## **Eighth Edition**

## Parikh's

# Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology

## for Classrooms and Courtrooms



Editor

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## Introduction and Legal Procedure

Nowadays, the term **Legal Medicine** is being used synonymously with various other terms, namely, Forensic Medicine, Forensic Pathology, Medical Jurisprudence and State Medicine.

#### Q. 1.1. Explain the following terms giving examples: (i) Forensic medicine, (ii) Forensic pathology, (iii) Forensic nursing, (iv) Medical jurisprudence, (v) State medicine.

**i.** *Forensic medicine* (derived from FORUM) deals with the application of medical knowledge in the administration of justice by correlating such knowledge and applying it to purposes of law. The following are a few examples:

- a. A person may die suddenly or unexpectedly, and therefrom a suspicion of foul play may arise. The dead body is submitted for autopsy to the medical officer to determine if death was due to natural causes or if there is any evidence of foul play, such as violence or poisoning.
- b. A person may die of coronary thrombosis while walking on the road; his dead body may then be run over by a motor vehicle and the driver charged with manslaughter (culpable homicide not amounting to murder). Histochemical and biochemical studies of the injuries would establish that the injuries are sustained postmortem, and examination of the coronary arteries will reveal the presence of disease.

- c. A person injured on the eye may feign blindness to bring the injury within the purview of grievous hurt. A careful medical examination would reveal the true condition.
- d. A woman may complain that she has been raped and accuse a man. Medical examination will help to reveal, if she has been sexually assaulted or a false accusation has been made.
- e. A person may be accused of being intoxicated while driving a motor vehicle. Medical examination would reveal, if he was so much under the influence of alcohol as to endanger public safety.

In all such cases, the doctor may be summoned to appear in a court of law as an *expert witness* and his evidence helps the court to assess the responsibility of the accused.

Thus, forensic medicine plays an important part in guarding the safety of each individual in the community, and also ensures that the accused is not unjustly condemned. Hence, forensic medicine is a subject which deals with all branches of medical knowledge, administered in a court of law for the purpose of administration of justice.

Forensic medicine is a vast subject. All branches of medicine are represented in it but the application of knowledge therefrom is viewed both from a medical as well as legal angle. As for example, when a surgeon sees a wound, he is interested to know, if it is infected or clean and how to treat it. It is of no great consequence to him about how and when it is caused. On the other hand, the Forensic expert is mainly interested to determine the kind of violence or weapon that has produced such an injury, whether the injury can be classified as simple or grievous, and the time when it was inflicted. This involves on his part, besides a basic and thorough medical knowledge, an understanding of certain provisions of the law of his country, e.g. Indian Penal Code (IPC), Criminal Procedure Code (CrPC), Indian Evidence Act (IEA), etc.

**ii.** *Forensic pathology* is a special field of pathology dealing with the medicolegal investigation of death. Accordingly, it is concerned with certain kinds of cases, such as sudden, unexplained, *suspicious, unnatural* and violent deaths. A full autopsy is required in most cases to determine the cause and manner of death. In fact, forensic autopsy is clinical autopsy plus the legal needs completed. Usually, pathology deals with the disease, whereas forensic pathology in addition deals with the cause of death, time since death, and the manner of death which are required for the purpose of investigation of crime.

**iii.** *Forensic nursing* is a speciality dealing with the scientific role of registered nurses in the medicolegal arena. It aims to provide a constructive response to the societal needs of the victims of domestic violence, sexual assault, drug and alcohol addiction, psychological abuse, trauma, and other death-related problems.

**iv.** *Medical jurisprudence* (*juris* = law; *prudentia* = knowledge) deals with the knowledge of law in relation to the practice of medicine. It deals with those relationships which are generally recognised as having legal consequences, e.g. (a) doctor-patient relationship, (b) doctor-doctor relationship, and (c) doctor-state relationship. In short, it deals with legal aspects of medical practice.

The following are a few examples:

- a. *Doctor-patient relationship:* When a doctor accepts to treat any person, it constitutes an implied contract. Default on the part of the doctor to provide adequate standard of care may render him liable to have the damages assessed against such default, if it has resulted in either physical or mental injury or monetary loss to the other party, e.g. malpractice, wrong diagnosis and unnecessary surgery, criminal abortion, divulging professional secrets, etc.
- b. *Doctor–doctor relationship:* A doctor criticising his colleagues or doing anything that means unfair competition is liable to face the consequences. As for example, a doctor making a derogatory remark about the practice or technique of another doctor may be guilty of such an offence. One example of such a remark is, "Oh, the other doctor has given you a bad X-ray burn".
- c. *Doctor–state relationship:* A doctor is liable to face the consequences, if he does not (1) attend the court to give evidence in response to a subpoena or inform, the police if he comes across a case of homicidal poisoning or suspected homicidal injuries, such as stab or gunshot wounds, in his practice or the public-health authorities of a case of notifiable disease or of food poisoning from a hotel, restaurant or other eating establishment.

**v.** *State medicine* deals with the medical and health requirement of public, community and environmental health. It deals with the application of medical knowledge to prevent the spread of disease. It is the responsibility of the state to preserve the health of the public. Accordingly, a registered medical practitioner has certain statutory duties: He must inform the public health authorities of—(a) births, (b) deaths, (c) notifiable diseases, and (d) cases of food poisoning from a hotel, restaurant or other

may include taking of fluids in cases of intoxication, etc. Section 53(2) lays down that whenever a female is to be examined, the examination shall be made only by or under the supervision of a female registered medical practitioner. Under section 54 CrPC, an arrested person may be examined by a doctor at his request to detect evidence in his favour.

#### **Illustrative Cases**

*Case 1:* Necessity of consent for examination: The necessity of obtaining consent is stressed in an Indian case in which the question was whether a particular lady was the daughter of one of the defendants to the suit. The trial court directed that the defendant should be sent to a doctor for medical examination to ascertain whether any issue had been born to her. The order was challenged and the appellate court held that in as much as the medical examination of a lady, if not voluntarily consented to by her, would amount to assault and battery, the order of the lower court directing a medical examination was invalid.

*Case 2:* Consent and emergency treatment: A patient who had been bitten by a poisonous snake was not warned by his physician of the possible hazards in receiving snakebite serum. He suffered ill effects. He was not, however, allowed damages because of emergency nature of the situation.

*Case 3:* **Treatment without consent:** A surgeon flatly denied to the patient that he was going to remove her breast. When she awoke from surgery, she discovered that her breast was removed. She was allowed to recover damages from the surgeon on the ground that the defendant had performed a completely unauthorised operation and this amounted to "assault and battery".

*Case 4:* Non-validity of blanket consent: A female patient entered the hospital for an appendectomy. The surgeon removed the appendix and then, while she was under general anaesthesia and without her prior consent, performed a total hysterectomy, the surgeon noticing fibroid uterus. In holding the surgeon liable for damages despite the blanket consent form signed by the patient, the court observed

that the so-called authorisation is so ambiguous as to be almost worthless, and certainly so, since it fails to designate the nature of the operation authorised and for which consent was given. It was pointed out that though it may be convenient for a surgeon to correct unrelated conditions discovered during the course of the operation, in the absence of an emergency threatening the life of a patient, the surgeon should not attempt to extend surgery beyond the scope of the patient's consent.

Case 5: Necessity of informed consent for diagnostic procedures: The patient had injured his neck in a fall. Several months later he reinjured his neck while in his automobile. His physician recommended that he undergo a diagnostic procedure known as a myelogram. The patient claimed that the physician told him the procedure was merely exploratory and that he had nothing to worry about. He further claimed that he suffered a herniated disc during the procedure which caused a "foot drop". He contended that the physician failed to inform him of this risk. The question, the court said, is not whether the reasonable medical practitioner would have disclosed the risk of foot drop. The question is whether or not the physician disclosed sufficient information to enable the patient to intelligently decide whether to undergo the myelogram. If he did not, the court ruled, he would be liable for all injuries sustained by the patient as a result of the procedure.

*Case 6:* **Consent by fraud:** A patient's legs and ankles were badly burned and ulcerated as a result of X-ray treatment for eczema. He alleged that if the defendant physician had made known to him that there was great danger that X-ray treatment might result in burns and ulcers, he would not have permitted the treatment and the injuries complained of would not have occurred. He further alleged that the defendant physician misled him not only by failing to warn him of the danger but also by affirmatively assuring him that X-ray treatment would cure his eczema within 8 weeks. The defendant physician was held liable.

*Case 7:* **Duty of disclosure and its extent:** A 19-year-old man was experiencing severe pain between his shoulder blades. A myelogram revealed a filling defect in the region of the fourth thoracic vertebra. A neurosurgeon recommended that the man undergo a laminectomy. Prior to

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the operation, the neurosurgeon did not inform the man or his mother that the laminectomy involved the risk of paralysis. The patient sued the neurosurgeon for damages. Regarding paralysis as risk of laminectomy, the neurosurgeon testified that there was only a very slight possibility. Paralysis can be expected somewhere in the nature of 1% of all cases. He further testified that it was not good medical practice to inform patients of the risk of paralysis. The disclosure of this risk might deter patients from undergoing the laminectomy that they needed or that it might cause an adverse psychological reaction that could decrease the possible success of the operation. The neurosurgeon was held liable. The court ruled that in all uncommon treatment or procedures, the doctor has a legal duty to inform the patient of the risk of death or serious bodily injury.

Case 8: Duty of disclosure and its extent: A patient who was given a pint of blood in connection with dilatation and curettage developed serum hepatitis. She alleged that the defendant hospital was negligent in failing to warn her of the risk of contracting serum hepatitis. The court said, "Considering the frequency of the use of transfusions, the nature and extent of the risk involved in comparison with the alternative risk, the possible detrimental effect of advising the patient of the risk, and the general practice in the local medical profession not to so advise patients, the court feels impelled to conclude that the defendant did not have a legal duty to the plaintiff to advise her in advance that serum hepatitis might be communicated".

*Case 9:* Alternative treatment: Without advising a patient with prostatic disorder that the recommended surgery would inevitably sterilise him or that there was another method of curing the disorder, the surgeon operated. In upholding the jury's award of damages to the patient, the appeals court held that in the absence of an emergency, the patient should have been advised of all alternatives by the defendant surgeon. He had a right to be given a chance to make up his own mind as to the alternative he preferred.

*Case 10:* **Consent for treatment by a particular doctor:** A patient was operated upon for hernia by a house surgeon instead of an experienced

and senior surgeon. The patient alleged that he had been shocked that an apprentice had operated upon him without obtaining his consent when he had engaged a skilled craftsman. It was, however, admitted on the patient's behalf that the operation had been performed in an entirely competent manner. It was held that the house surgeon had operated without the plaintiff's consent and that for an unauthorised person to do so, was a highly technical form of trespass. Although, the house surgeon had behaved in accordance with the traditions of his profession, as there had been technical trespass, the patient was awarded nominal damages amounting to twenty shillings.

Case 11: What constitutes informed consent: A patient underwent electroshock and insulin subcoma therapy for severe depression and anxiety complicated by alcoholism. He consented orally to the treatment before hand; there was no question of mental incompetence. The treatment, which was not immediately necessary to save his life, was carried out by qualified medical staff competently and without negligence. In the course of the treatment, the plaintiff suffered fractured vertebrae during a convulsion though all reasonable precautions had been taken to prevent this. Medical evidence was given that shock therapy carried a high risk of fracture. One doctor assessed it at 18%. The plaintiff did not complain that the treatment was not recommended by good medical practice or that it was not competent nor did he deny that he had given consent. He brought an action on the ground that he had not been informed of inherent risks and dangers and that the doctors had been negligent in not giving him this information. He said that he would not have consented had he known of the hazards. The court considered the following facts: (i) the risks of fracture were matters of fact and not speculation, (ii) the risks were high, (iii) the incidental hazard of fracture was not a danger which the ordinary patient would know about without special information, (iv) there was no emergency, (v) the patient was not mentally incompetent and could understand explanations, and (vi) there is reason to believe that the plaintiff would not have consented to the treatment had he known of the dangers. It was held that a prima facie cause for action in negligence was established.

## Identification in Mass Disasters

#### Q. 4.1. Define mass disaster. Mention the objectives of forensic investigation. Enumerate the specific points on which the identity can be established in mass disasters (fragmentary remains).

Mass disaster generally means the death of more than 12 victims in a single event. However, it is more logical to define it as the number of deaths which exceeds the capacity of the local death investigation system can handle.

The *objectives* of forensic investigation are:

- 1. To find the cause of the disaster, such as bomb or detonator fragments that may be embedded in the bodies of the victims.
- 2. To obtain samples for toxicological analysis (especially alcohol and carbon monoxide) where appropriate.
- 3. To determine the cause and manner of death of each individual.

In mass disasters, such as air or train accident, an entire body may not be available, and examination may have to be carried out from the available fragmentary remains.

*Identification* from remains begins at the scene of death. It should proceed in an orderly manner and be documented by photographs and diagrams. It is achieved by building up a description for each person as regards: (1) appearance, (2) clothing, pocket contents and other personal effects, (3) deformities, birth marks (moles),

occupation marks, scars, and tattoos, (4) race, (5) sex, (6) age, (7) stature, (8) fingerprints, (9) footprints in military personnel and newly born children in some hospitals, (10) dental status, (11) miscellaneous data and (12) data from specialised techniques.

#### Q. 4.2. Comment on: (1) photographs, (2) faked photographs, (3) superimposition photography, (4) facial reconstruction.

#### **Photographs**

Photographs are helpful in medicolegal work as they provide accurate documentation. Photographs, preferably with a scale in the plane of interest, serve various useful purposes:

- 1. They help to identify the body.
- 2. They provide an accurate picture of the scene of crime, e.g. evidence of struggle, if any; position of the body; presence of injuries; amount of blood lost; crime weapon, etc.
- 3. They may help the witness to refresh his memory about the findings.
- 4. They help the court to understand the testimony in its proper perspective.
- 5. Relevant photographs enhance the credibility of evidence especially with regard to those observations and interpretations which are supported by them, e.g. tailing of an incised wound indicates its direction.

#### **Faked Photographs**

The possibility of faked photographs should be considered on some occasions. The important deciding points are—(1) shadow inconsistencies, (2) grain distribution, (3) indication of grafting, (4) inconsistencies of body proportions, (5) retouching, (6) environmental profile, and (7) other data. All these factors can be easily understood from a brief discussion of the photographs of Lee Harvey Oswald (armed with gun), the alleged assassin of US President John F Kennedy, where the authenticity of photographs produced before the investigation commission became a matter of dispute. The photographic experts suspected that the head of Oswald was superimposed on a photograph of someone else and there were a number of other inconsistencies and problems also, such as height to rifle length ratio, and visual retouching of the chin area.

*Shadow inconsistencies*: The shadow on Oswald's face cast by his nose and eyebrows showed that the sun is directly overhead while the long shadows on the ground showed that the sun was in the late afternoon.

The body shadows did not relate to other shadows in the picture. The gun could be seen at an angle to the body which did not relate to the angle of the shadow.

*Grain distribution:* The grain distribution may not be uniform. In composited photographs, the grain distribution may be noticeably different.

*Indication of grafting:* There was a line running directly across Oswald's chin as evidence of compositing. No unnatural line could be discerned on the original negative when inspected using magnifying and microscopic equipment, varying density exposures and digital image processing.

The pictures of Oswald's backyard were visually inspected with stereoscopic techniques that permit the prints to be viewed in three dimensions. This analytic technique is useful to detect fakery because photographs of prints, when viewed in a stereo, will not project a three-dimensional image unless made from different view points along one axis. Any retouching of an original photograph of a scene can be detected because when two photographs of a scene are viewed in stereo, the retouched item will appear to lie either in front or behind the plane in which it should be lying. It is virtually impossible to retouch one or both images of a stereo pair with enough skill to escape detection when viewed stereoscopically.

*Inconsistencies of body proportions:* This can be studied photogrammatically. Photogrammetry is the science of ascertaining the positions and dimensions of objects from measurements of photographs of these objects. This method was given particular emphasis in studying critical shadow areas in Oswald's case. It was also found that the height to rifle length ratio did not match.

From a study of Oswald's photographs, it was apparent that Oswald's face did not precisely fit the neck and body in each picture. Furthermore, the facial portrait of Oswald was exactly the same in each photograph, whereas the posture and distance of the body from the camera differed. In addition to that, using the length of his face as a standard of measurement, it was found that one of the bodies in one picture was clearly taller than the corresponding body in another picture.

Oswald had a rounded chin while the photograph showed a square chin. Thompson, a British forensic photographic expert, said. "It is apparent that from the upper lip to the top of the head is Oswald and one can only conclude from the photograph that Oswald's head has been stuck on to a chin, not being Oswald's chin."

*Retouching:* The visual areas of retouching should be carefully observed. The retouching was very obvious in certain parts

The Charaka Samhita (Textbook of Medicine) and Sushruta Samhita (Textbook of Surgery) dating back to 200 BC and 200 AD, respectively, focus on India's age old proficiency in medical science. Today, there are number of laws which govern clinical research in India. There are shortcomings in the existing legal provisions with regard to identification of individuals for specified purposes such as victims of disasters, missing persons, etc., the Department of Biotechnology came up with a draft Bill titled "The Use and Regulation of DNA-Based Technology in Civil and Criminal Proceedings, Identification of Missing Persons and Human Remains Bill, 2016." On 27 September 2016, the draft Bill was forwarded to the Law Commission of India for examination and its revision, if required. DNA profiling technology, which is based on proven scientific principles, has been found to be very effective for social welfare, particularly, in enabling the Criminal Justice Delivery System to identify the offenders. Such tests relating to a party would definitely constitute corroborative evidence. Appreciating the use and regulation of DNA based technology in judicial proceedings, particularly, identification of persons accused of offences under the Indian Penal Code 1860 (IPC) and other laws, identification of missing persons and disaster victims apart from its use in medical sciences; a need has long been felt to have a special legislation to regulate human DNA profiling. DNA analysis offers substantial information which, if misused or used improperly, may cause serious harm to individuals and the society as a whole.

**Uses of DNA profiling:** DNA profiling, an accurate and well-established scientific technique is used for disaster victim identification, investigation of crimes, identification of missing persons and human remains, and for medical research purposes. Most of the countries have

enacted appropriate laws within the framework of their respective constitutions and other legal frameworks for the aforesaid purposes. DNA profiling and use thereof involves various legal and ethical issues and concerns are raised and apprehensions exist in the minds of the common man about its misuse which unless protected may result in disclosure of personal information, such as health related data capable of being misused by persons having prejudicial interests, adversely affecting the privacy of the person. The mechanism provided permits for processing of DNA samples only for 13 CODIS loci which would not violate in any way the privacy of a person and as a result will never go beyond identification of a particular person. The strict adherence to 13 CODIS loci will eliminate the apprehension of revealing genetic traits. The Code of Criminal Procedure (Amendment) Act 2005 which came into force on 23rd June 2006 added explanations to sections 53, 53A and 54 to clarify the scope of medical examination particularly in respect to the extraction to the bodily substances and the explanation provides that examination of a person shall include the examination of blood, blood stains, semen, swabs in case of sexual offences, sputum and sweat, hair samples and finger nail clippings by scientific techniques including DNA profiling and such other tests that the medical practitioner deems necessary.

**DNA profiling test:** The DNA profiling technique has been expressly included among the various forms of medical examination in the amended explanation to sections 53, 53A and 54 of the CrPC. It must also be clarified that a 'DNA profile' is different from a DNA sample which can be obtained from bodily substances. A DNA profile is a record created on the basis of DNA samples made available to forensic experts. Creating and maintaining DNA profiles of offenders and suspects are useful

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## Trauma, Work Stress, and Disease

## Q. 19.1. Discuss in detail the relationship between trauma, work stress, and disease, giving examples.

The relationship between trauma, work stress, and disease assumes importance mainly for two reasons, viz: (1) compensation, and (2) insurance.

*Compensation:* Under the Workmen's Compensation Act, provision is made for disabilities suffered as a result of occupational acquired disease or industrial accidents while at work, provided the worker himself was not negligent or responsible for the injury.

In case of death, especially when there has been no medical attention and the possibility of disease seems remote, a question arises if the ill-effects of workconditions or previous injury suffered by the worker while at work could be responsible for death.

*Insurance:* A person may have insured himself for "accident" only. Besides, some life insurance policies include a clause that if death is due to accident then the sum payable is doubled. This is called a double indemnity policy.

When these matters become the subject of investigation, a medical officer is called upon to examine a person: (a) to assess the disability or degree of physical damage, or (b) to perform an autopsy to interpret the relationship of disease or trauma to death.

In case of disability, a very thorough examination is essential, keeping the worker under observation, if necessary, to assess the degree of disablement, either temporary or permanent. An objective and balanced description of damage done by the injury and an opinion on the patient's future prospects at work and recreation is usually sufficient. The most important aspect is evaluation of whether the disabilities, claimed and observed, are consistent with the injury received. The worker may malinger and make false claims or he might have developed a neurosis after the accident. Malingering means a deliberate attempt on the part of patient to deceive the doctor.

In case of death, an autopsy should be performed. In a situation where autopsy findings indicate that there is a combination of injury and disease, the medical officer should analyse the data carefully and opine on the relative role of trauma and disease to death. Just because a given episode of stress, exertion, or trauma was antecedent, the assumption of cause and effect relationship is not necessarily warranted.

The following comments are intended to offer some assistance as to the line of approach to be adopted in certain common situations. For convenience, the discussion is grouped into:

1. Trauma and the heart

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- 2. Trauma and the nervous system
- 3. Trauma and the alimentary system
- 4. Trauma and malignancy
- 5. Disease from non-traumatic accident

#### TRAUMA AND THE HEART

Injury to any part of the body may predispose to myocardial infarction with or without coronary thrombosis, if the injury is sufficiently severe to cause hypovolaemic shock and coronary arteries are previously narrowed by atherosclerosis. In such a case, the injury causes a protracted episode of circulatory failure, and myocardial infarction occurs during the period of shock. Diagnosis should, however, be confirmed by clinical and laboratory tests in the living and appropriate findings at autopsy in the dead.

Thoracic trauma may lead to: (a) cardiac bruising, (b) myocardial infarction with or without coronary thrombosis, (c) subintimal haemorrhage in a coronary artery leading to coronary thrombosis, (d) arteriovenous communication, (e) dissecting aneurysm, and (f) rupture of aneurysm.

If the heart has sustained a significant degree of bruising as a result of thoracic trauma, heart failure should be apparent almost immediately. A cardiac bruise either causes death or disability within a few minutes, or recovery occurs without permanent or progressive damage to the heart.'

Occupational trauma, as defined by effort at work, can precipitate death by giving rise to circulatory overloading, or by aggravating previously existing disease, such as, coronary atherosclerosis, or aortic aneurysm. Narrowing is sufficient to explain death and a clot or acute obstruction is not necessary. It is frequent for death from partial coronary stenosis by atheroma to be precipitated by some exertion resulting in a greater demand of: (1) blood, (2) the pumping action of the heart, and (3) oxygen demand of the muscle of the left ventricle. Climbing stairs, working a hand pump, lifting a weight, etc., may precipitate such deaths, and if the deceased at the time of collapse was engaged in some such work as a part of his employment, then a claim for compensation may succeed. In determining the relationship of stress to death in such cases, the autopsy findings must include evidence of previous damage to the heart muscle (fibrosis), narrowing of the coronary vessels, and evidence of activity of disease in the form of infiltration of vessels' coats by white blood cells (adventitial lymphocytosis). Periodic health check-ups of workers are, therefore, essential, and if the doctor finds any such problematic condition he should inform the authorities and also warn the worker of the danger. Cardiac conditions which predispose to acute heart failure following physical exertion or excitement and which frequently result in sudden death include syphilitic aortitis with or without aortic valvular insufficiency, aortic valvulitis with stenosis, and hypertensive heart disease usually with coronary atherosclerosis.

A worker whose pre-existing aneurysm ruptured while tightening a bolt by a spanner was awarded compensation under the Workmen's Compensation Act, the Court having ruled that such exertion provided stress for the catastrophe to occur (Clover Clayton & Co vs Hughes, 1910, AC 242).

#### TRAUMA AND THE NERVOUS SYSTEM

Instances are on record where it is difficult to refute completely the direct cause and effect relationship between: (a) head injury and meningitis, (b) head injury and epilepsy, (c) head injury and psychosis, and (d) head injury including occupational stress and rupture of a congenital cerebral aneurysm.

It is now an accepted fact that intracerebral haemorrhage can occur due to violence alone without any evidence of disease of blood vessels. 23

## Violence in the Home

In the present society which is gradually becoming over-democratic it is natural that the old values of sanctity of life, respect for elders, and affection for family members should change and personality problems develop due to consequent stresses of life. These ultimately result in violence. The main victims of this changing pattern of life are children, wives, and the elderly. The common pathological features of all types of non-accidental violence in the family are *multiple injuries of varying age and aetiology.* Various terms are attached to the various forms of violence, such as battered babies, battered wives, battered elderly, etc., though battering is not the only feature.

#### **BATTERED BABY (CAFFEY SYNDROME)**

#### Q. 23.1. Give a detailed account of battered baby or Caffey syndrome from a medicolegal point of view.

The battered baby syndrome is a term used to define a clinical condition in young children usually under three years of age, who have received non-accidental violence or injury, on one or more occasions, at the hands of an adult responsible for the child's welfare. Six patterns of child abuse are recognised: (1) physical abuse, (2) nutritional deprivation, (3) sexual abuse, (4) intentional drugging, (5) neglect of medical care or safety, and (6) emotional abuse.

The victim is often an unwanted child, an illegitimate child, or a child whose father's paternity is doubted. The precipitating factor is usually a cry which interferes with either a parent's sleep or the outing, or their television programme. Battering is the result of sudden loss of temper under such and allied circumstances. The type of persons involved in child battering have frequently a low IQ. Some have a history of family discord, long-standing emotional problems, and financial stress, while others have a history of criminal background. Recent reports suggest that such parents had received similar treatment from their parents in their own childhood.

Injuries are commonly multiple, although all are not necessarily severe. They usually follow a pattern with one or more localised bruises on the head quite inconsistent with a simple fall, or bruises on the face, trunk, and extremities consistent with grip marks. Tearing of the frenum of upper lip and of alveolar margin of gums to stifle cries is commonly encountered.

Major injuries which prove fatal include head injuries, e.g. fractured skull and subdural haematoma, or visceral injuries, e.g. ruptured liver and mesenteric haemorrhages. Clinical and radiological evidence may be obtained that injuries have occurred at different times. The syndrome must be considered in any child: (1) in whom the degree and type of injury is at variance with the history given, (2) when injuries of different ages and in different stages of healing are found, (3) when there is purposeful delay in seeking medical attention despite serious injury, (4) who exhibits evidence of fracture of any bone, subdural haematoma, failure to thrive, soft tissue swelling or skin bruising, or (5) who dies suddenly.

In the Eastern culture, babies are considered as gifts from God and cases of battered baby syndrome are rare. However, instances of ill-treatment of young children (child abuse) who work as domestic servants are not uncommon. While child labour is prohibited, instances are on record when employers have beaten such children with sticks or branded with a pair of hot torigs. The crime comes to light only when such children complain to some one who knows their mother tongue.

#### Autopsy

The history may be completely misleading as to circumstances surrounding death. The external and internal examination should, therefore, be very thorough and supported by sketches, photographs, X-rays, microscopic sections of pertinent lesions, and toxicological analysis. Photographs should include views of the entire body showing distribution of injuries and close-up views showing their details. Colour photographs will show difference in ages between the various bruises.

*External examination:* Clothing should be examined for the degree of its cleanliness and state of repair. Weight, height, head circumference, and state of nutrition should be noted. The state of nutrition is assessed by subcutaneous fatty depot, and degree of diaper rash and its sequelae, such as infections, scarring, or loss of pigmentation. Special note should be made of any

evidence of insect infestation including fresh bites or secondary infection in more recent bites.

The external examination should also record any instance of suspected trauma, either remote or recent, noting in precise detail size, shape, location, colour, and degree of healing. Asymmetry of head or extremities, tearing of frenum of upper lip, burn scars, swelling of joints, and congenital deformities should be specially looked for. Fresh burns from cigarettes ends may be found. Careful examination of eyes may reveal subconjunctival haemorrhages, detached retina, and even displaced lenses. Genitalia should be specifically looked at for evidence of sexual abuse, such as pinching of scrotum and application of ligature to penis in males and concealed puncture wounds in females. Search should be made over the exterior of body for any type of trace evidence that may afford a clue to the actual assailant or the nature of weapon used.

**X-raying of whole body is essential** to reveal skeletal changes, either due to battering or natural disease, e.g. scurvy or osteogenesis imperfecta. If subtle changes due to battering are noted, another X-ray after evisceration is more revealing. A certain minimum number of photographs is essential: (1) the child in its clothing, (2) all external injuries, and (3) injuries and abnormalities found during examination.

*Internal examination: Head:* The scalp should be examined for bruising which is more easily felt than seen. Any type of brain injury may be found. Careful differentiation between coup and contre coup lesions will help to determine, if the injury resulted from a moving object striking a fixed head or a moving head striking a fixed object. Cerebral oedema is more common, than in the adult, after head injury. A number of deaths after head injury in a child are caused by raised intracranial tension

3. If born alive, how long did the child live?

4. What was the cause of death?

#### Q. 31.3. What is meant by a stillborn child and a dead-born child? How will you examine and establish that a child was stillborn or dead-born?

Conventionally, a stillborn child means a child which is born after the 28 weeks (age of viability) of pregnancy and which did not at any time after being completely expelled from its mother, breathe or show any other sign of life. The fact that the newly born child may be in a state of suspended animation must be borne in mind. The incidence of stillbirths in general is about 6% of all births and in primiparas about 9%. Stillbirths are due to many causes both before and during birth. They often occur among illegitimate and immature children, and where the labour is unassisted, or prolonged. Scalp oedema, cephalhaematoma, or severe moulding of the head are signs of prolonged labour and are indicative of stillbirth or death from natural causes shortly after birth.

A **dead-born child** is one which has died in utero and may show signs of rigor mortis, maceration or mummification.

*Rigor mortis:* Rigor mortis may occur in a dead foetus before birth. The most common cause is antenatal haemorrhage in the mother.

*Maceration:* This is a process of aseptic autolysis of a foetus dead in utero. It occurs when the dead foetus remains in the uterus for 3–4 days surrounded by liquor amnii but with the exclusion of air. It does not occur, if the dead foetus is born within about 24 hours. It is characterised by softening and degeneration of tissues. The process is aseptic because the foetus being enclosed in the membranes is in a sterile condition. When death has occurred for more than 3–4 days, depending on the time interval, the body is so softened and flaccid



Fig. 31.1: Disposing unwanted fetus in a closed briefcase found on railway platform scare created, if there is any bomb inside. (*Photo*: BV Subrahmanyam)

that it flattens out when placed on the table. The cuticle is raised in blisters containing thin fluid or is peeling and the true skin is brownish-red. The cellular tissues and organs are oedematous and body cavities full of reddish serum. The umbilical cord is thickened and soft. The bony junctions both in the skull and in the joints are lax and abnormally mobile. The skull bones override each other, an important radiological sign, known as Spalding's sign, which enables the diagnosis of this condition even when the foetus is in the uterus. The smell is somewhat rancid. If the membranes are ruptured after the death of the foetus and air gains admission into liquor amnii, the foetus undergoes putrefaction instead of maceration. Putrefaction is characterised by nauseating and unpleasant odour, green colour of the skin, and formation of gases. The latter findings differentiate it from maceration where the colour of skin is brownish red and gases do not form. Rarely, a child which has remained surrounded in amniotic fluid after death may get converted into *adipocere*.

*Mummification:* Mummification results when death of a foetus occurs from a deficient supply of blood or when liquor amnii is scanty, and when no air has entered the uterus. In this condition, the foetus is dried up and shrivelled.

#### 444

<u>Chapter</u>

42

## Non-Metallic Poisons

#### **IRRITANT POISONS**

The irritant poisons are classified as: (1) inorganic poisons (non-metals and metals), (2) organic poisons (vegetables and animals), and (3) mechanical poisons. Corrosives in very dilute solutions act as irritants.

Irritant poisons cause symptoms of gastroenteritis and also exert a marked depressant action after absorption. Chronic metallic poisoning leads to such a lingering death that chronic arsenic poisoning has been known as a 'slow-poison'.

General symptoms and signs: The onset of symptoms and signs which is variable is usually within half an hour to an hour. There is burning sensation in the mouth, throat, oesophagus, stomach and abdomen, followed by intense thirst, difficulty in swallowing, continuous retching, painful vomiting and diarrhoea. The vomited matter at first consists of normal stomach contents, but later becomes bilious in character and may be of dark brown appearance due to altered blood. The diarrhoea is severe, accompanied by tenesmus and consists at first of loose stools and later of stools mixed with mucus and blood. Collapse from shock sets in with cold clammy skin, pale anxious face, rapid feeble pulse, and sighing respirations. Cramps may affect the muscles of the limbs. Consciousness is usually retained during this period. Convulsions and/or coma may follow. Death occurs within 24 hours from shock, or in a few days from exhaustion. The patient may recover and death may ensue later from stricture of the oesophagus or other sequelae.

**Postmortem appearances** show changes chiefly in the stomach, and frequently in the duodenal and rectal portions of the intestinal tract.

#### NON-METALLIC POISONS

The important poisons in this group are: (1) phosphorus, and (2) iodine.

#### PHOSPHORUS

# Q. 42.1. Give the general characters, symptoms, signs, treatment, postmortem appearances, and medicolegal aspects of phosphorus poisoning. Add a note on necrobiosis of liver.

Phosphorus exists in two forms, viz. white as crystalline and red as amorphous. The white one becomes yellow on exposure to the air. It is, therefore, also called yellow phosphorus. It exists in the form of translucent, waxy, luminous cylinders. It is slightly soluble in alcohol, freely soluble in carbon disulphide, and insoluble in water. Being easily oxidisable, it is kept submerged in water to prevent ignition. When exposed to atmosphere, it gives off dense white fumes of phosphoric and phosphorus acids with a strong odour of garlic and are luminous in the dark. The fumes glow with pale yellow colour (*phosphorescence*). Red phosphorus is inert unless contaminated with yellow phosphorus. It is non-luminous, amorphous, odourless, insoluble in carbon disulphide, and does not give off fumes when exposed to air. Mixed with powdered glass, it is used on the side (striking surface) of the match box. The tip of the match stick contains a mixture of potassium chlorate and antimony sulphide.

Phosphorus is a protoplasmic poison. It affects cellular oxidation. Its effect on cellular metabolism is comparable to ischaemia. Under such anoxic condition, the metabolism of the cells diminishes considerably. This is known as necrobiosis, which is classically manifested in the liver. Deposition of glycogen in liver is inhibited while deposition of fat is increased.

#### Acute Poisoning

*Symptoms and signs:* There are two phases in the symptoms, primary, due to the local irritant action on the gastrointestinal tract, and secondary, due to the action of the absorbed poison, and there is usually a considerable interval between them.

The primary symptoms usually occur within two to six hours. There is burning pain in the throat, oesophagus and stomach with intense thirst, frequent gaseous eructations, nausea, vomiting, and diarrhoea. The patient may complain of a garlic taste in the mouth and a garlic odour may be perceived in the breath. The vomited matter is darkened by blood, smells of garlic, and is luminous in the dark. The faeces may be dark, luminous and offensive. The luminosity of vomit and faeces is diagnostic. This primary irritative stage lasts one to two days and may be so severe that the victim dies from collapse and cardiac failure. However, this is not the usual course and remissions are common after the usual bouts of vomiting and

diarrhoea. Contact of phosphorus with skin produces slow healing burns.

In the **usual clinical course**, there is a remission lasting for about two to three days. Then, secondary symptoms occur due to the absorbed poison damaging mainly the liver and kidneys. The original symptoms return, and in addition, there is jaundice and distension of the abdomen due to enlargement and necrosis of the liver. In the early stages, the liver is enlarged due to fatty degeneration (necrobiosis) and in late stages, it is shrunken due to necrosis (acute yellow atrophy). Purpura and epistaxis may follow due to hypoprothombinaemia. The faeces are pale. The urine is scanty and concentrated, strongly acid in reaction, and contains blood, albumin, bile, and sometimes sugar and crystals of tyrosine, leucine and cystine due to disturbed metabolism. Pregnant women abort with alarming flooding. Nervous system involvement manifests as frontal pains, insomnia, ringing in the ears, impaired vision, formication, cramps, and paralysis. Priapism is frequent. Death results from hepatic and renal insufficiency. The clinical picture is suggestive of acute yellow atrophy of the liver.

*Fatal dose:* A dose of 60–120 mg is usually considered a fatal dose, though as with all gastric irritants, vomiting may permit recovery from much larger doses.

*Fatal period:* Death may occur from collapse within 24 hours. In the normal course, it may occur in six to seven days or longer.

*Treatment:* Demulcents (oily and fatty substances including milk) are contraindicated as they dissolve and promote absorption of phosphorus. The stomach should be lavaged with 0.5% solution of potassium permanganate repeatedly, till no more smell of garlic is perceptible, and the bowel evacuated by a brisk purgative. Potassium

## **Deliriant Poisons**

The poisons in this group are characterised by a well-marked deliriant stage. The important poisons are: *Dhatura, Atropa belladonna, Hyoscyamus niger,* and *Cannabis indica*.

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Chapter

#### DHATURA

The plant commonly grows in waste places all over India. There are two varieties, viz. dhatura alba, a white-flowered plant (safed dhatura), and dhatura niger, a black or purple-flowered one (kala dhatura). The flowers are bell-shaped. The fruits are spherical and have sharp spines, giving the name thorn apple to the plant. They contain yellowish brown seeds resembling chilli seeds (Figs 54.1 to 54.3). Their differentiating







Fig. 54.1: Dhatura fruit (*Courtesy:* Dr SV Phanindra)



Fig. 54.3: Atrops belladonna plant with leaves, fruit and flowers

features have already been outlined under the topic "Capsicum". An average-sized fruit contains 450 to 500 seeds, and weighs about 8 grams. One hundred seeds weigh about 1 gram. All parts of the plant are poisonous but the seeds and fruits more so. The active principle contains the alkaloids, laevohyoscyamine, hyoscine or scopolamine, and traces of atropine.

An alkaloid is a complex chemical substance found in various plants. It is so called because it behaves like an alkali and combines with acids to form salts. The distribution of alkaloids in the plant is not uniform; some are concentrated in the roots, others in the seeds, still others in the bark, and so on. They act mainly on some portion of the central nervous system, each having its own individual action.

## Q. 54.1. Give a brief account of dhatura poisoning.

The alkaloids of dhatura stimulate the higher centres of the brain, and then the motor centres. They inhibit secretion of sweat and saliva, dilate the cutaneous blood vessels, dilate the pupil and stimulate the heat regulating centre situated in the floor of the third ventricle. The initial stimulation is followed by depression and paralysis of the vital centres in the medulla.

*Symptoms and signs:* The symptoms are described as "dry as a bone, red as a beet, blind as a bat, hot as a hare, and mad as a wet hen". They appear within half an hour, if seeds are taken, or earlier, if a decoction (concentrated water extract) of seeds is used, and almost immediately, if the alkaloids are taken. In most cases, powdered seeds are administered in food.

The earliest symptom is a bitter taste in the mouth. Due to inhibition of salivation, there is dryness of the mouth and throat (dry as a bone) resulting in difficulty in talking, dysphagia and unquenchable thirst. The face is flushed due to dilatation of cutaneous blood vessels (red as a beet). The pupils are dilated, insensitive to light, and the power of accommodation for near vision is paralysed (blind as a bat). The body temperature is raised. The skin is dry and hot (hot as a hare) due to inhibition of sweat secretion and stimulation of heat regulating centre. There is vomiting. These symptoms are soon followed by giddiness and unsteady gait, the person staggering like a drunken individual. The mind is affected early, the patient being at first restless and confused, and later becoming delirious, and mutters indistinct words (mad as a wet hen). He is subject to visual and auditory hallucinations. He appears to grasp at imaginary objects, picks at his clothings, and tries to pull imaginary threads from the tips of his fingers. The delirium passes off in an hour or so and the patient becomes drowsy (Figs 54.4 and 54.5). There may be a scarlatiniform rash. The drowsiness may progress to stupor or coma and rarely death from respiratory paralysis. Secondary delirium may appear when the patient recovers.

The important symptoms and signs can be summarized under 9 Ds, viz: (1) dryness of the mouth and throat, (2) difficulty in



Fig. 54.4: Acute dhatura poisoning. The victim picks at the clothings. (*Courtesy:* Dr GB Sahay)

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## Asphyxiants (Irrespirable Gases)

Asphyxiants mainly produce respiratory embarrassment. The important asphyxiants amongst others include carbon monoxide, carbon dioxide, hydrogen sulphide and some war gases. Carbon monoxide reduces the oxygen carrying capacity of the blood; carbon dioxide produces oxygen lack in the tissues; hydrogen sulphide paralyses the respiratory centre.

#### CARBON MONOXIDE

#### Q. 58.1. Mention the sources, clinical features, treatment, and postmortem appearances of carbon monoxide poisoning. Add a note on medicolegal aspects.

This is a colourless, odourless, non-irritant gas which cannot be perceived by the senses. It is formed by incomplete combustion of carbon and organic matter. The principal sources are: water gas, and illuminating gas; gases resulting from explosion in mines, from dynamite and other high explosives; from improperly regulated oil heaters, large oil lamps, and gas heaters without efficient fiues; and from gases formed in crank cases, exhaust of vehicular engines, cycle engines, and in burning houses.

The affinity of carbon monoxide for haemoglobin is about 200–300 times greater than that of oxygen. It displaces oxygen and combines with haemoglobin to form carboxyhaemoglobin which is a relatively stable compound. This results in tissue anoxia. It was formerly thought that the toxicity of the gas is due to its anoxic action but recently Lo Menzo and Pentelez have shown that dissolved CO interferes with some vital cellular enzymes.

*Symptoms and signs:* These depend upon the degree of saturation of carbon monoxide in the blood. The approximate relationship between carboxyhaemoglobin level and clinical manifestations is summarised in Table 58.1.

Table 58.1: Symptoms of saturation of carbon monoxide   in blood				
Saturation of haemo- globin with CO	Symptoms			
0–10% 10–20%	No appreciable symptoms Shortness of breath on exertion, mild headache, lassitude and flushed skin			
20–30%	Throbbing headache, buzzing in the ears. Breathlessness, muscu- lar weakness and in coordination, dulling of senses			
30–40%	Severe headache, dizziness, nausea, vomiting, collapse on slight exertion. Breathlessness. Mental confusion, impaired judge- ment, muscular weakness and incoordination. Dim vision			
40–50%	All symptoms intensified. May be mistaken with drunkenness. Incoordination, staggering, mental confusion, loss of memory, palpi- tation and dyspaces			
50–70%	Intermittent asphyxial convulsions, coma, Cheyne-Stokes respiration, respiratory paralysis and death			
Above 70%	Rapidly fatal due to respiratory arrest			

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## Some Important Information

This book, both as regards text and illustrations, is self-sufficient to cater to the varying requirements of the different groups of users. However, to encourage a **professional** *outlook*, this appendix has been prepared. It also includes material which involves methods or leads to results which are of considerable practical importance, although it has not been found possible to include it in the text. Special attention should, therefore, be given to this part.

#### **HEIGHTS AND WEIGHTS**

The standards for males and females fixed by the Life Insurance Corporation of India in respect of average height and weight are as follows:

Height	Men		Standard w Womer	Standard weight Women	
	kg	Lb	kg	Lb	
M 1.523 (5'-0'')	-	—	50.8–54.4	112-120	
M 1.5484 (5'-1'')	-	-	51.7–55.3	114–122	
M 1.5738 (5'-2'')	56.3–60.3	124–133	53.1–56.7	117–125	
M 1.5992 (5'-3'')	57.6-61.7	127–136	54.4–58.1	120–128	
M 1.6246 (5'-4'')	58.9-63.5	130–140	56.3–59.9	124–132	
M 1.65 (5'-5'')	60.8–65.3	134–144	57.6-61.2	127–135	
M 1.6754 (5'-6")	62.2-66.7	137–147	58.9-63.5	130–140	
M 1.7008 (5'-7")	64.0-68.5	141–151	60.8–65.3	134–144	
M 1.7262 (5'-8'')	65.8–70.8	145–156	62.2-66.7	137–147	
M 1.7516 (5'-9'')	67.6–72.6	149–160	64.0-68.5	141–151	
M 1.7770 (5'-10'')	69.4–74.4	153–164	65.8–70.3	145–155	
M 1.8204 (5'-11")	71.2–76.2	157–168	67.1–71.1	148–158	
M 1.8278 (6'-0'')	73.0–78.5	161–173	68.5–73.9	151–163	
M 1.8532 (6'-1')	75.3–80.7	166–178	—	—	
M 1.8766 (6'-2'')	77.6–83.5	171–184	—	—	
M 1.9040 (6'-3'')	79.8–85.7	176–189	_	_	

## Parikh's

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The book aims to keep up its image as a reliable text in classrooms and courtrooms, besides serving as a handy guide to the members of investigating agencies and lawyers. The questions in the book are useful to the defence attorneys while examining the medical witnesses in cross-examination.

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