

Clinical Forensic Medicine Advancements

Dr. Shilpa Singh¹, Dr. Sumit Tellewar², Dr. Bhumija Siwach³, Dr. Sachin Chourasia⁴

1. Assistant Professor, Department of Forensic Medicine, Santosh Deemed to be University, Ghaziabad
2. Professor, Department of Forensic Medicine, Santosh Deemed to be University, Ghaziabad
3. Tutor, Department of Forensic Medicine, Santosh Deemed to be University, Ghaziabad
4. Assistant Professor, Department of Forensic Medicine, ACMS, Delhi-10

ABSTRACT

The area of medicine that focuses primarily on instances involving both legal and medical aspects of patient treatment is known as clinical forensic medicine. The discovery, gathering, and preservation of evidence are all parts of a forensic review. Although they are essential parts of a forensic evaluation, pattern injury recognition, injury interpretation, testimony and injury documentation (including photography), reporting requirements, and regulations are rarely discussed in training hospitals.

Intricate forensic problems relating to child abuse, sexual assault, or unexpected childhood mortality are likely to be encountered by medical professionals working in prehospital care and acute care settings in their practise. This article focuses on the most recent developments in forensic evidence, shaken baby syndrome, and paediatric nonaccidental thermal injury as they apply to successful prosecution of sexual assault. Additionally, the most recent clinical forensic medicine publications from 2002 are examined. These publications incorporate useful therapeutic advice from the most insightful writings from the previous ten years.

Sexual assault evaluations

According to estimates, 12% of adolescent girls, 15% of college-aged women, and 20% of adult women have all experienced sexual assault or sexual abuse. Pediatric emergency medicine specialists and emergency medicine doctors have a duty to give victims of sexual abuse and sexual assault the best care possible in the acute care situation. There is a chance for legal defence as part of this care.

Reviewing the forensic records of sexual assault examinations conducted on the general population and correlating these results with the legal outcome allowed researchers to identify which characteristics affected prosecution [1]. This study was published in the Annals of Emergency Medicine in January 2002. 821 sexual assaults were recorded and 801 forensic tests were carried out over the course of the two-year study period. In 202 of the tests, there was evidence of trauma, and 110 (31%) of the cases in which a suspect was identified (n = 355 or 44% of the total) had spermatozoa discovered at the time of the forensic evaluation. When the authors used logistic regression, they discovered that (1) victims had to be under the age of 18;

(2) there had to be trauma; and (3) It is important to remove biologic and trace materials from skin and clothing, as was briefly discussed in the paragraph before. There are easy ways to preserve evidence without affecting the treatment of patients. Protective gloves should be worn while removing and collecting garments, and paper bags should be used rather than plastic ones.

Plastic bags should not be used since they put the fabric at risk for fungus contamination, which can reduce the quality of the specimen. Additionally, plastic bags increase the likelihood of moisture accumulation and hasten the deterioration of relevant evidence. Seminal fluid detection in sexual assault and abuse situations is crucial for forensic, medical, and legal experts.

The most frequent blunt force that an emergency room doctor sees is a contusion, followed by an abrasion and finally a laceration. Recognition of pattern contusions can assist in locating the offending weapon or body part in an assault. A circular bruise less than 2 cm in diameter on the inside aspect of the upper arm that is consistent with a grab mark would be an example of a pattern contusion. The bite mark is another pattern contusion that is essential to identify from the perspective of clinical forensic medicine. Human bite marks are a type of pattern injury that typically takes the form of two arches of contusions, either with or without abrasions. When a patient appears suddenly, it should be standard practise to swab the bite marks on the victim's skin. Distilled water and a standard sterile culture swab (cotton-tip applicator) are the only tools required, and both are readily available in an emergency room and office setting. It is necessary to wet the cotton, rub it over the bite, and then let it air dry. This might help to recover DNA-rich epithelial cells, which would be helpful in identifying the criminal.

The extremities were the most commonly wounded areas during the sexual assaults listed in the 2002 paper, followed by the head and neck, back, chest, and abdomen [1]. The most common genital trauma cases included cervical erosions, shallow vaginal opening and orifice lacerations, swelling abrasions, and erythema. There are a number of limitations with the physical examination that should be noted in the acute environment. In the 2002 investigation, spermatozoa were found on wet-mounted microscopic slides in 31% of the cases, according to forensic examiners. In contrast to earlier publications, this actually reflects a higher proportion of cases with spermatozoa present. Only 13% to 17% of retrieved spermatozoa are reported in other investigations [3,4]. These results can be improved by up to 50% using techniques for prostate-specific antigen staining [5]. To help identify semen on victims' skin and clothing, UV lighting more specifically, the Wood lamp from Luxo Lamp Corporation, Port Chester, New York—has traditionally been advised.

The Wood lamp and the Bluemaxx BM 500 may not be as effective as the Poliray (Rofin Australia Pty., LTD.) when looking for signs of semen on human skin (unpublished data). If sexual assault is suspected, forensic samples should be collected for conclusive confirmatory investigations (DNA analysis), regardless of the light source the examining physician utilised. Light should only be used as a supplemental tool throughout the investigation.

Regarding evidence and successful prosecution

The authors explain the medical-legal findings in a population of adult sexual assault cases that were evaluated in an adult emergency department setting and reported to police in an article that was published in the *Annals of Emergency Medicine* in June 2002 [8]. This was a report on the documentation of law enforcement, the legal resolution of cases, and the assessment of whether medical-legal findings were connected to the filing of charges and conviction following the adjustment for demographic variables and assault characteristics. The severity of the documented injury was shown to be significantly positively correlated with both the filing of charges and conviction, according to the authors. The relevance of injury recording in the forensic examination of sexual assault victims is confirmed in this crucial step.

What additional factors could lead to retinal haemorrhages? Retinal haemorrhages can be brought on by coagulopathy, severe unintentional injuries, infections of the central nervous system, seizures, and almost drowning. Ocular damage has been linked to birth itself. According to a recent study, parturition causes retinal haemorrhages in 30% of babies. However, the anatomy of these retinal haemorrhages was noticeably different (very light), and 99% of them disappeared by the time the infant was 4 weeks old [16].

The perpetrators who were identified had a higher likelihood of being single mothers living in low-income households, without social support, having poor impulse control, and having experienced abuse themselves. The abusive parents frequently had violent encounters with their spouses, relied on their kids for emotional support, and were dealing with difficulties such as substance abuse, unemployment, subpar housing, or mental illness [20].

For kids under the age of two, skeletal exams should be routine. Occult fractures are uncommon in children under the age of five. The taking of radiographs should be done if there is clinical or historical suspicion of such injuries. According to estimates, 35% of mistreated children have recent or ancient fractures [19]. Peck and Priolo-Kapel advise using an algorithmic method when assessing kids who may have suffered burns as a result of abuse. Initiating the investigation, evaluating the child radiographically, documenting with forensic photographs, and evaluating technical information about the alleged crime (such as the type and temperature of the liquid causing the thermal injury) are all tasks that fall under the purview of the physician.

Assessing and managing a youngster who might be the victim of abuse is a challenging and frequently impossible undertaking. Some recommendations are provided by the medical literature from a forensic standpoint. Texts and workshops that are offered nationally are additional resources. A formal clinical forensic medicine training and consultation programme is only currently available at one medical centre in the United States, in Louisville, Kentucky. Each of our facilities offers a tremendous chance to introduce medical professionals to the subject of clinical forensic medicine.

REFERENCES

1. *Arch Pediatr Adolesc Med* 2002, 156:265–268. Several cases of occult injury were evaluated using ultraviolet light (Wood lamp) depicting the injuries far more clearly.

2. Riggs N, Houry D, Long G, et al.: Analysis of 1,076 cases of sexual assault. *Ann Emerg Med* 2000, 35:358–362.
3. Rambow B, Adkinson C, Frost TH, et al.: Female sexual assault: medical and legal implications. *Ann Emerg Med* 1992, 21:727–731.
4. Penttila A, Karhunen PJ: Medicolegal findings among rape victims. *Med Law* 1990, 9:725–737.
5. Santucci KA, Nelson DG, McQuillen KK, et al.: Wood’s lamp utility in the identification of semen. *Pediatrics* 1999, 104:1342–1344.
6. A new light source is identified that appears to fluoresce semen far better than the Wood lamp.
7. Nelson DG, Santucci KA: An alternate light source to detect semen. *Acad Emerg Med* 2002, 9:77–80.
8. Wyszynski M: Shaken baby syndrome: identification, intervention and prevention. *Clin Excell Nurse Pract* 1999, 3:262–267.
9. Odom A, Christ E, Kerr N, et al.: Prevalence of retinal hemorrhages in pediatric patients after in-hospital cardiopulmonary resuscitation: a prospective study. *Pediatrics* 1997, 99:E3.
10. Duhaime A, Christian C, Rorke L, et al.: Nonaccidental head injury in infantsthe “shaken-baby syndrome”. *N Engl J Med* 1998, 338:1822–1829.
11. Tsao K, Kazlas M, Weiter J: Ocular injuries in shaken baby syndrome. *Int Ophthalmol Clin* 2002, 42:145–155.
12. Kivlin J, Simons K, Lazoritz S, et al.: Shaken baby syndrome. *Ophthalmology* 2000, 107:1246–1254.
13. Bennett T: The shaken slammed infant syndrome. *Iowa State Med Exam Newslett* 1997, July-Aug.
14. Emerson M, Pieramici D, Stoessel K, et al.: Incidence and rate of disappearance of retinal hemorrhage in newborns. *Ophthalmology* 2001, 108:36–39.
15. Heins M: The “battered child” revisited. *JAMA* 1984, 251:3295–3300.
16. Hight DW, Bakalar HR, Lloyd JR: Inflicted burns in children: recognition and treatment. *JAMA* 1979, 242:517–520.
17. Friedman S, Moore C: Child abuse: a five-year follow-up of early case findings in the emergency department. *Pediatrics* 1974, 54:404–410.

Research paper

© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11,Iss 6, Sep 2022

18. Peck MD, Priolo-Kapel D: Child abuse by burning: a review of the literature and an algorithm for medical investigations. J Trauma 2002, 53:1013–1022.

19. In reviewing 134 articles and 581 patient encounters, the authors were able to identify certain characteristics of the victims (burn injury) as well as their perpetrators.

20. Montrey JS, Barcia PJ: Nonaccidental burns in child abuse. South Med J
1985, 78:1324–1326.