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Editorial

ENQUIRIES CONDUCTED IN CASES OF ALLEGED MEDICAL NEGLGIENCE

In cases of allegations of medical negligence against doctors and hospitals, expert opinions and committees are essential for the courts to understand the applicable standards of care. Here the committee members are expected to offer expert opinion to the courts by considering the correct standard of care for a medical issue. Such opinions can identify doctors who are not meeting the requisite standards or those who were not at fault. The judicial system now relies on medical experts to assist the efficient rendering of justice in our system. Thus, in a way the society depends on expert doctors to monitor the medical profession because they are best suited to do so. Ethics recognizes that as professionals with special training and skills, doctors have an ethical obligation to assist in the administration of justice. Ideally, the system can then compensate patients who are harmed by incompetent physicians. It requires that medical experts should have recent and substantive experience in the area in which they testify and should limit testimony to their sphere of medical expertise. However, it cautions that the committee members should not become an advocate or partisan in the legal proceedings.

Several factors have made the role of expert committees and expert opinions increasingly more visible, including the following:

1. Access to the vast knowledge on internet and advertisements by self proclaimed experts.
2. Increase in the level of awareness of the patients and relatives about their rights and doctor's duties.
3. Increase in the incidences of medical negligence litigations.
4. Increasing costs of medical treatment.
5. The Supreme Court judgments requiring expert opinions in cases of alleged medical negligence.

As we all are well aware of, after the Hon'ble Supreme Court judgments in cases of Jacob Mathews and Martin D'Souza, it is mandatory for the police investigating officer to seek an independent and competent medical opinion before proceeding against the doctor accused of rash or negligent act or omission. The court also desired that such an opinion should be preferably from a doctor, qualified in that branch of medical practice who can normally be expected to give an impartial opinion applying the Bolam test.

In our medical curriculum, many practical aspects of medical profession in the present era are not addressed to. They include such aspects like communicating with the patients and relatives, managing a violent mob of patient's relatives, facing the media reporters, giving statements to the police in case of an allegation of medical negligence, tackle relative's demand for out of court monetary compensation etc. Similarly, the curriculum also does not address the various administrative aspects to be followed and considered for conducting an enquiry in the capacity of an enquiry officer.

As the situation stands today, there are no guidelines or protocols to be followed by an enquiry officer when he is entrusted with the duty to conduct an enquiry. As a result, each enquiry committee conducts the enquiry in their individual manner and style, which they feel appropriate. Due to this many aspects of the complaint remain unanswered and thus the purpose of the enquiry is not served.

Through this editorial, I wish to suggest that some concrete guidelines for the members of the enquiry committee should be framed and scrupulously followed. Following aspects are suggested towards this end:

A. Guidelines to formulate a committee (who should be the committee members?)
B. Pre-enquiry tasks for the committee

C. Protocol for conduct of the enquiry
D. Visit to the scene of alleged incidence if required
E. Preparing the report and formulation of Opinion

Guidelines to formulate a committee

1. All committee members should be postgraduate qualified doctors. There should not be any non-medical member (e.g. a lawyer or a social worker etc). This is because; the very purpose of constituting this committee is to seek guidance pertaining to medical intricacies. The Supreme Court in Jacob Mathews and Martin D'Souza has categorically stated that, ***"Judges are not experts in medical science, rather they are lay men. This itself often makes it somewhat difficult for them to decide cases relating to medical negligence. The testimony may also be difficult to understand, particularly in complicated medical matters, for a layman in medical matters like a Judge."*** This implies that the Supreme Court has directed this arrangement only to seek inputs on medical matters. Rest of the things they are quite capable of assimilating. Hence, including non medical members on the panel (which is being practiced in certain states) defeats the very purpose of the committee.
2. The committee members should be from specialties relevant to the case under consideration. During treatment, consultants from many specialties might be involved. However, an attempt should be made to select those members who are specialized in the area that is relevant to the allegations made. In all cases where the patient has died and the body has been autopsied, an expert from forensic medicine field should be included in the committee. This is in view of the fact that the postmortem findings and their interpretations can be of substantial help in determining the issue under consideration. Also, by involving forensic expert, the relevant police investigations that might have been conducted in that case can also be considered for finalizing the opinion.
3. The committee member should be having at least eight years of experience in the relevant specialty. He should not be a member of the same local medical association or of the same district to which the doctors under enquiry belong.
4. He should have sufficient working knowledge of the laws of the land including, but not limited to,
    a. The recent amendments, guidelines, rules and provisions etc of consumer protection act, Indian Medical Council Act, RTI Act,
    b. Relevant provisions of Indian Evidence act, IPC, CrPc, Drugs and Cosmetic act that are of concern to the practice of medicine.
    c. Rules framed by their professional bodies and recent court judgments related to medical negligence.
5. He should not be a member of or a partner in or not be having any stake (financial or otherwise) in or not holding any office of profit in or not related in any other way with the medical establishment in which any of the doctors involved in the treatment are involved. Also he should not be related in any way (by blood or by marriage or financially or in any other way) to any of the doctors under enquiry.
6. No any legal case pertaining to professional misconduct, medical negligence or any other criminal matter related to the practice of his profession should be pending against him or he should not have been convicted or held liable for such acts by any court of law, tribunal, forum or commission in India or abroad.

7. No member of the committee should be either of the following:
    a. Any officer or member of Executive body of the state medical council
    b. Any officer or member of the board of governors or executive body of the Indian medical council
    c. Employee in any capacity with the central health ministry

    This is because, the option of a separate remedy under State Medical Council Act is open for the patient. SMC forms a committee to hear such complaints before it. If any one who is on the executive body of that state medical council is also a member of this committee, then naturally when the patient files a complaint with the SMC, and if this same member of the expert enquiry committee is also a member of the committee formulated by the SMC to hear the patient's grievance, there are chances for the opinion to be biased.

    Also, the central health ministry and the MCI are the appellate authorities against the orders of SMC. If those who are associated in any official capacity with these bodies, then in case if the patient or the doctor appeals the matter before them, the chances of their opinion getting influenced (by their previous opinion) cannot be ruled out.

    In certain states, the dean of a medical college (to whom the police refer these cases for constituting the expert committee) is also the president or an executive council member of their state medical council. Thus, in the official capacity of an office bearer of state medical council, he refers all such cases directly before the state medical council. By this way, the option available to the patient to seek a separate remedy under state medical council act gets exploited.

8. In case any of such members (as per clause 7 above) is a part of such expert committee then a declaration to the effect that, "if the case comes before the SMC (or Central Health Ministry or MCI) then he will voluntarily withdraw from that committee" should be obtained. [An amendment to this effect should be made in the SMC acts of every state.]
9. The committee members should be ready to file an affidavit, if required and for cross examination, either in person (in criminal courts) or by way of interrogatories (in consumer courts).[Because often the opinions of expert committees are produced before the consumer courts with a plea for grant of compensation.]
10. Before commencing the task of enquiry they should give a declaration to the effect that, they are not related in any way to any of the parties to the complaint and that they will duly and faithfully and to the best of their ability, knowledge and judgment conduct the enquiry without fear or favor, affection or ill will.

Pre-enquiry tasks for the committee

1. It should be remembered when such an enquiry is a part of investigation process by the police (which is as per the directions of Supreme Court), whenever necessary, the assistance of police machinery should be sought for:
    a. sending notices to the parties involved or the witnesses,
    b. making available the relevant documents (clinical case papers, photographs, CD etc) related to the treatment and postmortem (if conducted), arrangement of visit to the scene of alleges incidence etc
2. The letter of appointment of the member as a part of the committee should be communicated to all the members through mail or fax along with a copy of the complaint received. A copy of the said letter should also be sent to the employers of these

committee members to relieve them from their official duties in order to enable them to conduct the said enquiry.

3. The committee chairman should communicate with the members either by phone/ fax or mail and decide on
    a. The date, time and venue of the enquiry committee meeting,
    b. The names of the persons whom they wish to interrogate/ interact with/ obtain statements from/ seek documents from etc. (e.g. nurses and attendants in the hospital, resident doctors who are not named in the complaint but were involved in managing the patients etc).
4. One of the committee members should then send a letter addressed to such identified person conveying them the following facts:
    i. The fact of formulation of the committee
    ii. The date, time and venue of the proposed meeting
    iii. The involvement expected of them (submission of protocols available in hospital for treatment of such patients, documents regarding statutory compliance of hospital, documents of qualifications etc)
5. The notice sent to them may be worded as, "Take notice that the aforesaid complaint is fixed for enquiry on (date and time) at (place). You are therefore required to remain present there with your witness, if any. Take notice that if you fail to attend in accordance with this notice, the matter enquiry will be conducted in your absence."
6. If there are multiple parties, then rather than calling everyone at the same time, specific slots during that day can be allotted to them, so that they can organize their schedule accordingly.
7. The committee members should also make necessary communications for arrangements of assistance of stenographer, audiovisual aids (LCD projector, Screen, Laptop) at the venue, in case they need to visualize the CDs of autopsy (if conducted) or laparoscopic surgical procedures etc.
8. A letter drafted to that effect should be dispatched to all the identified persons through mail/ fax/ courier/ police, as the case may be depending on the situation.
9. If the committee feels that a specialist from any relevant specialty will be helpful during the conduct of enquiry, such a specialist may be mutually identified and a request be made to him for his presence during the meeting.
10. A letter/ fax should also be sent to the in-charge of the police station/ investigating officer who is investigating this case about the details of the meeting and that they should make necessary arrangements to make available following documents on the date and time and at the place of meeting:
    a. The copy of indoor case papers of all the hospitals involved
    b. postmortem report (if it is conducted)
    c. Photographs, CDs obtained by police from the autopsy surgeon
    d. Statements recorded by them, if any
    e. Any other documents relevant to the enquiry
    f. Arrangements for visit to the scene of alleged incidence if required
11. Accordingly, the committee members should prepare for the enquiry, so that the enquiry can be conducted systematically and there is no need for a second meeting.

Protocol for conduct of the enquiry

1. At the beginning of the meeting the committee members should decide on the scope of enquiry. i.e. what all are the issues they seek to enquire into, during the course of enquiry. Those should be documented. One of the issues in the scope of enquiry should be to determine whether there was lack of reasonable care and skill on the part of any of the doctors involved in the clinical management of the patient. Other issues will depend on the contents of the complaint and the letter received by the committee from appropriate authority.
2. Any limitations to the enquiry should also be documented. e.g. non-availability of certain document for scrutiny, absence of any party to enquiry etc.
3. All the documents (clinical papers, investigation reports, nurses' notes, operative and anesthesia notes, referral slips, consultation papers, follow up notes, doctors' qualification certificates, statutory compliance of the hospital, copies of relevant pages of various registers maintained in hospital, postmortem report etc) before the committee should be thoroughly scrutinized by the committee members keeping in view the scope of enquiry.
4. The complainant and his witnesses if any should first be heard. Relevant questions should be put to him so as to clear any ambiguity. The whole exercise should be focused towards finding answers to the issues noted down in the scope of enquiry. The copies of any documents submitted by him in support of his allegations should be collected. It should be ensured that all are attested copies of the original document. If the complainant is a female then she should be accompanied by a female attendant.
5. Similarly, the doctor involved should be given a chance to clarify his stand. If there are more than one doctor then each one of them should be called and heard separately. Attested copies of documents submitted in support of their defense should be collected. Any document submitted by any of the parties to the compliant should be initialed by the committee members.
6. A chronology of events of the entire episode leading to complaint should be documented. If there is variance in the chronology as stated by the complainant and as told by the doctors under enquiry, then both should be recorded separately.
7. If there is any doubt as to facts, the reliance should be kept on the documentary evidence and not on the oral version of the parties to the compliant.
8. The 'reasonability' should be determined, as it is one of the important aspects which the court expects from such a committee. So, efforts should be made to determine what is reasonable in this case under consideration.
9. The principles of medical jurisprudence and certain principles laid down by the courts should be remembered while conduct of enquiry. Some of them are:
    a. The law requires that the practitioner must bring to his task a reasonable degree of skill and knowledge, and must exercise a reasonable degree of care. Neither the very highest nor a very low degree of care and competence is necessary.
    b. The law, like medicine, is an inexact science. One cannot predict with certainty an outcome of many cases. It depends on the particular facts and circumstances of the case.
    c. There is a tendency to confuse a reasonable person with an error free person. An error of judgment may or may not be negligent. It depends on the nature of the error.

d. The true test for establishing negligence in diagnosis or treatment on the part of a doctor is whether he has been proved to be guilty of such failure as no doctor of ordinary skill would be guilty of if acting with ordinary care.
e. To fasten liability in criminal proceedings e.g. under Section 304A IPC the degree of negligence has to be higher than the negligence which is enough to fasten liability in civil proceedings. Thus for civil liability it may be enough for the complainant to prove that the doctor did not exercise reasonable care in accordance with the principles mentioned above, but for convicting a doctor in a criminal case, it must also be proved that this negligence was gross amounting to recklessness.
f. Different doctors have different approaches, for instance, some have more radical while some have more conservative approaches. All doctors cannot be fitted into a straight-jacketed formula, and cannot be penalized for departing from that formula.
g. Duties of doctors and rights of patients (professional secrecy, consent etc)
h. The superiority of the doctor should not be abused in any manner.
i. If during surgery, any mishap occurs because of error of judgment, it would be deficiency in service or negligence, if that would not have been committed by a reasonably competent professional man professing the standard and type of skill that a surgeon held out as having.
j. For finding of deficiency in service, motive is not relevant ingredient. Act may be bonafide. But, if it is performed negligently or if any error is committed which the ordinary skilled person would not commit, then it is deficiency in service.

10. The parties to the complaint and the witnesses should be asked to write the statements they have made before the enquiry committee. They should be initialed by the committee members. If possible assistance of a stenographer to type the proceedings in question-answer format should be sought. A copy of the printout of the interrogation given to him for perusal and after corrections if any, he is asked to sign it.
11. Decorum of the enquiry committee should be maintained. No discussion other than the purpose of the committee should be held and entertained. No attempt should be made to educate the parties to the complaint, because it is not the purpose of this committee.
12. In sensitive matters, where there are chances of further allegations, the proceedings of the committee should be video recorded.
13. No unauthorized member should be allowed inside the enquiry committee hall.
14. As far as possible, all the proceedings should be completed on the same day. This is possible if the enquiry is well planned.
15. If any party to the complaint wishes to submit any document at a later date, a dead line and detail of correspondence given to him.
16. All the documents perused by enquiry officer during the course of this enquiry and those submitted by the parties to the enquiry on which the committee wish to base their opinion should be photocopied and retained with the committee.

Visit to the scene of alleged incidence if required

1. If required, a visit to the scene of alleged incidence may be undertaken, depending on the allegations of the complainant.
2. The visit should be so organized, as not to disturb the routine of the hospital.

3. The visit should be pre planned so as to get relevant information on the issues of grievance by the complainant.
4. All the details including the sketches, photographs etc should be obtained.
5. These should be made a part of the report.

Preparing the report and formulation of Opinion

1. The report should contain following pages:
    a. Index page
    b. List of documents perused. This should include:
        i. All the documents submitted to the committee by the authority ordering the enquiry.
        ii. Documents submitted by the parties to the complaint during the enquiry proceedings
        iii. Documents submitted at a later date.
        iv. Any other documents relied on by the committee members for formulating the opinion (postmortem report, CDs, photographs, crime scene report etc.)
    c. List of statements recorded during the enquiry.
    d. Chronology of events
    e. Scope of enquiry
    f. Observations by the committee (This should include the relevant points noted by the committee from the documents on which the opinion is based.)
    g. Report on visit to the scene of alleges incidence
    h. Comments (This should include any other aspect of investigation, which may not be in the scope of enquiry, but which has been noticed by the committee and which is relevant for the courts while deciding on the final issue.)
    i. Opinion (It should be commensurate with the scope of enquiry)
    j. Recommendations (If any)
2. The report should not be delayed, unless for want of any documents promised to be submitted by the parties to complaint. However, if those documents are not received in stipulated time, such a note should be made in the report and opinion be based on available documents.
3. The report should be signed by all members of the enquiry committee, sealed, labeled as 'CONFIDENTIAL' and submitted to the appropriate authority.

Prof. Rajendra S. Bangal

Original Paper:

A STUDY OF WRIST JOINT OSSIFICATION BY RADIOLOGICAL EXAMINATION FOR AGE ESTIMATION IN THE FEMALE POPULATION OF CENTRAL INDIA.

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Original Paper

A STUDY OF WRIST JOINT OSSIFICATION BY RADIOLOGICAL EXAMINATION FOR AGE ESTIMATION IN THE FEMALE POPULATION OF CENTRAL INDIA.

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ABSTRACT:

In the living, age determination is the most important issue to the Courts and to the common citizens as well. Determination of the age of an individual from the appearance and the fusion of the ossification centers is a well accepted fact in the field of Medical and Legal professions. Extensive work of determination of age of the epiphyseal union has been carried out in abroad and different states of India, which revealed difference in the age of epiphyseal union. The difference may be an account of varying Sexual dimorphism, dietetic, geographic, and hereditary and other factors. Keeping in mind that a very less literature is available relevant to the population of this particular region of India present study is being undertaken for academic as well as in judicial interest. Only the indigenous female population of central India was included in this study of age estimation from ossification of bones forming Wrist joint radiologically with standard accepted procedures and guidelines. This study was very much beneficial and yielding as it revealed age specific, bilateral difference of ossification and remarkable difference in age of ossification as compared to the foreign countries and other parts of India. Such studies are recommended with good sample size and at regular intervals for academic as well as in judicial point of view. For correct age estimation in judicial cases X-rays of bilateral sides of relevant joints for particular age should be taken to avoid miscalculation of age and miscarriage of justice.

KEY WORDS: Age, Ossification centers, Wrist joint, roentgen graphically, bilateral difference, less literature.

INTRODUCTION:

Forensic Osteology is the branch of Forensic medicine which deals with the study of the bones. Epiphysis of the bones unites during age periods which are remarkably constant for a particular epiphysis [1]. Epiphysis of the bones unites at the particular age and this is helpful in age determination. In law the crime and punishment is entirely based on criminal responsibility and this in turn depend on the age of a person [2]. Age is helpful in identification of an individual which in turn is helpful in both civil and criminal cases according to Sangma William Bilkey ch. et al [3].It has been also stated that the study of epiphyseal union of bones is considered a reasonable scientific and accepted method for age determination by the law courts all over the world [4]. India is a vast country with diversity in social customs, multiple religions, dietary habits and variations in climatic conditions. In Modi's textbook it is quoted that owing to variation in climatic, dietetic, hereditary and other factors affecting the people of the different states of India, it cannot be reasonably expected to formulate a uniform standard for the determination of the age of the union of epiphyses for the whole of India [5]. According to

Parikh CK Union of epiphysis in cartilaginous bones takes place earlier in the females by about 2 years than in females except in case of skull sutures where obliteration sets in little later and proceeds more slowly in females than in females and under tropical conditions ossification is observed earlier than in temperate areas [6]. According to Iscan M.Yasar and Loth Susan R (1984). Estimation of age from the adult skeleton has been the most difficult part of Human identification studies. Human growth is continuous process which goes through, first a developmental stage and second, the maintenance of status quo. In the developmental stage, changes in skeletal and dental morphology occur in an age –age predictive sequence [7]. Reddy KSN stated that (2009) the bones of human skeleton develop from a number of ossification centers. At eleventh to twelth week of intrauterine life, there are 806 centers of ossification, at birth there are about 450.The adult human skeleton carries only 206 bones [8]. Mehta Homi S (1963) observed that it has been approved by research in our country that the epiphysio-diaphysial union in Indian occurs about a year or two in advance of the age at which that occurs in Europeans[9]. Jit and Balbir Singh revealed that Precocity of epiphyseal union has been attributed to racial and climatic factors. Works in different regions of India-North (Punjab, Delhi and UP), East (Bengal) and South (Madras) have given different ages of fusion of the epiphysis. Further, workers in the same region have also given different ages of fusion of the epiphysis of the same bone and in the same sex. This difference could possibly be due to in adequate material or recording of incorrect ages of the subjects [10].

It was, therefore, decided to reinvestigate the problem in the central part of India by radiological examination, taking care that adequate material was examined and only those subjects investigated whose ages has been recorded with reasonable degree of accuracy.

AIMS OR OBJECTIVES:

Radiological evaluation of the bones forming the Wrist joints (i.e. Lower end of Radius, Lower end of Ulna, Scaphoid, Lunate, Triquetral, Pisiform, Trapezium, Trapezoid, Capitate, and Hamate) was undertaken with the following aims and objectives:

1) To estimate the age from ossification of bones of Wrist joint in relevant Subjects in central India.
2) To assess the age specific difference in ossification of bones of Wrist joint in all subjects.
3) To study the difference in right and left side in ossification of bones of Wrist joint in all subjects.
4) To assess and evaluate the difference in the ossification of bones of Wrist joint in Central part of the India with other part of India on the basis of literature available.
5) To compare the deduced data with previously available data of other countries.

MATERIAL AND METHODS:

Total fifty four female individuals (54) were taken in this study from age ranging from zero to twenty years (0-20) from the period of November. 2009 to October 2011 (2 year).

The female individual chosen for the study were evaluated and confirmed for the confirmed proof of date of birth, physical fitness and their native place of central India Individual involved in study were predominately right handed. A written informed consent and permission from Ethical Committee of the our Institute was obtained

Procedure of radiography

After taking the written consent the thorough physical examination and radiological evaluation was done. Training of Researcher was undertaken to get well acquainted with the all radiological procedures essential for X-Ray examination and developing X-Ray films. X-Rays were taken with the help of X-Ray machine in the Department. Minimum shots were taken to expose the joints involved in study and minimum and appropriate voltage settings of X-Ray machine were applied so as to avoid unnecessary radiation exposure of the subjects to get the desired qualities of X-Rays. The developed X-Ray films were studied and reporting was done with the help of by experienced Radiologist and Anatomist. All the radiological procedure was undertaken according to the present accepted standards.

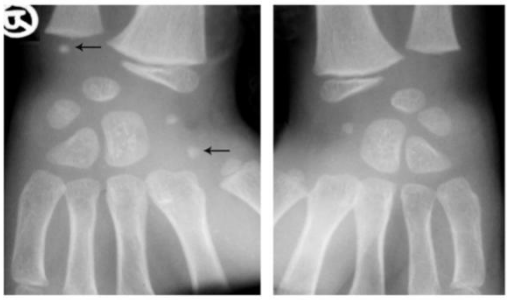
Skeletal maturity was evaluated according to the **Jits** and **Kulkarnis classification** of four stages, **Appearance**, **Non fusion**, **Partial fusion**, **and complete fusion** (abbreviated as **"AP", "NF", "PF", "CF"** respectively)[11].

Nonfusion
X-Rays showing clear gap between the epiphyseal and diaphysial end. The saw tooth like appearance ("NF")

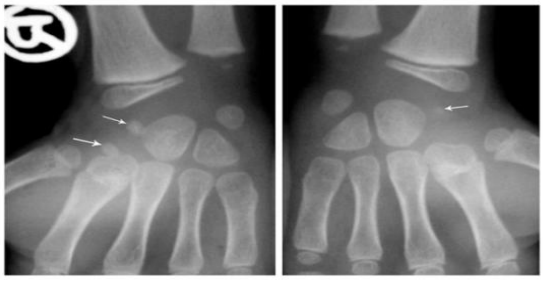
Partial fusion
X-Rays showing a line replacing the hiatus between the epiphyseal and diaphysial ends and not showing saw tooth like appearance ("PF").

Complete fusion
X-Rays showing the same bony architecture in the diaphysis and epiphysis and showing scar of the previous stage have been treated as complete fusion ("CF").The master chart was prepared and tabulated as per code number given above. It was classified, analysed and compared with known standards. Data analysis was done in P4 computer using HPSS software. At the end conclusions were drawn which are compared with available results of various previous studies.

Result



Lower end of ulna and Trapezium appeared Only on right side.



Trapezium appeared Only on righ side. Scaphoid more prominent on right side

Table 1: Ossification of distal End of Radius in females on right and left side.

Age in years	Side	NA	NF	PF	CF	Total
<1-5	R	1(2%)	7(14%)	2(4%)	0(0%)	10(20%)
	L	1(2%)	7(14%)	2(4%)	0(0%)	10(20%)
6-10	R	0(0%)	1(2%)	12(24%)	0(0%)	13(26%)
	L	1(2%)	2(4%)	10(20%)	0(0%)	13(26%)
11-15	R	0(0%)	0(2%)	12(22%)	0(0%)	12(24%)
	L	0(0%)	0(0%)	12(24%)	0(0%)	12(24%)
16-20	R	0(0%)	0(0%)	1(2%)	14(28%)	15(30%)
	L	0(0%)	0(0%)	1(2%)	14(28%)	15(30%)
Total	R	1(2%)	8(16%)	27(54%)	14(28%)	50(100%)
	L	2(4%)	9(18%)	25(50%)	14(28%)	
ϰ2-value	R	105.8				
	L	70.34				
p-value	R	P<0.0001,Significant				
	L	P<0.0001,Significant				

Note: - Figures in parenthesis indicates percentage.

Distal End of Radius was appeared and non fused in 8(16%) subjects in 6-10 age group and completely fused in 14(28%) subjects in 16-20 age group. Distal End of Radius was appeared and non fused in 7(14%) subjects in <1-5 age group and completely fused in 14(28%) subjects in 16-20 age group.

Table 2: Ossification of distal end of Ulna on right and left side in females.

Age in years	Side	NA	NF	PF	CF	Total
<1-5	R	10(20%)	0(0%)	0(0%)	0(0%)	10(20%)
	L	9(18%)	1(2%)	0(0%)	0(0%)	10(20%)
6-10	R	1(2%)	8(16%)	4(8%)	0(0%)	13(26%)
	L	1(2%)	7(14%)	5(10%)	0(0%)	13(26%)
11-15	R	0(0%)	1(2%)	11(22%)	0(0%)	12(24%)
	L	0(0%)	1(2%)	11(22%)	0(0%)	12(24%)
16-20	R	0(0%)	0(0%)	1(2%)	14(28%)	15(30%)
	L	0(0%)	0(0%)	1(2%)	14(28%)	
Total	R	11(22%)	9(18%)	16(32%)	14(28%)	50(100%)
	L	10(20%)	9(18%)	17(34%)	14(28%)	
ϰ2-value	R	63.45				
	L	95.02				
p-value	R	P<0.0001, Significant				
	L	P<0.0001, Significant				

Note: - Figures in parenthesis indicates percentage.

Distal End of Ulna was appeared and non fused in 8(16%) subjects in 6-10 age group and completely fused in 14(28%) subjects in 16-20 age group.Distal End of Ulna was appeared and

non fused in 1(2%) subjects in <1-5 age group and completely fused in 14(28%) subjects in 16-20 age group.

Table 3: Ossification of carpal bones on right and left Side in females.

Age in years	side	Scaphoid	Lunate	Triquetral	Pisiform	Trapezium	Trapezoid	Capitate	Hamate
<1-5	R	1 (2)	5 (10)	8 (16)	0 (0)	1 (2)	0 (0)	9 (18)	9 (18)
	L	0 (0)	4 (8)	8(16)	0 (0)	1 (2)	0 (0)	9 (18)	9 (18)
6-10	R	13 (26)	13 (26)	13 (26)	6 (12)	13 (26)	13 (26)	13 (26)	13 (26)
	L	13 (26)	13 (26)	12 (24)	7 (14)	13 (26)	13 (26)	13 (26)	13 (26)
11-15	R	12 (24)	12 (24)	12 (24)	11 (22)	12 (24)	12 (24)	12 (24)	12 (24)
	L	12 (24)	12 (24)	12 (24)	11 (22)	12 (24)	12 (24)	12 (24)	12 (24)
16-20	R	15 (30)	15 (30)	15 (30)	15 (30)	15 (30)	15 (30)	1 (2)	15 (30)
	L	15 (30)	15 (30)	15 (30)	15 (30)	15 (30)	15 (30)	15 (30)	15 (30)
Total	R	41 (82)	45 (90)	48 (96)	32 (64)	41 (82)	40 (80)	49 (98)	49 (98)
	L	40 (80)	44 (88)	47 (94)	33 (66)	41 (82)	40 (80)	49 (98)	49 (98)
ϰ2-value	R	26.96							
	L	29.35							
p-value	R	0.17,p>0.05 Non-Significant							
	L	0.10,p>0.05 Non-Significant							

Note: - Figures in parenthesis indicates percentage.

Scaphoid, Lunet, Triquetral, Trapezium, capitate, Hamate appeared in 1 (2), 5 (10), 8(16), 1(2), 9(18), 9(18) respectively in <1-5 age group. Pisiform and Trapezoid appeared in 6(12), 13(26) respectively in 6-10 age group. Scaphoid, Lunet, Triquetral, Trapezium, capitate, Hamate appeared in 1 (2), 5 (10), 8(16), 1(2), 9(18), 9(18) respectively in <1-5 age group. Pisiform and Trapezoid appeared in 7(14), 13(26) respectively in 6-10 age group.

<u>Comparison of the findings of the present study with the previous studies</u> (in Yrs and months)

	Galstaun (Bengalis)	**Hepworth (IPunjabi)**	**Nandy Apurba**	**Pillai (Madrasis)**	**Flecker (Australians)**	**Davies & Parsons (Englanders)**	**Present study**
Distal end of radius							
Appearance	1					10-12 month	1-3
Fusion	16.5	16 to 17		14 to 18	18	19 to 20	16-17
Distal end of ulna							
Appearance	8-10					7 to 8	6-8
Fusion	17			14 to 18	17	20	16-17
Triquetral							
Appearance	2-3		3		11/2	2 to 4	3
Lunate							
Appearance	2-3		4			3 to 4	4
Trapezium							
Appearance	5-6		4-5		5	6 to 7	5-6
Trapezoid							
Appearance	5-6		4-5		5	7 to 8	5-6
Scaphoid							
Appearance	6		6		5	6 to 8	5-6
Pisiform							
Appearance	9		9-12	10 to 12	9	12	9-10
Capitate			1				
Appearance	½	1/2		1/2	1/2	1	1
Hamate			1				
Appearance	1 to 14	1/2		6 to	4 to 5	1	1

	mon.			10m	mon.		

DISCUSSION:

Distal end of Radius:

In Bengali female population the centre for distal end of Radius appeared at 1 year and Centre fused with the shaft of the Radius at 0 16.5 year - 1 year later while in the present study it appeared 0-3 year later and fused at similar age nearly on both right and left sides [12].In Englanders it is observed that the distal end of the Radius appears at 10-12 months and unites with the shaft of the Radius at the age of 19-20 year in females whereas in present study the centre for distal end of Radius appeared at 2 months - 2 year later in some cases and fused with the shaft of the Radius 3 – 4 year earlier on both right and left sides[13].In the study on Punjabi Population it is revealed that the distal end of Radius unites with the shaft of the Radius at the age of 16-17 year in females which is correlating with the findings of present study[14].In Australians population it is observed that found that in females the distal end of Radius appears at1 year and unites with the shaft of the Radius 19 years while in present study it appeared 0-2 year later and fused 2-3 years later [15]. Franklin CA in females of Vidarbha region of Maharashtra found that the distal end of Radius fused at 17-18 year which is 1-2 year later than age of fusion appreciated in the present study [16].

Distal end of Ulna:

In study on Bengali female population the appearance of the centre for distal end of Ulna was found at 8-10 year which is 2 year later and fusion at 17 year which is 0-1 year later than age of ossification observed in the present study[12].In study on Englanders it is found that the distal end of Ulna appears at 7-8 year which is 0-1 year later and unites with the shaft of the Ulna at the age of 20 year which is 3-4 year later than age of ossification in present study [13].In observations on Australians population found that in females the distal end of Ulna unites with the shaft of the Ulna at the age of 19 year which is 0-1 year later than age of ossification in present study [15]. Franklin CA in females of Vidarbha region of Maharashtra found that the distal end of Radius fused at 17-18 year which is 1-2 year later than age of fusion appreciated in the present study [16].

Carpal bones:

In study on Australians population it is found that the **Scaphoid** has appeared 5 year which is 0-1 year later on contrarily to the present study [15]. According to Nandy A (2000) Scaphoid has appeared at 5 year which is 0-1 year later than the age of ossification in present study [17]. In Bengali in females population it is found that appearance of **Lunate** at 2-3 years in females which on comparison with the present study it found to be appeared 1 - 2 years earlier [12]. In study on Englanders it is found that the **Triquetral** appears at 2 - 4 years in females but in the present study it is found that the Triquetral had appeared 1 year earlier and later in some cases [13]. On observations in Australians population found that the appearance of **Pisiform** at 9 year in females, on contrary to this findings in present study it is found that appeared 0 - 1 year later [15]. Pillai M.J.S (1936) study done in Madrasis population found Pisiform appeared at 10-

12 years of age in females whereas the age of appearance of Pisiform 1-2 year earlier. [18]. In Bengali population it is found appearance of **Trapezium and Trapezoid** at 5-6 years in females which similar with the findings of the present study [9]. Nandy A (2000) found that Trapezium and Trapezoid appears at 4-5 years in females which is 0-1 year later than findings in the present study [17].Study on Australians population revealed that the appearance of Trapezium and Trapezoid at 5 year in females, on contrary to this findings in present study it is found that in females the Trapezoid and Trapezoid has appeared 0-1 year later [12]. In Bengali population and in Australians population found appearance of **Capitate** at 6 months in females [12] [15], in comparison with these studies in present study Capitate appeared nearly 6 months later. In study on Englanders found that the Capitate appears at 3 - 5 years in females. which is 2 - 4 year earlier than the findings of the present study[13].In study on Australians population it is found that the appearance of **Hamate** at 4-5 months in females, on contrary to this findings in present study it is found that the Hamate has appeared 7-8 months later in females [15]. According to Nandy A (2000) Hamate appears at 1st years in females which is correlating with the observation of present the study [17].

SUMMARY AND CONCLUSIONS

1. This study was conducted exclusively on the young female indigenous population of Central India keeping in mind that very less literature about the age estimation from ossification of Wrist joint on right and left side is available involving this particular region of India.
2. The ossification at the Wrist joint in females on right and left side is completed in all instances (100) at the age 17-18 year respectively.
3. The remarkable difference in the time of appearance of various ossification centers is observed on right side. Ossification was appreciated earlier on right side than left side in most of the cases. Contributing factors for this bilateral difference are not studied in this study, however right handedness in most of the subjects for earlier ossification in them cannot be denied taking into consideration the available literature.
4. By comparing the available literature the age of skeletal maturity in females in this region is nearly similar to those in state of Punjab.
5. By comparing the available literature ossification center appear and fuse one to two years earlier in this study with population of Central India than those in Australia and England.
6. As this study is done in Central India region the application of standards of this study can be considered ideal for application in the region of Central India.
7. As the sample size is limited further studies are necessary. Region wise studies should be conducted for better correlation and comparison.
8. Due to changing life style pattern, dietary, climatic, behavioral factors age of ossification is changing as mentioned in the available literature. So as to evaluate these changes, studies are recommended in every region of India at regular time period for academic and Judicial interest.
9. For correct age estimation in judicial cases X-rays of bilateral sides of relevant joints for particular age should be taken to avoid miscalculation of age and miscarriage of justice.
10. Along with the clinical and dental examination, radiological study plays an import role to arrive at the opinion about the age in medicolegal cases.
11. The opinion about age should be given always in the range. From this study range of 1-2 years of margin of error can be concluded.

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AGE DETERMINATION FROM HEAD OF FEMUR: A RADIOLOGICAL STUDY IN MUMBAI REGION

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Original Paper

AGE DETERMINATION FROM HEAD OF FEMUR: A RADIOLOGICAL STUDY IN MUMBAI REGION

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ABSTRACT:

The bones of human skeletons develop from separate ossification centers. From these centers ossification progresses till the bone is completely formed. These changes can be studied by means of X-rays and these changes are age related. It is therefore possible to determine the approximate age of an individual by radiological examination of bones till ossification is complete.

This radiological study was carried out with the objective to assess the general skeletal maturity around head of femur, of subjects in Mumbai region. 99 males between age group of 9-24 years and 76 females between age group of 3-23 years attending the outpatient department of this hospital were selected. Age confirmed from history and noting the birth dates from documentary evidence like driving license, passport, rations card or voter's card. The cases were selected after ruling out the nutritional, developmental, and endocrinal abnormality which affects the skeletal growth. Data analysis was done in P4 computer using HPSS software. At the end conclusions were drawn which are compared with available results of various previous studies

KEY WORDS: epiphyseal fusion, ossification centres, x-rays.

INTRODUCTION:

Determination of the age of an individual from the appearance and the fusion of the ossification centers is a well accepted fact in the field of medical and legal professions. Epiphysis of bones unites during age periods which are remarkably constant for a particular epiphysis. The determination of age presents a task of considerable importance from the view-point of the administration of justice. It is not possible to enunciate a hard and fast rule for age determination from this union for the whole India because the various geographical areas of our country differ in climatic, dietetic and disease factors which affect skeletal growth. The present study was carried out to study roentgenographically the epiphyseal fusion of head of femur in subjects between age group of 3 to 24 years attending outpatient department of this hospital.

AIMS AND OBJECTIVES:

[1] To assess the skeletal maturity of head of femur for a known chronological age in subjects of Mumbai region.
[2] Comparative study of fusion of head of femur with known standards
[3] To evaluate sex related variation & its correlation with age.
[4] To know variation if any & exception of fusion of head of femur.
[5] To evaluate the medico legal aspects of different ages.
[6] To suggest any additional radiological investigation to aid and to reduce range in determining age.

MATERIAL AND METHODS:

The study was carried out in Grant Medical College and Sir J. J. Group of Hospitals Mumbai which is a tertiary referral centre. The objective was to assess the general skeletal maturity of head of femur in subjects in Mumbai region. 99

males between age group of 9-24 years and 76 females between age group of 3-23 years attending the outpatient are selected. Age confirmed from history and noting the birth dates from documentary evidence like driving license, passports, ration card or voter's card. The cases were selected after ruling out the nutritional, developmental, and endocrinal abnormality which affects the skeletal growth. X-rays of head of femur were taken at department of radiology. The epiphysis of head of femur was observed for different phases of fusion. These phases were graded according to Dr. William Sangma et al and Mckern and Stewart's methods. The 5 stages were as fallows

Stage 1 (F1): Non union – when the epiphyseal cartilage did not begin to decrease in thickness

Stage 2(F2): Commence of union – when the thickness of epiphyseal cartilage was found to be reduced appreciably ($1/4^{th}$ united)

Stage 3(F3): Incomplete union – when the epiphysis has begun to fuse with shaft and complete union was well underway (1/2 united)

Stage 4(F4): Complete union – when the epiphyseal cartilage was bony in architecture and its density indistinguishable from the epiphysis and diaphysis in its neighbourhood but an epiphyseal line called epiphyseal scar could still be distinguished. (3/4 united)

Stage 5(F5): Complete union – with absence of epiphyseal scar.

The fusion of head of femur was evaluated rediologicaly and the results were compared with the previous known standard studies

RESULTS & OBSERVETIONS:

Table No. 1 shows in males,

F2 stage of fusion was seen in 3 cases (23.1%) at 9 – 10 years age group, in 4 cases (30.8%) at 10 – 11 years age group, in 2 cases (15.4%) at 11 – 12 years age group, in 3 cases (23.1%) at 12 – 13 years age group and in 1 case (7.7%) in 13-14 years age group.

F3 stage of fusion was seen in 1 case each (10%) between 10-11, 11-12, 12-13 years age group, in 4 cases (40%) at 13 – 14 years age group and in 3 case (30%) at 14 – 15 years age group.

F4 stage of fusion was seen in 1 case (6.3%) at 14- 15 years age group, in 8 cases (50%) at 15 – 16 years age group, in 4 cases (25%) at 16 – 17 years age group and in 3 cases (18.7%) at 17 – 18 years age group.

Complete fusion (F5) was seen in 3 cases (5%) at 16 - 17 years age group, in 6 cases (10%) at 17 – 18 years age group, in 12 cases (10%) at 18 – 19 years age group and in 39 cases (65%) between 24 – 25 years age group.

Table No. 2 shows in females

F1 stage of fusion was seen in 9 cases (90%) between 3 – 6 years age group and in 1 case (10%) at 6 – 7 years age group.

F2 stage of fusion was seen in 1 case each (25%) between 7 – 8, 8 – 9, 9 – 10, 10 - 11 years age group.

F3 stage of fusion was seen in 1 case each (11.1%) between 9 – 10, 10 – 11 and 13 - 14 years age group, in 4 cases (44.4%) at 11 – 12 years age group, in 2 cases (22.2%) at 12 – 13 years age group.

F4 stage of fusion was seen in 1 case each (11.1%) between 11 - 12 and 12 – 13 years age group, in 2 cases each (22.2%) between 13 – 14 and 15 - 16 years age group and in 3 cases (33.3%) at 14 – 15 years age group.

Complete fusion (F5) was seen in 1 cases (2.3%) at 14 - 15 years age group, in 4 cases (9.1%) at 15 – 16 years age group, in 6 cases (13.7%) at 16 – 17 years age group and in 33 cases (74.9%) between 17 – 23 years age group.

DISCUSSION

In present study males show complete epiphyseal union (F5 stage) after 16 years of age so the complete union of epiphysis of head of femur in males occurs between 16 - 18 years age group and earliest union was seen at 16 - 17 years of age.

Females show epiphysis of femur shows complete union (F5 stage) after 14 years of age so we can say that complete union in females occurs at 14 - 16 years age group and earliest union was seen at 14 - 15 years age group.

The present study findings are close to Flecker, Galstaun, B. D. Chaurassia, Parikh, Hepworth, Krishan Vij, Pillai and Apurba Nandy. [1, 2, 5, 6, 7, 8, 10, 11]

CONCLUSIONS

The fusion of Head of femur is very important because it fuses around 16 – 18 years age group which is a tender age and it has vast medico legal importance for example in sexual assault, in child labor, in juvenile cases. It will be useful to determine the age in this age group.

From the present study it can be concluded, that epiphysis of head of femur fuses at 16 – 18 years in males and at 14 – 16 years in females. Earliest union occurs at 16 - 17 years in males and at 14 - 15 years in females. The present study findings are tandem with study carried out by Galstaun, B. D. Chaurassia, Parikh, Hepworth, Krishan Vij, Pillai and Apurba Nandy as all these studies are carried out in India.

RECOMMONDATIONS

[1] More sample size should be taken for more accurate results.

[2] Such type of studies should be done from different geographical regions of country and the comparison should be done for more accurate results.

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Table – 1: Incidence and extent of fusion of head of femur in different age groups in males (in years)

Extent of fusion	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-24	Total
	Cases (%)	Cases (%)	Cases (%)	Cases (%)	Cases (%)	Cases (%)	Cases (%)	Cases (%)	Cases (%)	Cases (%)	Cases (%)	Cases (%)
F2	3 (23.1)	4 (30.8)	2 (15.4)	3 (23.1)	1 (7.7)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	13 (100)
F3	0 (0)	1 (10)	1 (10)	1 (10)	4 (40)	3 (30)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	10 (100)
F4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (6.3)	8 (50)	4 (25)	3 (18.7)	0 (0)	0 (0)	16 (100)
F5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (5)	6 (10)	12 (20)	39 (65)	60 (100)

Table – 2: Incidence and extent of fusion of head of femur in different age groups in females (in years)

Extent of fusion	3-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-23	Total
	cases (%)	cases (%)	cases (%)	cases (%)	cases (%)	cases (%)	cases (%)	cases (%)	cases (%)	cases (%)	cases (%)	cases (%)	cases (%)	Cases (%)
F1	9 (90)	1 (10)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	10 (100)
F2	0 (0)	0 (0)	1 (25)	1 (25)	1 (25)	1 (25)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (100)
F3	0 (0)	0 (0)	0 (0)	0 (0)	1 (11.1)	1 (11.1)	4 (44.4)	2 (22.2)	1 (11.1)	0 (0)	0 (0)	0 (0)	0 (0)	9 (100)
F4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (11.1)	1 (11.1)	2 (22.2)	3 (33.3)	2 (22.2)	0 (0)	0 (0)	9 (100)
F5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2.3)	4 (9.1)	6 (13.7)	33 (74.9)	44 (100)

Table – 3: comparison of time of fusion (in years)

Author	Year	race	Sex			Earliest Union (Yrs) Male/female
			Males Fusion	Females Fusion	Mixed	
Davies & Parson	1927	English	-----	----	19 - 20	---------
Flecker	1932	Australians	17	14	----	---------
Galstaun	1937	Bengalis (Indians)	16 - 19	14 - 15	----	----------
Hepworth		Panjabi's (Indians)	----	----	$15^{1/2}$-17	----------
Chaurassia	1980	Indian	----	----	17 - 18	----------
Parikh	1990	Indian	----	----	16 - 18	----------
Basu & Basu		Bengalis (Indians)	----	13 - 14	----	----------
Krishnan Vij	2001	Indian	----	----	17 - 18	----------
Pillai		Madrasis (Indians)	----	----	14 - 15	----------
Apurba Nandy	1995	Indians	16 - 17	14 - 15	----	----------
Present study	2010	Mumbai (Indian)	16 - 18	14 - 16	----	Male-16-17 Female-14-15

Original Paper

RETROSPECTIVE STUDY OF PATTERN OF MECHANICAL INJURIES AMONGST VICTIMS OF ASSAULT AT PRAVARA RURAL HOSPITAL, LONI.

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Original Paper

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ABSTRACT:

Any harm whatever illegally caused to any person over his body, mind, property or reputation is labeled as injury, as per Indian law. In India, all injuries cases are treated as medico-legal cases, in casualty departments and casualty medical officers asked by the law enforcement agency to give opinion in terms of nature of injuries, age of injuries, type of weapon used etc.

In this study we retrospectively collected the data at Pravara Rural Hospital of Rural Medical College, Loni of one year, from 01.08.2007 to 31.07.2008 those reported as a case of assault.

In our study it was found that most common (80%) victims were male, the majority (78.76%) of the victims belongs to the age group of 17 – 45 years. As the time day increases the cases of assault were also raising the maximum number (53.33%) of cases were found during the 16.01 – 24.00 hrs. During the sowing season of this country, 50% of the cases of assault were reported. Hard & blunt was the most common weapon used and head & neck was the most common site of injuries amongst assault victims.

INTRODUCTION:

Injury is recognized as a major health problem as well as a leading cause of death and disability globally [1, 2]. In India, the medical profession has taken its time in addressing assault related trauma as a public health problem [3]. These patients are usually attended in casualty by medical officer; apart from treatment the evaluation of any tissue injury, is essential component of forensic practice [4].

Law enforcement agencies rely on scientific investigation to a constantly growing extent. Objectivity, reliability and completeness are the hallmarks of scientific evidence for it to be acceptable in court of law [5]. The interpretation of injuries may have significant medico-legal consequences [6], with regard to identification of suspect as perpetrator of crime, correlation between history of the case, age of wound, weapon used etc [7].

As per Indian law, injury defined under section 44 of Indian Penal code (IPC) as "any harm whatever illegally caused to any person body, mind, reputation or property" [8]. It is very broadly classified by Indian law but medical professionals only able to comment on physical consequences as a result of injury over the body of victim.

Interpretations of injuries for the purpose of addressing various medicolegal questions are very important part of any physical examination of victim of assault.

As there was relative paucity of information regarding patterns of injuries sustained during physical assault particularly from rural India, hence the present study was undertaken to find out the various epidemiological aspects of mechanical injury at a rural tertiary care hospital of western Maharashtra, India.

MATERIAL & METHODS:

This was a hospital based retrospective study conducted at Pravara Rural Hospital associated teaching hospital of Rural Medical College, Loni. It is tertiary care unit located

at Ahmednagar district, Maharashtra. The main drain of patient to this hospital is from the nearby rural places and the adjoining districts of Nashik, Aurangabad and others.

The data for study was collected for the period of one year, from 01.08.2007 to 31.07.2008. For conducting this study prior ethical approval has been taken from the Ethical committee of Pravara Institute of Medical Sciences.

The data was obtained from medico-legal register of Casualty and clinical case file record of the patient. Only antemortem cases of assault victims were taken for the study. All patients with mechanical injuries were included. Patient those having thermal, chemical and other type of injuries were excluded from the study.

RESULTS:

During the study period total 878 medico-legal cases were registered out of which 90 cases were of alleged assault that accounts for 9.75%. Males were four times more affected in comparison with females (Table-1). Majority (78.76%) of the victims were in age group between 17-45 years (Table-2).

Table No. 01: Gender and Marital status wise distribution of cases:

Gender	Marital Status		Total No. (%)
	Unmarried No. (%)	Married No. (%)	
Male	20 (22.22)	52 (57.77)	72 (80)
Female	02 (2.22)	16 (17.77)	18 (20)
Total No. (%)	22 (24.44)	68 (75.55)	90 (100)

Table No. 02: Age group wise distribution of cases:

Age group (yrs)	No. of cases	Percent
1 – 10	02	02.22
11 – 16	02	02.22
17 – 25	23	25.55
26 – 35	26	28.88
36 – 45	21	23.33
46 – 55	09	10.00
50 – 60	01	01.11
Above 60	06	06.66
Total	90	100

As for the time of assault was concerned maximum (53.33%) cases were reported at the end of day it may be due to the fact that individuals were more exhausted and irritable as day passes (Fig-1). Almost 50% of the cases were reported during the month of June to August, this may be attributed to sowing season in rural areas, in which more work related disputes were found with special reference to agriculture sector (Fig-2).

Fig 1: Time of assault wise distribution of cases:

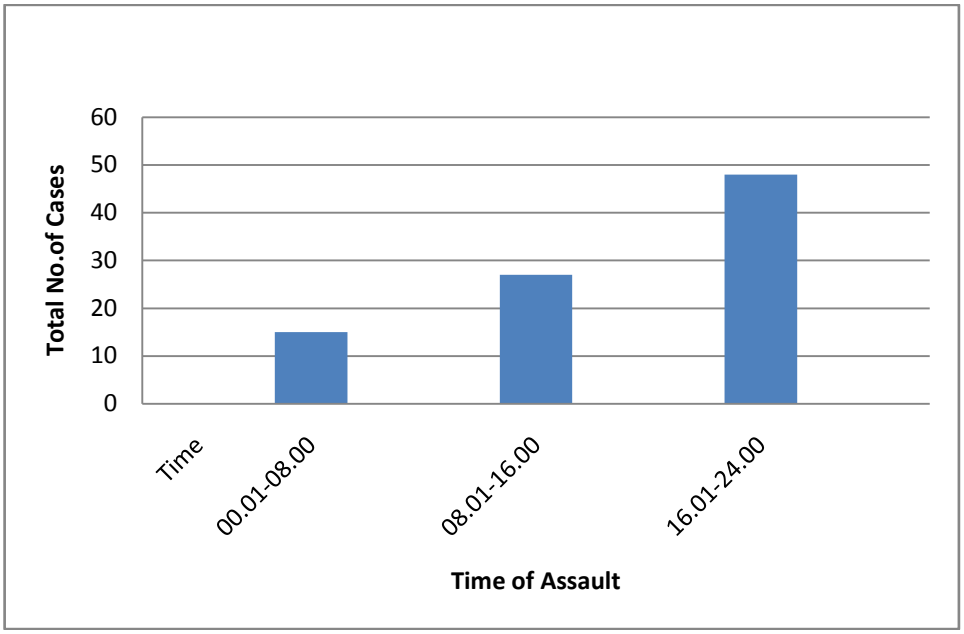

Figure 1

Fig 2: Seasonal Variation of assault cases:

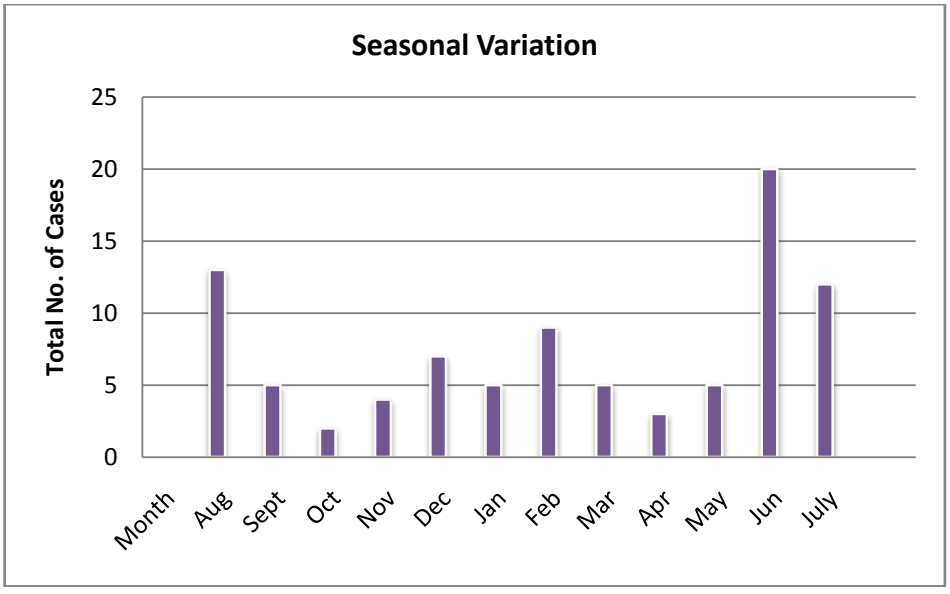

Figure 2

In our study injuries were classified as simple or grievous as per Section 320 of Indian Penal Code[8] .The majority (64.44%) of the injuries in our study were simple in nature. The commonest weapons involved were stick and stone that accounts for 37.77% and 35.55% respectively (Table-3). The total numbers of injuries were more than the total number of cases involved in this study. The ratio of injuries per case was 2.42:1. The majority of the injuries in our study were in the head & neck and upper extremity that accounts to 90 and 48 cases (Table 4).

Table No. 03: Type of weapon and Kind of injury wise distribution of cases:

Kind of injury	Type of Weapon							Total No. (%)
	Stone	Stick	Fist	Rod	Rope	Sharp	Firearm	
Simple No. (%)	22 (24.44)	17 (18.88)	12 (12.33)	04 (4.44)	02 (2.22)	01 (1.11)	00	58 (64.44)
Grievous No. (%)	10 (11.11)	17 (18.88)	01 (1.11)	01 (1.11)	00	02 (2.22)	01 (1.11)	32 (35.55)
Total No. (%)	32 (35.55)	34 (37.77)	13 (13.44)	05 (5.55)	02 (2.22)	03 (3.33)	01 (1.11)	90 (100)

Table No. 04: Relation between type of injury and region of body involved:

Body region	Nature of Injury						Total
	Abrasion	Bruise	Laceration	Fracture	Incised wound	Stab wound	
Head & Neck	12	25	34	14	05	00	90
Anterior Trunk	04	07	00	02	01	02	16
Posterior Trunk	08	11	02	02	03	01	27
Upper extremity	13	18	04	12	01	00	48
Lower extremity	09	14	05	05	04	00	37
Total	46	75	45	35	14	03	218

DISCUSSION:

As per section 351 of Indian penal code assault has been defined as 'whoever makes any gesture or any preparation intending or knowing it to be likely that such gesture or preparation will cause any person present to apprehend that he who makes that gesture or preparation about to use criminal force to that person is said to commit an assault.' [(8)] Medical officer play crucial role in administration of justice with appropriate interpretation of injuries which is correctly documented.

Data of one year suggest that assault victims were only 9.75% of total medico-legal cases reported to casualty. Number of cases may be much more higher as all victims not come for treatment to hospitals and cases identified by only history which was documented, due to some force or apprehension of assailants may be wrongly given by patient

Males were four times more affected in comparison with females. The reason for predominance was due to more exposure to environment and more aggressive behavior. Majority (78.76%) of the victims were in age group between 17-45 years. It might be due to they commonly involved in family dispute and other arguments.

As for the time of assault was concerned maximum (53.33%) cases were reported at the end of day it may be due to the fact that individuals were more exhausted and

irritable as day passes. Almost 50% of the cases were reported during the month of June to August, this may be attributed to sowing season in rural areas, in which more work related disputes were found with special reference to agriculture sector.

In our study injuries were classified as simple or grievous as per Section 320 of Indian Penal Code[8] .The majority (64.44%) of the injuries in our study were simple in nature. The commonest weapons involved were stick and stone that accounts for 37.77% and 35.55% respectively. This may be due to easy availability of these weapon in the vicinity where the incidence taken place. [9, 10] Only one case has been found due to firearm, it was due to unavailability and strict legislation.

The total numbers of injuries were more than the total number of cases involved in this study, which clearly indicate the multiplicity of the injuries and it indicative of a high emotional status of the mind. [10] The ratio of injuries per case was 2.42:1. In cases of multiple injuries, there were possibility of it was of different duration in that circumstances guarded opinion should be given because it is not possible to give the exact duration of injuries in all cases. [9] The majority of the injuries in our study were in the head & neck and upper extremity that accounts to 90 and 48 cases. Other researchers also show same distribution of lesions according to body area involved.[11-14] As far as head & neck is concerned it may be due to intention of the person to cause maximum physical harm to the victim by the assailant and easy accessibility of these parts of the body.[15] Upper extremity might be as consequences of defense offered by the victim.[10] As far as type of injuries were in concerned bruise, abrasion and laceration were common and in accordance withn study conducted by Faergemann C et al.[11]

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Original Paper

ASSOCIATION OF INTOXICATION IN DATE RAPE VICTIMS- A STUDY OF VICTIMS OF SEXUAL ASSAULT.

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Original Paper

ASSOCIATION OF INTOXICATION IN DATE RAPE VICTIMS- A STUDY OF VICTIMS OF SEXUAL ASSAULT.

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ABSTRACT

Acquaintance sexual assault is non consensual sexual behavior between adults who know each other [9]. It is commonly seen among college student, peer group teenagers.The definition of Date Rape is not absolute. When someone force to have sexual intercourse by any means usually under influence of intoxication on particular occasion; on particular day may be referred as date rape. The victims of sexual assault when examined may reveal the history of intoxicant abuse. The detail history & clinical examination may through light on incidence of date rape. This study consists of examination of victims of sexual assault during period of one year in govt. hospital. The cases studied in detail and result indicates that out of 232 victims of sexual assault studied 22 cases were suspected of Date Rape. Date rape is common in teenagers intoxicated with different types of drugs.

KEYWORDS: date rape, sexual assault, intoxication

INTRODUCTION:

The definition of the terms not absolute when someone is forced to have sexual intercourse by any means, usually under effect of intoxication, on a particular occasion of get-together on a particular day may be referred as date rape.

Since ages rape has been one of the many 'Conscious processes of intimidation by which men keep women under a state of fear' [1]. It is "Not an act of sex, but an act of violence, with sex as the primary weapon [5]. WHO report on "VOILENCE & HEALTH" One in four women worldwide experience sexual violence, one in three adolescent girls report their first sexual experience as being forced. There is one rape in every 29 minutes, one act of sexual harassment every 53 minutes, and one act of molestation every 15 minutes.

According to NATIONAL CRIME RECORD BUREAU REPORT Total numbers of cases in 2005 were 18348, & in 2009 were 21647. Bihar & Delhi reported heights incidence of sexual assault [10].

In our study we found that many date rape victims was intoxicated with different types of drugs. The indiscriminate use of intoxicant was not uncommon in sexual assault victim. These drugs can be used to assist in the commission of a sexual assault (Date-rape). Date rape drugs commonly have sedative, hypnotic, dissocialize / amnesiac effect & when used to facilitate rape, are often added to food or drink without victims knowledge. These drugs producing Hallucinations, lost sense of time and identity, Agitation, aggressive or violent behavior, Convulsions, Loss of consciousness, Loss of coordination Potentially fatal respiratory failure.

Sexual assault victims are either voluntarily approaches to medical examination or referred by investigating police authority or near relatives. To obtain history and to illicit the possible events before, during & after the incidence is matter of skill which is of great importance to correlate the events & facts. The possibility of date rape cases ascertained from among the sexual assault victim from proper history & meticulous clinical examination.

An attempt is made to evaluate the date rape occurs which are examined in a Govt. Hospital in Mumbai region & the conclusion are withdrawn from the study. Create comprehensive data of date rape cases occurring in Mumbai region.

AIMS & OBJECTIVES:

1) To know the percentage of date rape cases among the total no. of cases of sexual assault referred for medical examination.
2) To study the percentage of age groups.
3) To know the occasions of incidence.
4) To know the literacy & socioeconomic status of victim.
5) To study the patterns of genital injuries of victims.
6) To study the type of drug/intoxicant abused

MATERIAL & METHOD:

Study carried out at Police Hospital Nagpada & sir J. J. Hospital where victims of sexual assault are brought for examination. Victims of sexual assault which offered medical examination by investigating authority were studied. The detail history was obtained by document produced by investigating police interviewing the victim, relatives of victim & also from accompanying person & police. The special intension is given to obtain history with regards to the relationship with accused/assailant, date, time, place of incident, types of beverages taken & the level of intoxication & whatever the victim had consumed or aware of the act. Total no. of cases of victims studied were 232, which were brought for the medico legal examination. The study was carried out from Jan. 2011 – Dec.2011 for the period of one year. The study analysis is done with the help of Microsoft excl and percentage analysis.

OBSERVATIONS & RESULTS:

It is clear from table no.1 that: Out of 232 cases after taking detail history 10% cases (22) were suspected date rape. It is clear from table no.2 that: Maximum affected age group was 16-18 years (46%), 14-16 (22%), 8% each between (18-19, 19-20), in between 21-22 years (12%), 20-21 (4%). It is clear from table no.3 that: 48% girls from junior college were affected. It is clear from table no.4 that: Occasion of incidence- Maximum incidence had occurred between paired of couple know to each other during gate together party (28%) followed by dating of couple (23%) of which pair familiar to each other. 16% incidence occur during picnic, 8% during birthday party & 23 % in other events. It is clear from table no.5 that: Genitals injuries congestion of labia observed in 19 cases (86%). Fresh tear of hymen due to defloration were observed in 12 cases (54%), victim was experienced genital sexual intercourse for the first time in 04 cases (16%), hymen was intact where penile introduction in the genital was not occurred due to vaginasmus & or immature ejaculation before actual penetration, in 3% cases rectal & perennial injuries were seen. In drug analysis of victim 6 cases were found positive for alcohol & benzodiazepine, 4 cases were found positive for both. 1 case found to be positive for cannabis & 235 of the cases of drug analysis were negative.

DISCUSSION:

The term date is not defined exactly neither it has specific reference in Indian penal code. The case is lodged under IPC 375 [6] however it is important to know the cause of the crime in victim of sexual assault. Some of the incidence occurred in which the assailant/accused may suffering from psychiatry disorder & in some incidences force is applied against victim when she is not consented [7]. All the cases of date rape were noticed that victim & the accused knew each other had healthy relation [2]. The incidence had occurred in all the cases during social gate together, dating the partners. History had played important role to obtain information where taking the patient in confident & sympathic attitude of examiner played an important role in date rape cases.

Intoxicants were used are alcoholic & benzodiazepine. Vulnerable age group between 16-18 year which is teenager age group. 16% date rape victims had experienced sexual intercourse for the first time that shows recent tear of hymen. Extra genital trauma occurs in 20-50 % cases of sexual assault [3]. These caused by rough handling, manual squeezing & manipulation especially over nipple, chest wall, thighs [4, 8]. Most of the victims are college going students. The incidence had occurred unexpectedly &due to casual attitude for self precaution. During the celebration of event was the underlined cause & this can be avoided by taking simple feasible precautions.

Preventive strategies:-Don't accept open drinks (alcoholic or non-alcoholic) from others who you do not know or do not trust; this includes drinks that come in a glass. When in bars or clubs always get your drink directly from the bartender and do not take your eyes off the bartender or your order; don't use the waitress or let somebody go to the bar for you. At parties, only accept drinks in close containers: bottles, cans or tetra packs. Taking the patient in the confidence for obtaining history & examination is of immense value.

CONCLUSION:-

Among the cases of sexual assault victims of date rape were 10% most of them were teenagers. Two cases were aware of intoxicants (Alcohol-Vodka consumption). In most of the victims 22% cases were found positive for alcohol & benzodiazepine. Most of the accused were known to the female victims. Proper detail history & meticulous examination in case of sexual assault can reveal date rape cases [11]. Most of the victims suffer from psychiatric problem as a consequence of sexual assault in 70% of cases rape gives rise to traumatic events. Date rape can be avoided by taking common measure of protection.

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OBSERVATION:

Table 1: number of suspected cases out of total cases studied.

Duration	Period	Total no. of cases	Suspected date rape cases
1 year	Jan 2011- Dec. 2011	232	22
%	1 Year	100%	10%

10% of cases of date rape were suspected.

Table 2: Age group involved in study

Age Group	No. Of cases	%
14-16	05	22%
16-18	09	46%
18-19	02	08%
19-20	02	08%
20-21	01	04%
21-22	03	12%

Maximum affected age group was 16-18 years (46%)

Table 3: Educational level of the study population

Educational Level	No. Of Cases	%
Secondary	05	22
Jr. College	10	48
Sr. College	04	20
Uneducated	03	10
Total No. Of Cases	22	100

48% girls from junior college were affected.

Table 4: Occasions associated with Date rape incidence.

Birthday party	02	08%
Friends gate together (peer group)	06	28%
Dating of couple	05	23%
Picnic	04	16%
Other events	05	23%
Total no. of cases	**22**	**100%**

Friends gate together followed by dating with couple are common. In all cases accused was single.

Table 5: Clinical findings in victims.

Findings	No. Of Cases
Congestion Of labia	19
Recent tear of hymen	12
Old tear	03
Intact hymen	04
Rectal injury	01
Perineal Injury	01

Cases with of congestion of labia are 86%

DRUG ANALYSIS REVIEW:-

Alcoholic – 06 Cases, Benzodiazepine – 06 Cases, Cannabis – 01 Case,
Alcohol + Benzodiazepine – 04 Cases.
23% of cases of drug analysis were negative
Type of Benzodiazepine derivative cannot be specified.

Review Article

FUTURE OF AUTOPSY

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Review Article

FUTURE OF AUTOPSY

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An autopsy is a remarkably important exercise in the field of medicine and positively in Forensic Medicine.

Autopsy means self examination. (Auto – self, Opsy – examination) There are two types of autopsies- a) Clinical or pathological autopsy and b) Medico legal autopsy. The basic difference between these two autopsies is, the first one needs consent of the relatives of deceased while the latter does not. The clinical autopsy can be "partial" i.e. confined to only some organ or system of the body while the medico legal autopsy is always complete and thorough. Moreover the primary objective of clinical autopsy is to ascertain the cause of death while in medico legal autopsy in addition to this, time since death, mode of death and identity of the deceased is also opined about.

The term medico legal postmortem is often used in Forensic medicine for medico legal autopsy while it is only "post mortem" for lay people. This post mortem work has always been a subject of much debate and even mental agony to many. But its usefulness to law, society and medicine is unquestioned. The role played by autopsy for different people or agencies has evolved with time and will continue to do so even in future. This role can be summarized as under - [1]

1) For family e.g. stillborn, SIDS cases. It is helpful in allaying the underlying guilt of parents, as also to 'counsel' the parents.
2) For layman e.g. infectious diseases.
3) For law enforcement agency e.g. suspicious deaths.

4) For primary care physician e.g. cause of death in undiagnosed cases. Clinicians also need autopsy to 'clarify and correct diagnosis', to guide them in discovery of new diseases, improvement in surgery etc.
5) For surgical staff e.g. operative deaths.
6) For hospital administration e.g. incidence of deaths in hospitals
7) For government e.g. epidemics. The industrialization has added new dimensions to autopsy i.e. to investigate work related and environmental and industrial pollution related deaths.
8) For research e.g. it provides facts and accurate, unbiased data upon which medical statistics could be founded. It also provides critical data that can and do bring about immediate changes. It also forms basis of quality control and discovery of new diseases.
9) For medical student e.g. teaching.
10) For society e.g. organ donation.

Due to various reasons like availability of recent non invasive techniques for diagnosis and scare against contracting HIV infection etc the number of pathological autopsies is dramatically going down. But the rate of medico legal autopsies is continuously rising year after year due to increase in crime, violence, accidents etc. [2]

The 'past' of conventional autopsy is glorious, the 'present' shaky and the 'future' uncertain. As majority of the readers are aware of the past and the present scenario of autopsy, we are trying to peep into the future of autopsy in this article. This discussion pertains to both clinical and medico legal autopsies with more tilt to latter as we belong to this branch.

The medico legal post mortem work has been largely neglected by the government, the society and also by the people concerned with it. In addition to routine work the forensic man has to perform certain special cases like dowry deaths, operative and post operative deaths, custody deaths, HIV related deaths etc. The conventional procedure and the protocol to be followed in routine cases have been modified while conducting such special cases. This process of changes in procedure and protocol is ongoing and will continue to get evolved further in future. Some examples would make this point more clear e.g. forming panel of doctors preferably with one pathologist, video shooting of custody death post mortem cases, more frequent and meticulous histopathological examination of tissues etc. "Defence autopsy" – a practice prevalent in western countries where the defence lawyer and a forensic expert representing the accused are present at the time of autopsy, though this is not presently practised in India, in future the forensic man will have to gear up for such changes.

As we know medicine is a progressive science. The recent advances in medicine have also helped to improve the technique and scientific accuracy of autopsy with less or minimum mutilation of dead body. Because of personal, religious or cultural objections to the autopsy by dissection, as also objections to performing a full autopsy where there is hazard of infection; some institutions are evaluating "limited" or so called

"non invasive" autopsies. In future, autopsies might be targeted to specific questions and limited to those organs expected to provide answers to relevant questions. A brief discussion of "limited" autopsies –

1. NEEDLE AUTOPSIES

The first detailed description of autopsy by needle sampling is that of Terry in 1955. Terry modified an instrument used for liver biopsy for his study. According to him most major organs can be sampled, including the brain. The brain may be approached through foramen magnum. Later on studies by West and Chonet, Wellman showed that needle autopsy was inadequate substitute for conventional autopsy, but still valuable when consent for full autopsy is not forthcoming (not applicable in medico legal autopsy). Needle autopsies may be done in high-risk cases like HIV. Needle biopsies may miss conditions like pulmonary embolism, pseudo membranous colitis, myocardial infarction and a host of malignant tumors.

There is no gross information other than from the external examination of the body. The technique may enable the relatives to agree to less disfiguring way of autopsy investigation. The most recent published study reports that a clinical diagnosis could be given in 67% of needle autopsy cases (Huston et al 1996).[2, 3]

2. ULTRASONOGRAPHIC AUTOPSY/ ECHOPSY

Sampling of needle cores is guided by conventional ultrasound imaging. Out of 100 cases there was diagnostic concordance between the echopsy and full autopsy in 83. Lesions missed were pulmonary thromboembolism, various diseases of cardiac valves and small malignant tumors. [2]

3. ENDOSCOPIC AUTOPSY

In 1995 a study on endoscopic autopsy was published by Avrahami et al (1995) from Israel. Most of these cases were victims of trauma. There was correlation between usual autopsy and endoscopic autopsy. But it missed pulmonary thromboembolism, myocardial infarction and pulmonary aspiration. These studies do not mention about utility of endoscopic autopsy in non-traumatic cases.

Endoscopic autopsy requires insufflations of gas, as in conventional laparoscopy and thoracoscopy, and this may be difficult if body wall is damaged.

It does not require large incisions or removal of organs. But their study is limited to cases of major traumatic lesions. Sensitivity of these techniques is unacceptably low for non-traumatic lesions.[4]

4. PLAIN X- RAYS

It is used to supplement rather than replace full invasive autopsy. It is useful in investigation of fractures, foreign bodies, bullets, and dislocated cranial fractures. These are very much useful in perinatal and fetal autopsies.

5. ANGIOGRAPHY

Post mortem angiography is a potentially valuable technique in the investigation of deaths due to ischemic heart disease and cerebrovascular disease. Saimanen et al investigated cast angiography in 144 deaths following cardiac surgery. In 20% of these autopsy demonstrated new ischemic cerebral lesions and cast angiography detected acute cerebral infarct, with main cerebral artery thrombosis with a sensitivity of 92%. However it could not identify old infarcts or those cases of vascular filling defects secondary to cerebral edema. It is also useful in identification of deaths due to rupture of intracranial aneurysms. This is especially useful in identification and quantification of coronary stenosis.

6. MAGNETIC RESONANCE IMAGING

Magnetic resonance imaging has been used for sometime for the intrauterine visualization of fetuses. MRI can demonstrate central nervous system anomalies not detected on conventional autopsies, but cardiovascular anomalies were better demonstrated by conventional autopsy.

A study of 53 cases was recently reported where causes of death were determined using a combination of clinical history and MRI autopsy. Conventional autopsy was subsequently requested in six of these cases, because the radiologist was unsure of the diagnosis. These results contrast to the outcome of two studies where the MRI autopsies have been routinely checked by conventional or limited autopsies. MRI autopsy missed coronary artery bypass graft, myocardial infarct, similarly inability to image coronary artery lesions and to differentiate postmortem clot from thrombosis and edema from inflammatory exudates. Post mortem MRI may also detect many insignificant lesions with the risk of over interpretation e.g. pneumoperitoneum and accumulation of gas in hepatic veins is a common early postmortem change but its identification on MRI may result in a false positive diagnosis of bowel infarction or perforation.

In a study carried out by Brookes et al in 1996, on 20 still born/ aborted fetuses, Magnetic Resonance Imaging examination and autopsy findings were in agreement only in 8 cases. The MRI examination revealed information in 4 cases that was not evident by autopsy dissection.[5]

Disadvantages of MRI

i. It does not have spatial resolution to identify very small but significant lesions.
ii. It cannot sample the body for micro – organisms.
iii. No histological confirmation of findings.

7. PSYCHOLOGICAL AUTOPSY

Pioneered by Robins et al. They found that the majority of those who committed suicide have communicated suicidal ideas to friends, family and physicians, often repeatedly. In psychological autopsy, the acquaintances of a patient who has committed suicide are subjected to structured interview and all other potentially useful information is collected, so that a retrospective psychiatric diagnosis can be made. The validity of the method has been confirmed by studies of those whose suicide attempts have failed.[2]

8. VERBAL AUTOPSY

Many times we find that death certificates are inaccurate. One of the supposed benefits of the autopsy is the provision of accurate information about cause of death for epidemiological studies. With inaccurate clinical diagnosis and low rate of autopsies, their potential to contribute to the validity of epidemiological data is poor.

Verbal autopsy is an epidemiological tool, used mainly in Africa, Asia and Latin America. Relatives of the deceased might be subjected to structured questionnaire, in order to determine the number of deaths from a small panel of diseases important in that area and at that time.

Some very large studies have been carried out, with 54,834 families interviewed in a study of infant death mortality in rural Pakistan. Another study is 48,000 families interviewed in cases of adult deaths in urban India.

A recent study combines verbal autopsy with other methods, and reveals that very high death rates in young Ukrainian diabetics are related to irregularities in supply of insulin.[6 7]

9. VIRTOPSY

The Virtopsy or Virtual Autopsy developed by Michael Thali and colleagues at the University of Bernes' Institute of Forensic Medicine is a scalpel free procedure that uses the latest in medical imaging technology, to provide a completed three dimensional view of the inside and outside of the body.

The procedure combines the technologies of multi slice computed tomography (MSCT) and MRI with a three dimensional surface scan like that used in automobile design. MSCT scans provide cross sectional views of tissue, which are layered to form 3 – D computer images, MRI's delve into the interior of the body, focusing on special organs and soft tissue in great detail. The procedure also makes examination of contagious cadavers less hazardous. When teamed with post mortem angiography and biopsy procedure, Thali says, there is little of forensic importance that the virtual autopsy cannot detect. It has its shortcomings like it cannot detect color of organs, leaks in vessels etc. And it is fairly expensive. It also doesn't tell which infectious agent is present or what kind of tumor is present. Virtual autopsy doesn't provide truly "objective" data.[8]

10. MOLECULAR AUTOPSY

DNA is robust enough to retain sufficient integrity to enable genetic analysis of post mortem tissue. In cases of sudden, unexpected death in which an inherited genetic cause may underlie the fatal lesion, it may be worthwhile to use post mortem tissues for molecular analysis where no ante mortem samples are available. The findings could be used to counsel the family of the deceased about the risks and prophylactic measures to be taken.

The above discussion pertaining to "limited autopsy" may not be immediately acceptable in medico legal postmortem cases but a beginning has to be made by open discussion with concerned authorities in different fora. The above-mentioned procedures may not be routinely possible in India for obvious reasons but a combination of certain innovative measures can be practiced in future. This might also help the burning need for "organs" that can be transplanted. To substantiate this, the work conducted by Michael Thali and his colleagues should be inspiring.

We all, those concerned with medico legal post mortem work will entirely agree that the medico legal autopsy is becoming more and more "sensitive" and "sensational". The investigative journalism, media, NGOs and some other unscrupulous people will always try to make a forensic expert a scapegoat. So in our opinion more transparency should be brought in medico legal post mortem work without sacrificing confidentiality. If we strike right balance of transparency and confidentiality, the probable doubts or allegations can be cleared away. The medico legal expert while doing autopsy must remember the legal consequences and also the social repercussions of his opinion. With increasing number of CPA cases, it should be remembered that much would depend on autopsy findings.

To conclude we think the medico legal expert should bear in mind that the autopsy work, though modified, is here to stay. It is our responsibility to make this work more scientifically accurate, legally correct and socially reliable; and mind well it is not the "future" of autopsy but "OUR" future.

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Review article

DISASTER MANAGEMENT IN MORTUARY

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Review article

DISASTER MANAGEMENT IN MORTUARY

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ABSTRACT:

In certain parts of the world nature is frequently responsible for mass disasters like flood, hurricane, and earthquakes. Unnatural disasters like bomb blast, building collapse, etc. do occur killing 100 – 1000 peoples at a time.

In such crises management of dead bodies / human remains if carried out in uncoordinated and disorganized manner may lead to kiosk. Inappropriate management leads to loss of evidence for future identification and investigations. Systemic management plays a pivotal role in disaster management. There is a strong need for development of technical guidelines based on evidence for management of dead bodies / human remains following disasters.

KEY WORDS – disaster, evidence, management.

INTRODUCTION:

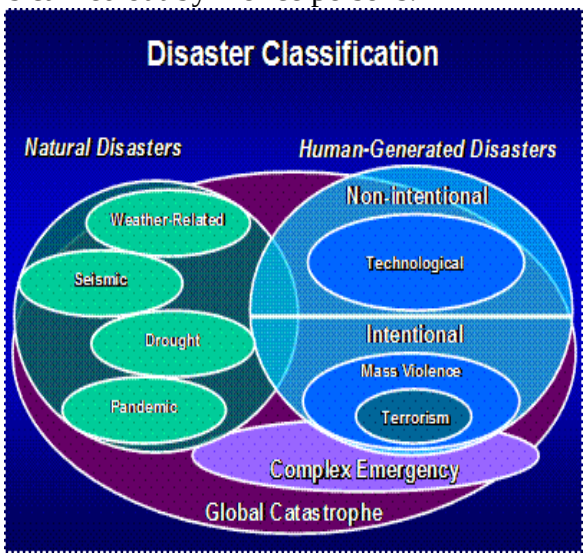
Disaster is defined as Death of greater than 12 victims in a single event that exceeds the capacity of local death investigation system to handle it.[3] In general mass disaster means a disaster or calamity on a large scale. The effect of disaster in the ecology & environment is spread over vast area. The victim is very large in numbers and there is considerable loss of human life and property. The disaster can occur at any time, hence always a medico legal person should be ready at any given time to handle such situation.

The mass disaster can be grossly classified under two headings:

[A] Natural disaster: it includes earthquake, floods, tidal wave, storms, volcanic eruption, landslide, cyclones etc.

[B] Manmade disaster: they are caused by manmade equipments which may be intentional (Terrorism, violence) & non intentional (technological).

Plans for disaster management are usually clinically oriented, However mortuary management during disaster &provision for Dead body management. Is often ignored. Forensic Pathologist should ensure that there is cooperative planning that includes adequate provision for collection, Accommodation, examination and disposal of large number of dead bodies. Forensic pathologist plays as a catalyst between the major agencies responsible for overall planning Which includes Police officials, local community members, Forensic team, Legal Experts, Radiologist, Dentist, Public Health officers. In India collection of evidence from the site as well as shifting of bodies to mortuary for medicolegal examination is carried out by Police persons.



MANAGEMENT IN MASS DISASTER

The management should be organized in such a way so as to speed up the process of investigation and disposal of the dead bodies and to minimize the inconvenience to the relatives. These are aimed as follows:

1. To identify each dead body and to establish cause of death for legal purposes so that death certificate can be issued.
2. To retrieve and reconstruct bodies and fragmented bodies decently.
3. To obtain material for analysis where appropriate.
4. To help investigating authorities to find out the cause of disaster itself example Bomb/detonator may be embedded in the bodies of victim.

PHASES OF MANAGEMENT

Mass disaster can be managed **effectively in 3 phases:**

FIRST PHASE (AT THE ACCIDENT SITE):-

It is carried out by investigating officer and related team members. Following guidelines if followed will be helpful for forensic pathologist for effective conduction of 2nd and 3rd phases.

First of all Seal that area then locate the bodies, Label them with appropriate number. Place each body / body part in body bags, if not available then polythene sheets, bed sheets can be used. Take photographs and do not separate Personal belongings like wallet, jewellery, documents, from the human remains during recovery process.Transfer bodies to mortuary preferably in cold refrigerator vans. Get prior information about black labeled bodies as they are likely to be sent to mortuary & accordingly we can get prepared.

SECOND PHASE :- (MORTUARY)

The mortuary work is an organized team work where contribution of each employee from class IV to class I is required. It is preferable& ideal to have mortuary in close proximity of disaster but same is not possible in most of cases. However the autopsy room should be well equipped, cleanliness should be maintained by repeated washing and Mopping. The refrigeration system should be working. There should be separate area for embalming so that the autopsy work will not be disturbed. There should be separate room for interviewing relatives and media. A separate room should be created as a control room for communication with head quarters where all recent information should be updated regularly.

Temporary Mortuary:- Temporary mortuary should be established near disaster site in store houses, empty factories, Halls, Minimum things will be required at such places like Good electric lighting, portable lights for close inspection, adequate piped water, washing and toilet facilities if not available then generators, water tanks should be provided, telephone & fax facilities. Flooring should be waterproof; tables for examinations should be wooden trestle. Use of ice bar for storage should be preferably avoided. [3]

Postmortem examination will be conducted in usual manner but considering following points more meticulously.

I) Primary Identification:-

a) Visual identification i.e. matching of deceased with similar information who are missing. It is reliable when a body is intact or little damage externally.

b) Photography: - Photography of clothing's, personal possession or physical characteristics, external injuries, internal autopsy findings should be done. After initial photography clothing and jewelry must be removed from body and handed over to police taking due receipt.

c) Examination of cloths: - Look for blood stains, any damage, manufacturer label or laundry marks.
d) Finger prints: - It should be done after autopsy so that trace evidence will not be lost.
e) Dental status: - Look for dentures, artificial teeth,

II) Careful External Examination:-
Sex, Apparent age, Hair color, Height, Weight, color of eyes,/skin, tattoo or birth marks, any surgical/traumatic scars, external injuries, blackening /dusting, amputation (partial or complete) .Missing parts due to traumatic amputation should be mentioned specifically and in detail. Mutilated remains if recovered later on can be compared with the missing parts as recorded during examination.DNA sampling from the body and mutilated part would confirm identity.
III) Radiography: - Full skeletal X-Ray to locate metallic fragments, pacemaker implant, fractures and old deformities.
IV) Full internal autopsy: -Besides routine internal examination following things should be looked for.

1. In Bomb blast cases look for intra parenchymal hemorrhages in lungs.
2. In firearm cases look for entry and exit wounds.
3. In burn cases look for carbon particles in trachea.
4. Surgical absence of internal organs.
5. Any internal injuries.
6. Post surgical states like Gastro enterostomy.

V) Samples to be preserved:
a) Tissue specimen containing metal fragments for C.A. should be deep frozen and for Histological examination 10% formalin is used.
b) Microbiological examination: In cholera outbreaks stool sample should be preserved.
c) Cloths if charred or blood stain for analysis
d) Viscera for c.a.
e) Foreign body for analysis
f) Bone piece for D.N.A.
g)Skin scrapping for C.A.

VI) Storage of bodies/human remains: -
Burial method is method of choice for long term storage and mass disposal

Waterproofs labels with unique number should be used..Burials should be 1.5 meter deep and atleast 200 meters from the water source. In case of trench burial, space of about 0.4 meters should be kept which helps in future identification process. Clear marking of the body and their positions on ground surface is recommending buffer zone which allows planting of deep rooted vegetation. For exhumation of these bodies Magistrate order will be required.

THIRD PHASE
(RECORD KEEPING):

a) Label or token No. should be unique and only one for all the material /body remains for one single case.
b) Maintain the records.
c) In Australia Disaster victim identification form has been devised. It includes 4 different colors and one white colored form. 2 for Male and 2 for Female of which 1 for External examination and other for internal examination. White form for missing persons. Upon completion they are kept in transparent envelope. In India no such separate forms are available and all the information related to identification is recorded in Post mortem report.[2]
d) Previously coroner used to give orders to Doctors to certify the Dead bodies & issue Cause of Death by doing only External Examination considering the over load in mass disaster and reduce the waiting period of relatives. The same method can be applied through Magistrate / Zonal A.C.P. by applying the same power by them.

e) Instead of carrying autopsy of all bodies Sample Autopsy can be carried out.

Mass Disasters in India:
Bhopal gas Tragedy – 1984
Latur Earthquake -1993
Gujrat massacre-2002
Terrorist bomb blast Mumbai-2006
Fire disaster Jaipur-2009
Terrorist attack Mumbai-2009
Flood in Bihar-2011
Serial bomb blast Mumbai-2011

OUR EXPERIENCE:

Grant medical college, sir J J hospital is a tertiary referral centre for medico legal cases where the occasions come frequently to manage the mass disaster which had included Building collapse, Bomb blast, Riot victims and chlorine gas leakage etc. The general principles of management in mass disaster were kept in mind& effective medico legal services delivered in following manner.

After discussion with police authorities it was decided that all autopsies would take place at Sir JJ PM Centre under department of Forensic medicine GMC. This decision was taken for uniformity in procedure as well as convenience for the involving agencies and relative of victims. Each corpse was labeled by an unique no. and same no. was mentioned distinctly on all related documents, samples and belongings collected from body of victim. Forensic Experts helped the police while noting down injuries in inquest panchanama. Two teams of doctors carried out the work in shifts. Each team included, Associate professor, Assistant lecturer, Senior resident and Junior resident. Each one of them was allotted a specific duty. After receiving police documents, the corpse was sent for X-ray along with clothes. After obtaining X-ray plates PM examination started after establishing identity beyond any doubts. External & internal examination was carried out as mentioned above taking necessary photographs throughout examination. Samples as mentioned above were collected, labeled, sealed and handed over to police. Embalming was done free of cost, wherever necessary. Bodies were handed over to relatives through police. For communication with relatives of victims, police authorities& Press reporters a separate counter was assigned managed by a senior experienced doctor. Information was conveyed time to time to central control room.

Difficulties faced at Mortuary:

Ideal things are easy to discuss but difficult in available setup to implement effectively.
The major obstacles for smooth functioning are:

a. Delay in receiving Inquest & other papers from Police.
b. Interruption from Media people, relatives.
c. Visit of VIP persons
d. Unavailability of portable X-ray machine, body bags, disinfectants etc. &
e. Miscommunication or communication gap

adds to further difficulties.

RECOMMENDATIONS:

The disaster management plan must include pre disaster preventive & post disaster curative operation. The help of other governmental agencies like NGOs should be included actively in the plan. The education of people on large scale is also important. Display of emergency numbers for emergency help should be displayed with people friendly services. The working for management of mass disaster like All India Disaster Mitigation Institute, public health foundation for India

& Times foundation, similarly certain international agencies should be consulted.
i) Proper communication
ii) Adequate Civil facilities like water, light.
iii) Sufficient instruments, disinfectants, adequate man power,
iv) Transport facilities.

CONCLUSION:

Mass disasters are an unavoidable incidence and real competency of Forensic Experts is being judged by Society and investigating authorities in such situations. Well planned efforts to overcome the situation would give effective services to the Society.

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Original Paper

HANGING VS STRANGULATION A COMPARATIVE STUDY.

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Original Paper

HANGING VS STRANGULATION A COMPARATIVE STUDY.

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ABSTRACT:

In violent asphyxial deaths, the process of respiration i.e. exchanges of air between the atmosphere and lung beds are prevented by some violent mechanical means. Violent asphyxial deaths are always challenging to forensic experts. Hanging and strangulation are commonest type of violent asphyxial deaths. Distinction between hanging and strangulation is not always easy. Our article tried to distinguish between hanging and strangulation by considering different parameters such as material of ligature, direction of ligature marks, no. of turns and its colours. In the study, hanging cases showed single ligature mark and the direction of ligature mark was oblique and above the thyroid cartilage. The commonest findings associated with hanging were cyanosis and sub-conjunctival hemorrhages. Fractures of hyoid bone, thyroid and cricoid cartilage were rare in hanging cases.

In strangulation cases number of ligature marks was single in one case and double in another case. The direction of ligature mark was horizontal and below thyroid cartilage. Strangulation was also associated with cyanosis and sub-conjunctival hemorrhage. In Strangulation cases injuries to neck and subcutaneous tissue were common. Fracture of hyoid bone was also common in strangulation cases. This article may help to distinguish between hanging and strangulation.

KEY WORDS: Ligature Marks, Hanging, Strangulation.

INTRODUCTION:

Hanging is that form of asphyxia, which is caused by suspension of the body by a ligature, which encircles the neck, the constricting force being the weight of the body [1]. The whole weight of the body is not necessary and only a comparatively sight force is enough to cause death [1]. While asphyxia by strangulation is caused by the application of a ligature to the neck in such a manner that the force acting upon it is exerted solely by the ligature, the weight of the victim's body plays no part[1]. Hanging is thus distinguished from strangulation by a

ligature. This distinction has practical importance because hanging raises a presumption of suicide, whereas strangulation is usually homicidal[2]. Considering the difficulty in diagnosing hanging from strangulation, an attempt is made to distinguish the various features

and to observe the common postmortem features of these two.

MATERIAL AND METHODS:

A 5 yrs retrospective study was done in the Dept. of FMT at Pravara Institute of Medical Sciences, Rural Medical College, Loni, Tal Rahata, Dist- Ahmednagar. This study was carried out from postmortem reports, actual cases during postmortem, case files and police records. In some cases history from relatives, eyewitness and also from investigation offices were obtained. A proforma was prepared with various columns, tables and findings were entered in it. All proforma were entered in master table. The information gathered was carefully compiled and meticulously scrutinized to have a clear picture of observation.

OBSERVATIONS:

Table 1: Distribution of various types of ligature material used

Type of Material	No. of Cases	Percentage (%)
Rope	12	75%
Dupatta	1	6.25%
Saree	1	6.25%
Any other Material	2	12.50%
Total	16	100 %

Table 2: Direction of ligature marks

Direction of Ligature Mark	Hanging	Strangulation
Oblique	14 (100%)	00

Horizontal	00	02(100%)
Total	14	02

Table 3: Number of ligature turns

No. of turns	Hanging	Strangulation
One	14(100%)	01 (50 %)
Two	00	01 (50%)
More than Two	00	00
Total	14	02

Table 4: Colour of ligature mark found in hanging / strangulation.

Colour of Ligature Mark	Hanging	Strangulation
Pale	03 (21.42)	01 (50)%
Reddish	03 (21.42)	00 (00)
Brown	08 (57.16)	01 (50) %
Total	14 (100 %)	02 (100)

Table 5: Position of ligature material in hanging / strangulation

Position of ligature mark	Hanging	Strangulation
Above thyroid cartilage	14(100%)	00(00)
Below thyroid cartilage	00(00)	02(100%)

Total	14	02

Table 6: Postmortem examination features of hanging / strangulation

Postmortem features	Hanging		Strangulation		Total	
	cases	percentage	cases	percentage	cases	Percentage
Subconjunctival hemorrhage	10	(71.42%)	02	(100%)	12	75%
Cyanosis	14	(100 %)	02	(100%)	16	100%
Associated abrasion	03	(21.47%)	02	(100%)	05	31.25%
Injury to subcutaneous tissue	02	(14.28%)	02	(100%)	04	25%
Injury to neck muscles	02	(14.28%)	01	(50%)	03	18.75%
Injury to vessels of neck	00	(00)	00	(00)	00	00
Hyoid bone fracture	01	(7.14%)	01	(50%)	02	12.5%

Thyroid cartilage fracture	00	(00)	00	(00)	00	00
Cricoid cartilage fracture	00	(00)	00	(00)	00	00

RESULT AND DISCUSSION :

Our study reveals that majority of victim used rope (75%) as material. These findings are in consistent with sheikh at el. [3]. Rope is commonest material available at any place, so its use is more. In all Hanging cases direction of ligature mark was oblique and above thyroid cartilage while in strangulation, it was horizontal and below thyroid cartilage. Similar finding were noted by Gargi et al [4] and Momanchand et.al [5]. Polson et al [2]. also showed that ligature mark above the thyroid cartilage in 80% of cases hanging at the level of thyroid cartilage and in 15% cases below the thyroids 5% cases of hanging. These findings are also consistent with Reddy [1] and Nandy [6]. This finding may be due to pull of ligature by weight of body in hanging cases. Present study also gives significant finding about number of turns of ligature marks. In all Hanging cases it was one and in strangulation it was single (50%) cases and double (50%) cases. Momanchand et al [5] in his study also reveal single ligature mark in 96.7% in hanging cases and 40% in Strangulation cases.

The colour of ligature mark in hanging cases was brown (57.16%), pale (21.42%) and reddish (21.42%) cases. Strangulation colour was brown in 50% and pale in 50% cases. Gargi et al [4] also noted similar finding related to colour of ligature mark. Colour of ligature mark depends upon various factors such as colour of skin, force applied, time since death etc.

Total numbers of cases of hanging were 14 and that of strangulation were 02. In the study out of 14 cases of hanging subconjunctival hemorrhages was observed in 10 (71.42 %) cases and in all these cases cyanosis of face, nails or lips was observed. These are the important findings of asphyxia and are mentioned in every literature available.

In hanging out of 14 cases, three cases found associated abrasion. Our findings in this regard are consistent with Gargi et al [4]. Injury to subcutaneous tissue was observed in 2 cases (14.28%) which are similar to Patel et al [7]. in which 28.17% cases had injury to subcutaneous tissue. In 14.28% cases we found injury to muscles of neck and there was no injury to the intimae of carotid arteries. Polson [2] reported injury to neck muscles is only 2 to 12 % of cases and injury to carotid artery in 51% cases of hanging.

In both cases of strangulation we observed petechial hemorrhages, cyanosis and associated abrasion. The findings are similar to Nandy[6]& Reddy[1] in these regards. In the present study we observed injury to subcutaneous tissue in both the cases and injury to muscles of neck in one case. Polson[2] and Nandy[6] also mentioned same findings as in our study.

The study also showed that out of 14 cases of hanging only one case (7.14%) we came across fracture of hyoid bone and there was no fracture of thyroid and cricoid cartilage. Patel et al [7] observed fracture of hyoid bone in only 9.37% cases of hanging and Momanchand et al[5] observed fracture of hyoid bone in only 4.9% cases of hanging. Our findings are consistent with these authors. Two cases of strangulation observed fracture of hyoid bone in other case fracture of thyroid and cricoid cartilage was not seen.

Sheikh et al[3],observed fracture of hyoid bone in only one case (14.28%) out of 7 cases of strangulation in his study .The findings are consistent with Sheikh et al(4) and not with Patel[7] and Nandy[6] where they mentioned that fracture of hyoid bone is uncommon in strangulation deaths[8].

CONCLUSION:

In all hanging cases number of ligature marks was single, direction of ligature mark was oblique and above the thyroid cartilage. The commonest findings associated with hanging were cyanosis and sub-conjunctival hemorrhages. Fractures of hyoid bone, thyroid and cricoid cartilage were rare in hanging cases.

In strangulation cases number of ligature marks, was single in one case and double in another case. The direction of ligature mark was horizontal and below thyroid cartilage. Strangulation was also associated with cyanosis and sub-conjunctival hemorrhage. In Strangulation cases injuries to neck and subcutaneous tissue were common. Fracture of hyoid bone was common in strangulation cases.

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Case Report

MIXED PICTURE OF DECOMPOSITION, ADIPOCERE & MUMMIFICATION WELL PRESERVED THE LIGATURE MARK IN HANGING BODY: A CASE REPORT.

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Type Of Paper : Case Report

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Case Report

MIXED PICTURE OF DECOMPOSITION, ADIPOCERE & MUMMIFICATION WELL PRESERVED THE LIGATURE MARK IN HANGING BODY: A CASE REPORT.

Dr. S.S. Bhise, Dr. S. D. Nanandkar, Dr. H. R. Thube

ABSTRACT:

Adipocere refers to a postmortem product which forms from body fat. Factors present in the surrounding environment will influence adipocere formation and may accelerate or retard the process of conversion. adipocere is a product comprising predominantly of saturated fatty acids which results from the hydrolysis and hydrogenation of neutral fats in the body. In a soil burial environment these conditions may include such factors as soil pH, temperature, moisture and the oxygen content within the grave site.

This one is the case where we have found mixed picture of decomposition mummification with adipocere formation in a body which was found in the forest hanging from the tree.

KEYWORDS:

Adipocere, fatty acids, clothing, Decomposition; Temperature; Moisture

INTRODUCTION:

Adipocere formation is of interest to forensic scientists as it has the ability to preserve the remains it encases by inhibiting decomposition. The degree of decomposition and differential preservation observed depends on the surrounding environment.

Adipocere represents a form of arrested decay of postmortem soft tissue. Variously referred to as grave wax or corpse wax [1–4] this tenacious material has been documented in a variety of contexts and has served as the focus of considerable research. Through experimentation, case analysis and observation much has been learned about its external morphology, chemical composition, mechanisms of formation and the timing of its development and eventual degradation. Adipocere represents an important taphonomic phenomenon since it can lead to prolonged preservation of evidence; reveal environmental and constitutional factors that may be useful in forensic investigation and evaluations of postmortem interval.

HISTORY:

According to den Dooren de Jong [5], as early as 1789, Fourcroy described adipocere and coined the term from the Latin words adeps (fat) and cere (wax). Fourcroy's work focused on human remains exhumed from the cemetery of the innocents in Paris [6]. He noted that in a three to five year old buried body, some muscle tissue was preserved within the adipocere formation, whereas in remains buried longer, even muscle could not be recognized. Fourcroy also noted that adipocere was concentrated in areas of the body with major fat deposits and that with time soft and wet adipocere became dry and brittle. He also related information from cemetery grave-diggers that typically adipocere was noted in remains interred for over three years. Fourcroy conducted experiments suggesting that adipocere represented a form of soap resulting from reactions of fat with ammonia. [5]

In a Canadian study and major review article, Ruttan and Marshall [7] published their analysis of ‘‘hard, clean

adipocere wax'' revealed 68 percent palmitic acid with less than 10 percent stearic acid, oleic acid, hydroxy stearic acid, stearin, palmitin and other substances. Their conclusion was that ''adipocere is the residue of the preexisting fats of animals, composed almost entirely of the insoluble saturated fatty acids left after the slow hydrolysis of the fats in wet ground. The insoluble hydroxy stearic acids which are so characteristic of adipocere are probably derived from a portion of the oleic acid in the original fat by hydration'' [7].

Chemical analysis of adipocere advanced in 1922 with Goy's [8] research in Germany. He also noted the decline in oleic acid and documented the increase in free fatty acids.

Working in London, Mant and Furbank [9] noted that fat throughout the body potentially may become hydrolysed and hydrogenated. They also made the key observation that the body itself contains sufficient water to promote adipocere formation. They suggested that a damp environment was more conducive to adipocere formation than either a very dry one or submersion in water. They noted that bodies with clothing presented more rapid and complete adipocere formation, than those without. They observed that bacteria (bacterial enzymes), especially Clostridium were essential for adipocere formation. They found anaerobic conditions to be conducive, but not essential.

In 1961 den Dooren de Jong [5] provided a major review article, summarized that ''the formation of adipocere is a process occurring under virtually anaerobic conditions in which human fat is converted into a complex of saturated fatty acids by a great variety of bacterial species occurring in and on the decomposing body'' [5].

CASE HISTORY:

On the very first day of March, a decomposed body of an unidentified male; aged 40-42 years was referred to Department of Forensic Medicine, GMC Mumbai, from a peripheral post mortem center. The inquest panchnama and other papers given by police narrated that the body was hanging by neck with the help of cotton cloth to the branch of tree in the jungle, when it was first seen by police.

As per police inquest the body was in decomposed state. The ligature material used i.e. dupatta was found around neck, with complex knot at the posterior aspect of neck. The ligature material cut opened from side, and body was sent for post mortem examination to Sir JJ PM Center.

POST MORTEM FINDINGS:

The deceased was with white shirt, dark grey pant and brown underwear, with black thread with silver pendal of sai baba around neck, and two metallic rings in left middle and ring finger. On gross examination it was a thin body of a male in advanced stage of decomposition, with partial skeletanisation and partial adipocere formation. Black dead maggots were present at places. Ribs on left lateral side exposed. 2^{nd}, 3rd, 4th and 5^{th} left ribs were separated at costochondral junction. Facial features were mummified with partial adipocere formation. Orbital cavities were mummified. Tongue protruding out and it was decomposed. Muscles of left foot, left thigh and groin were exposed. Multiple dead maggots were present over muscles, in abdomenal and chest cavity. Cervical vertebrae were disarticulated from each other. Back showed totally adipocere formation. Skin over back was brownish yellow, cracked. External genitalia decomposed with exposure of testicles, corpora cavernosa and spongiosa of penis. Glans penis was intact. Mummification was seen mostly around the face of the body,

both combined mummification with Adipocere was seen around neck of the body, decomposition was seen around thoracic and abdominal cavity and fully developed Adipocere formation was seen over back and over the lower legs.

There was evidence of ligature mark around neck. It was horizontal on anterior aspect with multiple parallel impression of ligature material. It was going obliquely backward, upward below both angles of mandible and deficient over occipital prominence. Color of base of mark was dark brown. The mark was 5 cm bellow right ear 4 cm bellow left ear 6 cm bellow chin and 3 to 4 cm in breadth. On dissection parchmentisation of skin noted around the whole ligature mark. The underlying muscles, vessels, trachea and esophagus have formed in single black pultaceous mass. The Hyoid and Thyroid were intact. Thoracic cavity and abdominal cavity were empty with some dead maggots. Pelvic cavity contains black pultaceous mass, foul smelling with some maggots.

DISCUSSION:

Through research and case experience, much has been learned about the context of adipocere formation. Although typically regarded as a product of a damp environment, adipocere can form in a variety of contexts, including dry environments and water submersion even cold sea water [12]. Remains can include all ages, both sexes and both embalmed and unembalmed remains , although most common in individuals with high body fat and within individuals in areas of high body fat . Moisture appears to represent an important factor in formation but the source can be from the environment or from the body itself.

Above mentioned body was hanging from a tree in damp jungle near back water of sea. Adipocere formation, sometimes preserves the injury mark, and sometimes makes it prominent. The ligature mark in this case was well preserved as well as the minor impression of folds of ligature material became prominent. Also due to mummification the facial features well preserved, helped in identification.

Although adipocere represents extremely tenacious material resistant to degradation, eventually even it will break down leading to skeletonization [6]. Fisher suggests that adipocere can persist for ‘‘months or years’’ [12]. In a German experimental study, Fru¨nd and Schoenen [12] found that adipocere degraded in less than 10 years with exposure to air and soil microbiota. They suggest that degradation of adipocere is accelerated with exposure to air, moisture and fungal growth. In this case also the body remained exposed to air with moisture for longer time so there has occurred break down of Adipocere tissue on left lateral side of chest.

CONCLUSION:

Since adipocere represents unusual preservation of soft tissues, it can contribute to the retention of evidence related to those tissues. In the extreme, advanced adipocere can maintain the form of the body offering evidence of external morphology that can contribute to recognition and thus personal identification. Such soft tissue preservation also can preserve evidence of injury or lack there of and thus contribute to interpretations of foul play.

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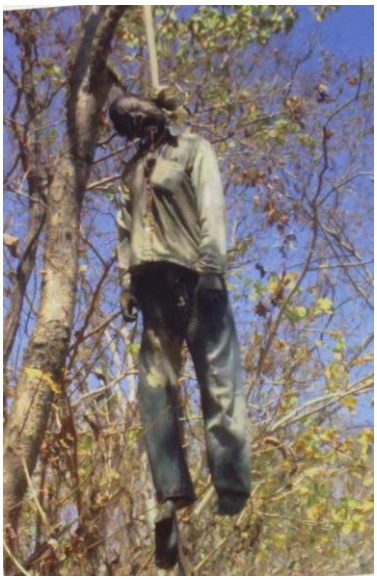
Photographs



Scene of crime

Ligature mark

Partial skeletonization

Fully developed Adipocere over the back

Case Report

PLAYING WITH FIREARM SACRIFICE HIS LIFE: A CASE REPORT OF FATAL AIRGUN INJURY.

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Case Report

PLAYING WITH FIREARM SACRIFICE HIS LIFE: A CASE REPORT OF FATAL AIRGUN INJURY.

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ABSTRACT:

Accidental firing while handling firearm carelessly is not uncommon. The accidental projection may results during carrying weapon; during handling; while greasing or during loading of gun. Apart from this playing with weapon may results into accidental fire which are fatal one.

Usually the firearm cases encountered are from the sophisticated weapons like rifled guns and smooth bored guns. Because of easy operation and economical aspect; there are various uses of airgun like self-protection, bird hunting, and various Olympic Games. In most air gun the compressed air is used to propel the projectile.[1] The projectiles are the pellets made up of various types of metals. But the uses of non-jacketed lead projectiles which are hollow from base are common.[2]

Death due to airgun is very rare unless and until it is contact shot or close shot. It also depends upon the part of body involved like eye, face or head. If the victim or patient is admitted and treated results in alteration of original wound characteristics; which add difficulty to interpret it unless until properly obtained history and detail description of injury witnessed initially by medical person & subsequent document is available.[3]

A case of fatal airgun injury referred for autopsy in which injury sustained by patient when two friends playing with weapon with drama of movie; accidental fire occurred which results in fatality.

Careful correlation with available records; hospital paper summary; and autopsy finding reveal the nature of airgun injury. A case is presented hereby.

***KEY WORDS*:** Airgun, Projectiles, Firearm, Contact Shot

INTRODUCTION :

Air guns are non-sophisticated arms that use air or compressed gas to propel the projectile.[1] Air weapons used since 400 years first produced in middle of 16th century. There are three basic operating power systems for air guns. 1) Air chamber 2) Spring air compression 3) CO2 from cartridges.[2]Different types of air weapons used are BB Guns (ball baring guns), Pellet guns,Air rifles,Air pistol,Paint ball guns, High vel. air guns,Low vel. air guns.[5]Gun barrel can be smooth or rifled and longer the barrel higher the velocity. Also dieseling of barrel with oil increases velocity.For bone penetration velocity required 200 ft/sec, ocular penetration 130 ft/sec.Sophisticated air gun muzzle velocity may vary from 150 ft/sec to 1200 ft/sec. Air weapons are categorised in arms act 1962 under SCHEDULE 1 CAT III) subgroup (d).[4]

CASE REPORT :

The corpse of 32 years old male was referred to morgue of Forensic dept, GMC Mumbai from a district hospital. The police paper and clinical summary narrated that the victim and his few friends gather at home for party. One of his friends jokingly kept the airgun on victim's temple. In the mood of fun the trigger got pulled, resulting in a pellet getting lodged inside victim's brain.

Then friends rushed him to private hospital where he was admitted to ICU. The CT brain suggests that pellet lodged into the left ganglio-capsular region. Then neurosurgeon operates by doing first burr hole and then decompression craniotomy. Victim died on 10^{th} day and body sent for post mortem examination.

On external examination it was averagely build body with swollen face and closed eyes. On the scalp the injury present was surgically stitched, healing wound of craniotomy of length 30cm starting from mid frontal region going backward to right parietal region bending around right parietal eminence ending anterior to right tragus. Another stitched wound with four stitches over right fronto temporal region situated 7cm superior and posterior to lateral end of right eye brow, indicative of entry wound. The next stitched wound placed transversely over abdomen of 12cm length, right to umbilicus.

On internal examination under scalp hematoma all over right half. Bony defect from right fronto-temporo-parietal region observed. Dura underneath craniotomy removed. Brain was congested. Right temporal region shows entry wound of 0.6 cm X 1cm with irregular margins. A haemorrhagic tract with necrosis of brain parenchyma continues underneath wound of entry across right parietal, right ganglio basilar to left ganglio capsular region. A metallic deformed pellet of 0.5cmX 0.6cmX 0.4cm with mid constriction recovered from left ganglio basilar region of brain parenchyma.

On further dissection of abdomen craniotomy bone was recovered subcutaneously at umbilicus. It was measured 12cmX9cm showing wound of entry circular of 0.5cm diameter, with punched out margin on outer table and inner table shows bevelling of margin. At posterior part of bone a burr hole, 1cm diameter with punched out margins on both side of table. All other organs were congested. Cause of death given as complication following gunshot injury.

CONCLUSION:

Fatality from air gun injury is not common. The gravity of injury depends upon actual impact velocity & the muzzle velocity. The second most important factor; as with all gunshot fatalities is the area and circumstances of pellet impact. Any air, spring or CO2 actuated pellet gun capable of developing a muzzle velocity in excess of 350 to 400 feet/s (107-122 m/s) has a lethal potential at close range, under circumstances ideal for maximum pellet penetration.

Typical firearm residues are not observed on entry wound in the form of blackening, tattooing, and singing. History is an important source to arrive at conclusion. During autopsy attempt should made to collect pellet. Skin of entry should preserve to rule out gun powder residue. Examination of weapon by ballistic expert for comparison and test firing is must recommended by investigating agencies.

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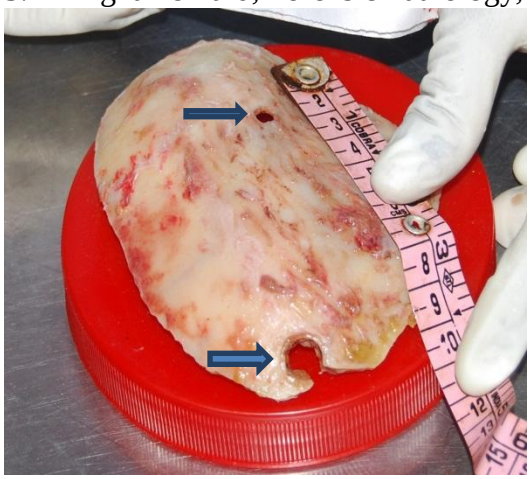
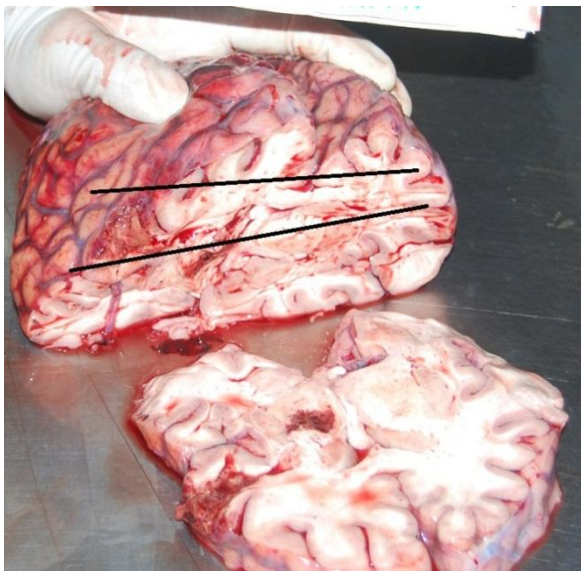


Photograph 1- Craniotomy bone upper arrow entry wound, lower arrow burr hole.

Photograph 2-Craniotomy bone upper arrow burr hole, lower arrow entry wound.

Photograph -3 SHOWS ENTRY WOUND AT RIGHT TEMPORAL REGION.


Photograph -4 SHOWS TRACT OF PELLET.

Photograph -5 THE PELLET RECOVERED FROM BRAIN.

Photograph -6 AIR PISTOLS.

Case Report

PUERPERAL SEPSIS: WHO IS AT FAULT?

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ABSTRACT:

Maternal death, or maternal mortality, also "obstetrical death" is the death of a woman during or shortly after a pregnancy. One case reported from Aurangabad on 14/11/2011, when lady died 15 days after Cesarean delivery. The patient was operated in one of the hospitals in Aurangabad, M. S. India. The patient later shifted to higher centre when she developed a unhealing wound over Lower Section Cesarean Section (LSCS) site. The patient was diagnosed as Necrotizing Fasciculitis of anterior abdominal wall with septicemia in post operative LSCS. Her general condition deteriorated on 12th postoperative day. Inspite of all the life saving interventions she could not be reviewed and died after a day. The body was sent for Medicol-legal autopsy. The uterus was firmly attached to the anterior abdominal wall at suture site and surrounded by yellowish pus flecks. It measured 16x10x2 cm and weighed 500 grams.

The anterior wall of uterus showed stitched wound of length 8 cm. with evidence of gapping of 4 cm at middle (Fig. 3). On dissection interior was warm to touch and reddish with evidence of yellowish red tissues adherent to it's posterior wall. On conclusion of autopsy pieces of organs including the uterus were preserved for histopathological examination. The peritoneal fluid was preserved in blood heart infusion with one swab from uterine cavity preserved for microbiological examination awaiting the reports.

High rates of maternal deaths occur in the same countries that have high rates of infant mortality, reflecting generally poor nutrition and medical care. The need for accurate measurement of the risk of such mortality has raised questions about the adequacy of the conventional 42-day postpartum period of risk used to define maternal death.

KEY WORDS: Pregnancy, Puerperal sepsis, Maternal mortality.

INTRODUCTION:

The Tenth Revision of the International Classification of Diseases (ICD-10) defines a maternal death as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes"(1).

WHO estimates that some 515 000 women die annually from pregnancy-related causes during the period including pregnancy and the six weeks postpartum, nearly all in the developing world (3).

Forty-five percent of postpartum deaths occur within 24 hours. Over 90% of maternal deaths occur in developing countries (3).

Major causes:

As stated by the WHO in its 2005 World Health Report "Make Every Mother and Child Count", they are: severe bleeding/hemorrhage (25%), infections (13%), unsafe abortions (13%), eclampsia (12%), obstructed labour (8%), other direct causes (8%), and

indirect causes (20%). Indirect causes such as malaria, anaemia.[2] HIV /AIDS and cardiovascular disease, complicate pregnancy or are aggravated by it (3).

Puerperal sepsis: Puerperal sepsis is an infection of the genital tract by organism occurring within 14 and 21 days after childbirth or abortion. Childbed Fever, another name for Puerperal Sepsis, was first reported in Britain in 1792 by Alexander Gordon (2).

This is caused by 2 types of organisms: They are Exogenous Organism: In this type the causative organisms are Streptococcus fecalis that lives in the anus and in the perineum. Anaerobic streptococci and clostridium welchi which are found in the vagina. These are responsible for the infection. Endogenous Organism: This comes from sources outside the body and is transmitted by another person. The source of infection can be midwife, doctor and other patients or visitors. Air and dust also cause infection to the patient (2).

Historically, puerperal sepsis has been a common pregnancy-related condition, which could eventually lead to obstetric shock or even death. During the 19th century, it took on epidemic proportions, particularly when home delivery practice changed to delivery in lying-in hospitals, as there still was a total ignorance of asepsis (4).

In 1843 Oliver Holmes in Boston, USA, was the first to establish that puerperal fever was contagious and was carried by the unwashed hands of the physician from bed to bed. In 1847 Semmelweis in Vienna, Austria also concluded that examiners might transmit infection from live patients as well as from the dead and ordered his students to scrub with the chlorine solution before every physical examination. This led to a striking decrease of mortality due to puerperal sepsis from 11% in 1846 to 3% in 1847 (5).

To diagnose puerperal sepsis following things are looked for:

- Fever which occurs within 24 hours or more is the first sign.
- Pulse rate is increased.
- The uterus is sub-involuted, tender and softer than usual.
- The vaginal discharge after delivery is foul smelling.
- Local pain and swelling of the infected suture line.
- Headache, insomnia and anorexia (2).

The last known case of Puerperal Sepsis occurred in Europe in 2004. Jessica Palmer died six days after giving birth to her son. In Jessica's case her infection was not property diagnosed, and the infection was past the stage of being cured by antibiotics. Jessica's death could have been prevented if the midwife would have treated her infection signs more seriously (6).

And the one case reported from Aurangabad on 14/11/2011, when lady died 15 days after Cesarean delivery, done in a private hospital in Aurangabad, M. S. India.

CASE REPORT:

On 29 November 2011, a 21 year old female died on 15th post operative day in a private hospital in Aurangabad. The patient was operated in one of the hospitals in Aurangabad. She was discharged on 3rd postoperative day. Readmitted on 7th postoperative day due to discomfort at operation site. During hospital stay, she developed a wound over Lower Section Cesarean Section (LSCS) site. Pus sample from this wound was sent for microbiology. But her general condition deteriorated on 12th postoperative day and she was referred to higher centre.

On admission (on 11/11/11 in higher centre) patient was afebrile and had tense and distended abdomen, with gaping of the wound and presence of the slough. The wound was surrounded by ecchymoses and blebs. The patient was diagnosed as "Necrotizing Fasciculitis

of anterior abdominal wall with septicemia in post operative LSCS". Patient was covered by Broad Spectrum antibiotics and local extensive debridement was performed. She was investigated thoroughly. A preaneasthetic check up was undertaken (on 12/11/11) for inserting drainage tubes and exploratory laprotomy SOS. Ultrasound abdomen showed about 200 cc collections surrounding the involuting uterus and right sided pleural effusion. But patient started complaining of facial flush and developed facial puffiness. She later went into hypotension. She was given inotropic medicines, plasma expanders and blood transfusion vigorously. Inspite of all the above maneuvers she could not be reviewed and died after a day. The body was sent for medico-legal autopsy.

Autopsy Findings:

This 21 year old female was a primigravida of average built. The body had pale conjunctiva and tongue in between teeth in a partly open mouth. A wound of 22x12.5x1cm was present 5.5 cm below umbilicus, horizontally. There was no evidence of frank pus or oozing at the base of wound, with some stitches seen at places. (Fig.1& 2)

Fig. 1 (21 year female)

Fig. 2 (LSCS wound)

Fig. 3 (Uterine stitched wound)

Fig. 4 (Lung, cut section)

Fig. 5 (Lung, cut section)

The brain was pale. All major cavities contained about 200 cc straw colored fluid. The lungs were congested and dark bluish red discolored. On cut section showed blackish discoloration with small thrombi at places (Fig. 4 & 5).

The uterus was firmly attached to the anterior abdominal wall at suture site and surrounded by yellowish pus flecks. It measured 16x10x2 cm and weighed 500 grams. The anterior wall of uterus showed stitched wound of length 8 cm. with evidence of gapping of 4 cm at middle (Fig. 3). On dissection interior was warm to touch and reddish with evidence of yellowish red tissues adherent to it's posterior wall.

On conclusion of autopsy pieces of organs including the uterus were preserved for histopathological examination. The peritoneal fluid was preserved in blood heart infusion

with one swab from uterine cavity preserved for microbiological examination awaiting the reports.

DISCUSSION:

High rates of maternal deaths occur in the same countries that have high rates of infant mortality, reflecting generally poor nutrition and medical care.

Another issue that is associated with maternal mortality is the lack of access to skilled medical care during childbirth and the distance of traveling to the nearest clinic to receive proper care. In developing nations, as well as rural areas, this is especially true. Traveling to and back from the clinic is very difficult and costly, especially to poor families when time could have been used for working and providing incomes. Even so, the nearest clinic may not provide decent care because of the lack of qualified staff and equipment (7).

The need for accurate measurement of the risk of such mortality has raised questions about the adequacy of the conventional 42-day postpartum period of risk used to define maternal death (7). It has been suggested that the period for calculating the risk of maternal mortality should be extended to 12 weeks. However, concern has been expressed that this would reveal only a very small percentage of deaths attributable to pregnancy and its complications. In recent years, WHO's International Classification of Diseases (ICD-10) has introduced two additional definitions to accommodate measures of extended maternal risk: a late maternal death occurs more than 42 days but less than a year after the outcome of pregnancy and is attributable to direct and indirect obstetric causes; a pregnancy related death occurs within the conventional six-week interval but includes deaths from all causes during pregnancy and until 42- days (six weeks) postpartum. Few population-based data exist on the length of time during which the risk of mortality remains elevated following pregnancy outcome (7).

The World Health Organization (WHO) estimates that in 2005 over 500,000 women died from pregnancy- and birth-related causes. A woman in a developing country is 97 times more likely to die as a result of pregnancy than a woman in a developed country (3). The majority of these deaths occur during and immediately following birth. The increase in cesarean sections -- which now account for almost one-third of all U.S. births -- was identified as another trend corresponding to the rise in maternal mortality. Cesarean section or the anesthesia administered during a cesarean section was one of the contributing factors in 15 of the 65 maternal deaths with cesarean section. Most were unplanned or emergency surgeries to try to save the lives of the mother and infant. But previous cesarean sections were cited as complications in some of the cases (8).

The technologies needed to prevent deaths from most of these causes exist. For this reason, the World Health Organization designates such deaths as "avoidable"(3).

RECOMMENDATIONS in this case:

1. It is in the practice that a patient of LSCS is kept under observation till 10^{th} postoperative day. In most of cases, the patient is discharged on 7^{th} post operative day, but in this case the patient was discharged from the Hospital on the 3^{rd} Post operative day, which was not feasible.

2. It can be said that the infection was inoculated right at the time of operation. As in the autopsy there was gapping of 4 cm in the uterine wall, surrounded by pus.

3. A sample of pus was sent for microbiology to a laboratory, in charged by a M.sc., D.M.L.T. personnel who found gram positive cocci scattered in the culture and opined the

specimen as sterile therefore the sensitivity was not carried, and the operating surgeon didn't think a need for second opinion.

4. The relatives sued the Doctor and the Expert Medical Committee opinioned presence of criminal negligence against the operating surgeon.

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