized without difficulty. The injuries produced by fire arms vary depending on the projectile, the muzzle velocity, distance, angle of firing and part of the body involved [4]. These wound are subdivided as, when a bullet, passing through a body, produces a wound a the point of entrance on the skin known as entry wound and another at the point of exit of the bullet known as exit wound. The differences between both wound characteristics are given in Table 1, which is very useful for the forensic community while examination at the spot of firearm used.

Table 1: Difference in Physical characteristics of entry and exit wound of bullet

S. No.	Physical Properties	Entry Wound	Exit Wound
1.	Size	Smaller than the diameter of the bullet	Bigger than the bullet
2.	Edges of the skin	Inverted	Everted or Torn
3.	Bruising/Abrasion	Present	Absent
4.	Burning of the skin	May be observed around the wound	Absent
5.	Lead ring or metal ring	May be seen while radiological examination	Absent
6.	Bleeding	Less	More

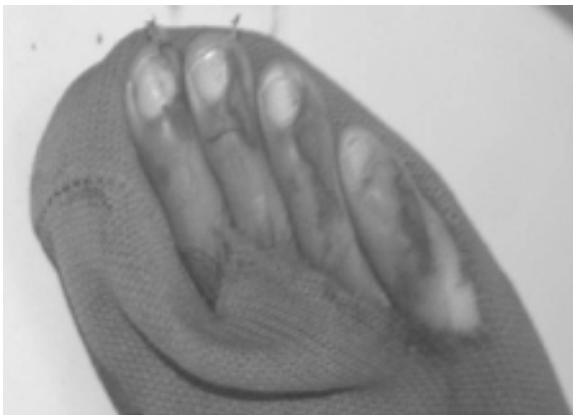
3. ILLUSTRATIONS OF INJURIES WITH PHOTOS:



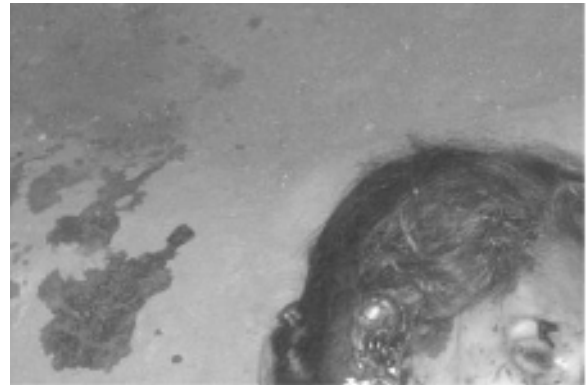
Abrasions



Bruise



Contusion

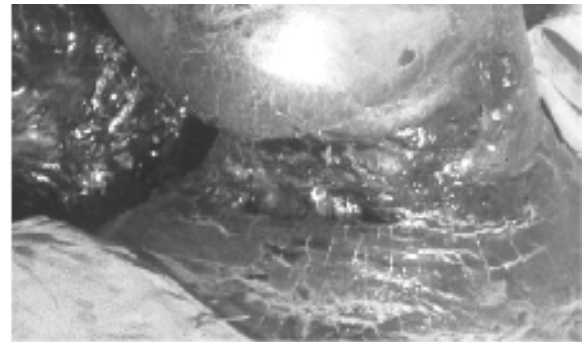


Split laceration



Stretch laceration

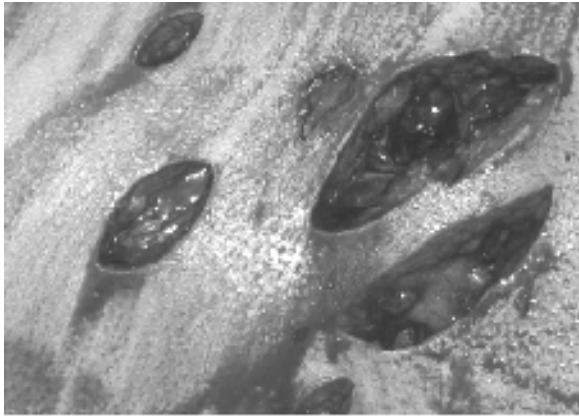
Illustration 1: Blunt Force Injury



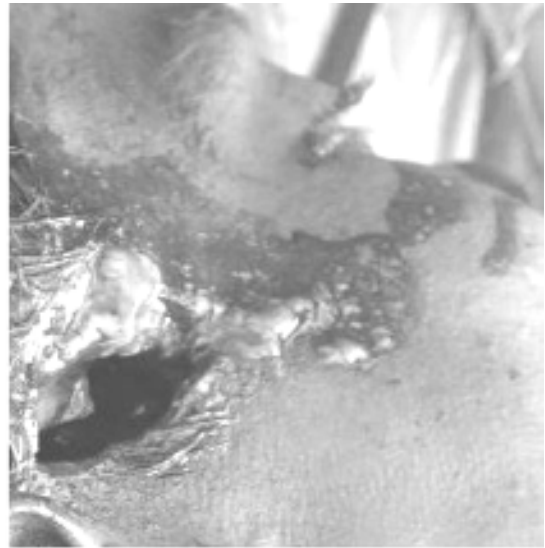
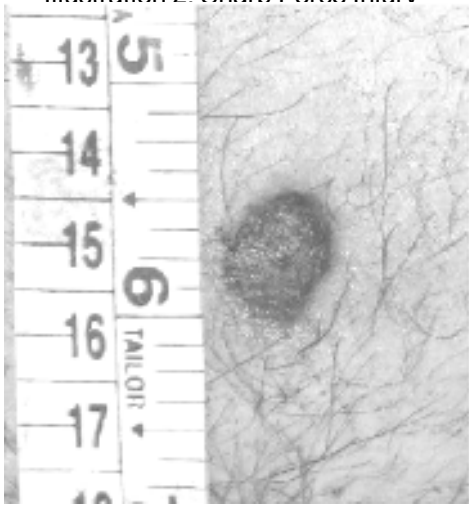
Cut/Incised injury



Single stab/penetrating injury



Multiple stab/penetrating injury
Illustration 2: Sharp Force Injury



Entry wound behind the ear at LHS
Exit wound behind near ear at RHS in the
same case.

Illustration 3: Firearm Injury

From illustrations 1 to 3, all the different type of injuries/wound and their typical edges can be explained easily. From Illustration 1, blunt forces occur whenever one makes contact with a hard dull object in a way that hurts. Abrasions are injuries that result in the removal of the superficial layers of skin.

Now it is clearly be seen that stab wounds usually are deeper than they are wide. They are also more likely to be distorted by the victim's twisting and turning to fend off an attacker. Incised or cut wounds are caused when a sharp instrument is drawn across the skin as illustrated in Illustration 2. Unlike stab wounds they have no characteristic width or depth and thus reveal little of the nature of the weapon. These wounds are rarely fatal but when they are usually are suicidal or homicidal. Suicidal wounds typically are found on the victim's wrists and rarely on the neck. Suicidal incised wounds frequently are accompanied by hesitation marks.

In Illustration 3, the character of a wound produced by a gunshot depends upon several factors includ-



ing the distance between the victim and the muzzle of the gun.

Whether the bullet remains within the victim or passes completely through exiting the body (a through and through gunshot wound) as shown in Illustration 3, the medical jurist can estimate the distance from which a single bullet was fired by looking closely at the entry wound.

4. DISCUSSION:

In all injuries/ wound related cases the total number or wounds should be recorded and each would in carefully measured and it's characteristics described with photography. A blunt force injury comes from impact with a blunt object or something with no sharp edges.

Forensic expert determine the direction of impact, the type of object that caused it and how often the contact was made, often they're made by blows from a hammer or axe head. Bite marks are also a form of crushing wounds. With a knife or incised wounds the crime scene investigator must make a distinction between cut and stab or puncture wounds and among different types of piercing implements such as an ice pick or small knife. Most knives have a flat edge and a sharp edge which can be seen in the wound angles. Some wounds are defensive such as cuts made on the palms or fingers of a victim's hands. Some time cuts are associated with suicidal gestures are known as hesitation wounds as the person attempts to inflict self-damage.

As with all instances of a firearms offence that results in an injury, measurements are taken along with photographs to aid in the identification of the weapon used, it is necessary for a Forensic expert. Powder residue samples are taken and if the victim dies as a result of their gunshot wound, the round is removed for ballistic analysis from the corpse at the autopsy stage. The forensic scientists and investigating officer scour the crime scene looking not only for the weapon involved as they

are sometimes disposed of but also for spent shell casings and/or loose rounds that were fired but did not hit their intended targets and imbedded themselves in nearby walls, doors or the ground.

5. REFERENCE:

- [1] Olshaker et al. Forensic Emergency Medicine. Lippincott Williams & Wilkins: 2001
- [2] Knight B. Forensic Pathology. 2nd ed. London: Amold, 1996; pp.232.
- [3] Polson CJ, Gee DJ and Knight B. The Essentials of Forensic Medicine. 4th ed. Oxford: Pergamon Press, 1985; pp.125-127.
- [4] Sharma GK, Sarangi MP, Tyagi AK, Kumar B. Medico-legal Interpretation of Stabbing and Cutting Injuries (An Autopsy Study). JFMT, 1994; 11(1&2): 21; also Crowley, Sharon R. Sexual Assault: The Medical-Legal Examination. McGraw-Hill/Appleton & Lange: 1999.
- [5] Scolan V, Telmon M, Blanc JP, Allery D, Charlet RD. Homicide - Suicide By Stabbing Study Over 10 Years In The Toulouse Region. The American Journal of Forensic Medicine & Pathology, 2004; 25(1):33-36.

CONCEALMENT OF BIRTH OF AN IDENTIFIED NEW BORN CHILD A CASE REPORT

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Abstract

This paper relates to postmortem examination of a new born baby who was allegedly born to an unmarried 19 years female. The delivery was conducted by the parents of girl at their home. After the delivery, the new born was disposed of in a nearby well. The placenta was retained in the uterus. The condition of the girl deteriorated on account of excessive bleeding per vaginum, as a result of which she was admitted in a Govt. hospital for management. From here the true story was revealed, which led to the identification of recovered newborn child from well. The body of the new born was sent to the mortuary of Forensic Medicine Department of Government Medical College, Amritsar. Though it is not uncommon to conduct autopsies of new born babies u/s 318 IPC but these cases most of the times remain unidentified. But in this case the dead body was identified which led to filing of first information report under section 318IPC and prosecution was launched against the girl and her parents. The important postmortem findings of the new born of medico legal relevance are presented and discussed in this paper.

Key words

Child, Secretly disposal, Infanticide, Viable.

Introduction

One way of preventing the detection of the crime of infanticide, and probably most effective is the concealment of the body of the child. Section 318IPC punishes secret disposal of the body of child with the intention of concealing the birth of such child. But to bring the charge u/s 318 IPC the new born should be a child. A verdict of concealment of birth is an alternative to that of infanticide and, in view of the difficulties of proving the major charge; the accused is usually convicted of concealment of birth¹. Again to say a new born as a child is not that easy as it is thought. The postmortem findings are important in this regard which help the investigating agencies. Ordinarily, the term, child has been applied to an infant who has attained certain degree of maturity/development and it ceases to be a foetus and is capable of having its own independent existence in the event of its birth. According to section 318 IPC whoever, by secretly burying or otherwise disposing of the dead

body of a child, whether such child dies before or after or during its birth intentionally conceals or endeavors to conceal the birth of such child is punishable for this offence. As under section 318IPC concealment of birth is a crime, but it is not necessary to prove live birth. It is sufficient that there had been a birth and the child was dead at the time of concealment^{1 2}.

History

An unmarried pregnant female 19 years old delivered a male child at her parental home. The delivery was conducted secretly by the parents of the female to avoid social stigma. The new born was thrown into a nearby well in the early morning hours which was witnessed by the watchman of that area. The matter was reported to police. The placenta could not be delivered, as a result of which she bled profusely. Due to excessive bleeding per vaginum her condition deteriorated. Fearing

danger to her life and concerned about her safety, she was taken by her parents to a Govt. hospital where treatment was started. The dead body of newborn was recovered from well by police team with the help of fire brigade. In the mean time the police started its investigation, the police started searching the nearby private and Government Hospitals to find out whether any lady has delivered a new born in the morning or not. Surprisingly this female was found to be admitted in the government hospital for management of her deteriorating condition (retained placenta). Ultimately, whole incidence was correlated with the story narrated by the girl in the hospital which led to booking of girl and her parents u/s 318 IPC (concealment of birth). Inquest was held by police and the dead body of newborn was sent to the mortuary of Forensic Medicine and Toxicology department, Government Medical College, Amritsar for postmortem examination.³

Observations

It was naked dead body of a male child wrapped in a yellowish cloth which was further put in a bluish plastic container. The length of the new born was 46cms. Skin was soft and could be easily peeled off at places. Head circumference was 29cms. Weight of new born was 2574gms. Scalp had blackish hair measuring up to 2.00cms. Body was flaccid. No rigor mortis was observed. Faint reddish brown coloured postmortem staining was present on the left side of abdomen except in areas of contact flattening. Pupillary membrane had disappeared. Eyes and mouth were closed. At places skin was greasy to touch. No vernix caseosa was present. Face was devoid of wrinkles. Ear and nasal cartilages had appeared. Umbilical cord was located in the middle of xiphisternum and pubis. It was glistening in appearance with a natural fold and measured 19.00cms. Its terminal end was torn

and frayed and had dark reddish brown coloured clot. Scrotum contained testicles. Finger nails projected beyond fingertips. Lanugo were present on the shoulders. Large intestines contained meconium. Centres of ossification were present in the sternum, calcaneum, talus and lower end of femur (5mm. in diameter). Chest was drum shaped with 23.00cms circumference and of abdomen 19.00cms. Level of diaphragm was at the 7th rib. Lungs were voluminous, mottled, crepitant, elastic with rounded margins spongy filling the pleural cavities thereby covering the thymus and pericardium and their weight was 75gms. The covering pleura were taut. Subpleurally, at places small expanded air blebs were present. On cutting the lungs, blood stained froth was revealed. Hydrostatic test was positive as the lungs floated in a bowl of water. Breslow's Second Life Test was positive.

More or less diffused bruising of the scalp (except right frontal and right temporal region) was present. Cranium contained 35cc of dark reddish subdural collection of blood. Brain was soft and liquefied. Heart, large vessels, small intestines and bladder were empty. Left femur was removed, preserved and handed over to the accompanying police officials for DNA profiling as requested by them with standard instructions.

In the end it was concluded that it was a dead body of a full term mature, live born, viable male child and cranio-cerebral trauma was declared cause of death. The probable time that elapsed between injury and death was reported as immediate and between death and postmortem examination 24 to 36 hours.

Discussion

As per above stated history and observations, following points of medico legal significance have emerged;

A. Secretly conduct of delivery by the parents

- of female at their own house.
- B. Birth of full term mature, viable and live born child
 - C. Secretly disposal of the new born child
 - D. Admission of the female in the hospital leading to identification of secretly disposed of child.
 - E. Recovery of the dead body of a new born child from the well leading to its positive identification.
 - F. Medico legal autopsy of the body of newborn.

As per section 318 IPC to bring the charge of concealment of birth; following criteria should be fulfilled:

- A. Secretly burying or otherwise disposing of the dead body of a child
- B. Whether such child dies before or after or during its birth is immaterial.
- C. Intentionally concealing or endeavor to conceal birth of such child
- D. No need to prove live birth
- E. Proof of birth
- F. Child is dead at the time of concealment
- G. Foetus is considered a child if it has attained such maturity as to be capable of maintaining separate existence.

From the above highlighted points it is clear that a dead body of new born baby was recovered from a well (secretly disposal of dead body of new born), the delivery was conducted secretly at home (Intentional concealing /endeavor to conceal birth), new born was live born and died after its birth (though there is no need to prove live birth), proof of birth was established (from the examination of female at Govt.Hospital), when new born was recovered from the site of disposal he was dead (Child is dead at the time of concealment) and new born was considered as child on autopsy findings i.e. the degree of maturity /development was to

such an extent that he was capable of having its own independent existence, which is usually taken seven months of intrauterine age, though in this case it was in between nine to ten months (Foetus is considered a child if it has attained such maturity as to be capable of maintaining separate existence) So, these points led to confirmation of the commission of offence u/s 318IPC1,2.

The authors are of the opinion in such cases though most of the points as explained above may be confirmed by eye witness (if available) and corroborated by circumstantial evidences. But to decide whether the new born is a child or not (capable of having independent existence after birth) largely depends upon autopsy findings of the new born. Similarly, if new born child is recovered alive from the secretly disposed of site then the offence may fall under section 317 IPC (Abandonment of child) or culpable homicide or murder if the death of recovered alive child occurs later on as the circumstances warrant.

Though usually concealment of birth cases remains unidentified. But in this case identity of both the child and mother was established. Moreover, eyewitness account supported by medical findings and strong circumstantial evidence helped in establishing the corpus delicti leading to prosecution of the perpetrators of crime.

References

1. Vij K. Text book of Forensic Medicine and Toxicology, Principles and Practice, 5th ed.India, Elsevier; 2011:156-157.
2. Parikh CK. Parikh's Text Book of Medical Jurisprudence and Toxicology, 4th ed.Bombay; Medicolegal Centre; 1985:492.
3. Paul GS. Parents of pregnant girl abort foetus themselves, booked. The Tribune, 2010; 130(186):3.