National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 743–751, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.011

CASE REPORT

Beaten to Blindness: Battered Baby Syndrome

Nishanth V.S,[1,*] Niranjanaa, N.M.,[2] Soma Ram Reddy,[3] Naga Mohan Rao, B. V.,[4] Sudha, R.,[5] Gollapudi Sridevi Naga Rajeswari,[6] Boddepalli Devaraj[7] and Kattamreddy Ananth Rupesh[8]

[1]*Resident, Department of Forensic Medicine and Toxicology, GMC, Nizamabad*
[2]*Resident, Department of ENT, GMC, Nizamabad*
[3]*Resident, Department of Pediatrics, GMC, Nizamabad*
[4]*Professor & Head, Department of Forensic Medicine and Toxicology, GMC, Nizamabad*
[5]*Associate Professor, Department of Forensic Medicine and Toxicology, GMC, Nizamabad*
[6]*Resident, Department of Pediatrics, Kilpauk Medical College, Chennai*
[7]*Resident, Department of Forensic Medicine and Toxicology, Andhra Medical College, Visakhapatnam*
[8]*Assistant Professor, Department of Forensic Medicine and toxicology, Andhra Medical College, Visakhapatnam*

Accepted: 06-May-2024 / Published Online 08-July-2024

Abstract

Introduction: A battered child is one who sustains repetitive physical injuries due to non-accidental violence inflicted by a parent or guardian. Child abuse encompasses behaviors exposing the child to various forms of physical or sexual abuse, neglect, or emotional misconduct. Typically, battered child syndrome is diagnosed through a disparity between the history provided by the child's caregivers and the findings of clinical examination. **Case details:** An 18-month-old girl child was admitted to a tertiary care hospital, presenting with a four-day history of fever, vomiting for two days and a seizure episode. The child had a history of head injury one week ago, resulting in transient unconsciousness. Upon examination, multiple healed and fresh injuries were observed on the face, hands, and right thigh. CT brain revealed hypodensity areas with a mildly displaced fracture of the left frontal bone. Fundus examination identified bilateral multiple intraretinal hemorrhages and papilledema. X-ray showed a fracture of the right proximal tibia. The child required ventilator support during the hospital stay, and subsequently, developed retinal blindness. The child was managed accordingly. **Discussion:** The classical feature of Battered Baby Syndrome is the discrepancy between the nature of injuries and the history provided, and the delay between the injury and medical attention. The parental risk factors for child abuse are poverty, social isolation, drug addiction, violent environment, family history of abuse, communication skills deficit and the child related risk factors are children with special needs, children with behavior problems, bonding deficit. etc. **Conclusion:** The current case sheds light on the unfortunate prevalence of this condition within the Indian context, urging point-of-care health providers to stay vigilant and informed about child abuse patterns in the community. It serves as a crucial reminder of the responsibility we all share in safeguarding the well-being of children.

Keywords: Battered Baby Syndrome, Child abuse, Head injury, Blindness, Fracture.

*Corresponding Author: Nishanth V.S.
Email: nishanthsenthilvel@gmail.com

Introduction

Battered Baby Syndrome, also known by various names such as Caffey's syndrome, Caffey-Kempe syndrome, Maltreatment syndrome, and Non-Accidental Injury of Childhood, is a clinical condition wherein young children, typically under 3 years of age, are subjected to repeated beatings over the most trivial provocations. A battered child is one who is exposed to repeated purposeful acts of sublethal physical abuse or prolonged deprivation of food and water or a combination of both [1]. Injuries due to physical abuse would be usually present in regions concealed by clothing and in anatomically protected regions like trunk, lumbar region, buttocks, inner aspect of thighs, cheeks and scalp [2]. The child abuse cases may present as physical abuse, starvation abuse or a combination of both[3]. The most common types of child abuse are physical abuse, neglect, sexual abuse, emotional and psychological abuse. Child abuse is mostly caused by the family members [3]. Epidemiologically, Battered Baby Syndrome tends to affect males more frequently, particularly unwanted, disabled, or stepchildren, as well as those conceived due to contraceptive failures. The parents involved are typically young, aged between 20 and 30, with low IQ, limited education, unemployed, belonging to a low socio-economic class and often having psychiatric co-morbidities.

Battered Baby Syndrome is characterized by distinctive features. The abuse often occurs without any provocation, with the child's seemingly trivial actions serving as the precipitating factor. Moreover, these children commonly experience deprivation in terms of nutrition, care, and affection. Additionally, there is a notable delay between the occurrence of injuries and seeking medical attention. Furthermore, the history provided by the parents is often inconsistent with the injuries observed, adding a layer of complexity to the diagnostic conundrum.

Violence against children comprises physical, sexual, or emotional harm, as well as neglect, inflicted by parents, caregivers, peers, romantic partners, or strangers, affecting those under 18 years old. Globally, an alarming estimate indicates that up to 1 billion children aged 2 to 17 experienced such violence in 2021 (Reference: WHO, 2021). Addressing this pervasive issue, Target 16.2 of the 2030 Agenda for Sustainable Development explicitly aims to *"end abuse, exploitation, trafficking, and all forms of violence against, and torture of, children"* (United Nations, 2030 Agenda) [4].

Case Report

An 18-month-old female child, whose father was a daily wage worker engaged in construction works and the mother being a housewife, was admitted to a tertiary care hospital in Nizamabad with a four-day history of fever, accompanied by a seizure episode and vomiting for the past two days. The child had a head injury one week prior, resulting in a transient unconsciousness. On admission, the child appeared emaciated, and her weight was recorded at 10 kg. On examination, the child was gasping, with a GCS – 3/15, abdominal type respiration, peripheries were cold, pulse was not felt, BP was not recordable. Capillary refill time was found to be >3sec, on systemic examination, CVS- S1, S2 present, RS – bilateral air entry present, bilateral crepitations present, P/A – distended, CNS – unconscious. The lab data at admission were GRBS – 137mg/dl, Hb- 8.6g/dl, WBC- 7800

cells/mm^3, Platelets – 4.76 lakh/mm^3, FiO2 – 75%, Respiratory Rate – 34/min. In view of impending respiratory failure, the child was intubated and connected to a ventilator.

The antenatal history of child was uneventful, and the immunisation was incomplete as per universal immunisation program. On physical examination, a partly healed ulcer, indicative of cigarette burns, measuring 3x2 cm is present over the right cheek, with partly healed marguins brown in colour and the base of the ulcer, partly healed and red in colour. (Figure 1). Adittionally, a partly healed ulcer measuring 2x2 cm was observed over the left side of the face with black brown scab present over the margins and base of the ulcer, red in colour, positioned 1 cm anterior to the ear (Figure 2). A partly healed scar of size 2.5 cm was noted on left ear lobule as shown in figure 2. A contusion measuring 5x3 cm was present over the outer aspect of the right arm in the middle 1/3rd, black in colour. Further examination revealed partly healed abrasions of varying sizes over an area of 10x4 cm on the lower part of outer aspect of the right arm with black scab, extending to the right forearm. A contusion measuring 6x3 cm over the outer aspect of the middle 1/3rd of the right forearm. A bite mark was evident over the outer aspect of the left forearm in the middle 1/3rd. A partly healed scald measuring 2x1 cm was observed on the dorsum of the left hand (Figure 3). Multiple nail mark abrasions were present on the front of the chest wall. Healed scars, likely scalds, of varying sizes covered an area of 5x3 cm over the anterior chest wall. Additionally, there were healed scars (scalds) measuring 7x5 cm and 6x4 cm over the epigastric region of the anterior abdominal wall (Figure 4). Multiple partly healed bite marks of varying sizes covered an area of 10x6 cm over the upper 1/3rd of the right thigh. A swelling was noted over the anterior aspect of the upper 1/3rd of the right leg, with an underlying old unhealed fracture of the right tibia (Figure 5), for which an above-knee slab was applied.

Figure 1. Showing a partly healed ulcer on right side of face.

Figure 2. Showing partly healed ulcers on left side of face and left ear lobule

Figure 3. Showing a partly healed scald scar

Figure 4. Showing partly healed scars

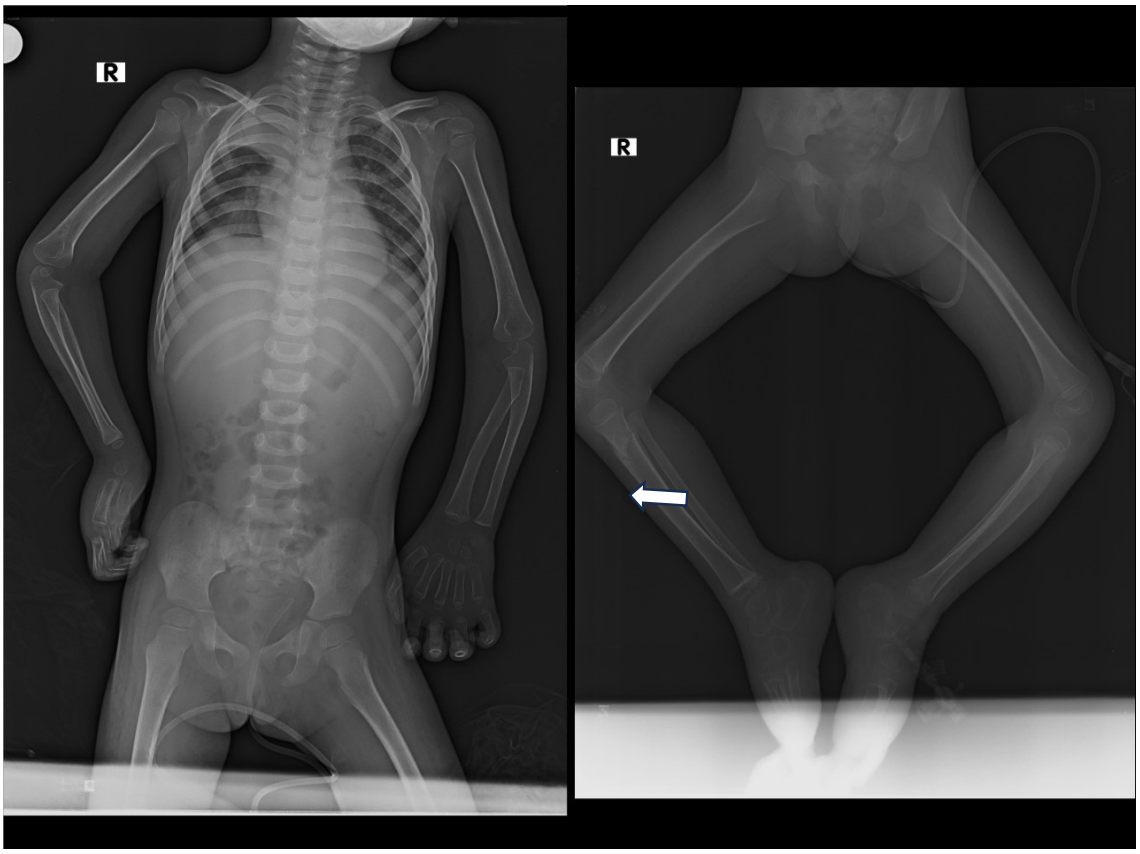

Figure 5. Showing fracture of right tibia in the upper part.

Initially, the child's condition led to suspicions of acute encephalitis, child abuse, or hypotensive shock. Subsequently, the patient was diagnosed as a victim of child abuse and was placed on a ventilator for management. An ophthalmologist's examination revealed multiple intraretinal hemorrhages throughout the fundus and surrounding arteries in the right eye, along with the presence of roth spots. In the left eye, blurry nasal margins of the disc and hemorrhages on the nasal side of the disc were observed, accompanied by multiple intraretinal hemorrhages around the arteries. The child eventually developed *retinal blindness*. A CT scan of the brain indicated hypodensity areas in the bilateral frontal lobes and bilateral capsulo-ganglionic regions, indicative of chronic infarcts. Additionally, a mildly displaced fracture of the frontal bone was noted.

On admission day 3, GCS improved to 8/15. The laboratory parameters during day 8 of admission were: Blood urea – 26mg/dl, S.Creatinine- 0.7mg/dl, S. Bilirubin – 0.8mg/dl, SGPT – 19U/L, SGOT – 21U/L, Hb- 11.0g/dl, TLC – 15,200 cells/mm^3, Platelets- 1.74 lakh/mm^3, DLC- Neutrophil: 80, Lymphocytes: 17, Eosinophils: 01, Monocytes: 02, Basophils: 00, and Na – 139 mEq/L, K – 3.9 mEq/L, Cl- 99 mEq/L.

The child showed further improvement and was successfully weaned off ventilatory support. Consultation with a psychiatrist uncovered that the parents lacked awareness of the severity and consequences of the child's condition. Both

parents exhibited a lack of interest in the child's well-being, with mild to moderate intellectual disabilities noted in both. Despite counseling, they struggled to grasp essential aspects of baby care. Subsequently, the child was transferred to the child protection wing, which then relocated the child to an orphanage.

Discussion

The classical feature of Battered Baby Syndrome (BBS) lies in the disparity between the nature of injuries and the provided history, coupled with a delay in seeking medical attention. A constant feature is the repetition of injury infliction over an extended timeline. Injuries in BBS primarily result from direct violence, frequently manifesting as injuries to the eye and orbital region. The possibility of non-accidental trauma must be considered in any child presenting with ecchymosis or laceration of the lids, hemorrhage in or around the eye, cataract or dislocated lens, retinal detachment, or orbit fracture.

A tear of the frenulum is the most typical injury in cases of Battered Baby Syndrome (BBS). Soft tissue injuries constitute the most common type of manifestations in BBS, such as abrasions resulting from dragging, bite marks on the cheek, neck, and back, bruises like six-penny bruises, butterfly-shaped bruises due to pinching, slap marks, and lacerations caused by hitting with blunt objects may be observed. In some cases, bruises may be found on the chest, abdomen, lower back, buttocks, genitals, inner thighs, arms, and face. The presence of bruises with various colours indicates repeated abuse [2]. Due to hair pulling, subgaleal hematoma and traumatic alopecia may be observed.

Inflicted childhood neurotrauma (shaken baby syndrome) occurs secondary to violent, nonaccidental, repetitive, unrestrained acceleration-deceleration head and neck movements, with or without blunt head trauma in children typically younger than 3 years of age. Inflicted childhood neurotrauma accounts for approximately 10% of all cases of child abuse and carries a mortality rate of up to 25%. The ocular manifestations are numerous and may have a prominent role in recognition of this syndrome. Retinal hemorrhage is the most common ophthalmic finding and occurs at all levels of the retina. Retinal haemorrhages can occur without associated intracranial pathology. The pattern of hemorrhage helps distinguish this disorder from other causes of retinal hemorrhage or from accidental injuries. It is often associated with anterior chamber hemorrhages, luxation of lens, retinal detachment and failing to recognize and treat the same promptly may result in permanent loss or impairment of sight.

Fractures are the second most common manifestation of child abuse after soft tissue injuries. Skull fractures, fractures of ribs (Nobbing fractures – string of beads appearance on X ray), periosteal hematomas, avulsion of metaphysis, epiphyseal separation, Sub dural hemorrhage, post traumatic pulmonary pseudo cysts are seen in cases of child abuse. Child abuse should be suspected in non-ambulatory children with lower-extremity long-bone fractures. However, no fracture pattern or types are pathognomonic for child abuse. A full skeletal survey (as opposed to a “babygram”) is essential in every suspected case of child abuse. Abdominal injuries like laceration of liver, spleen, rupture of stomach, intestines, urinary bladder, transection of second part of duodenum and jejunum may also be noted.

Detection of abuse is not only important in order to treat the pathology that is discovered but also to prevent further abuse or even death. Most common cause of death is head injury followed by rupture of abdominal organs. The effects of abuse are failure to thrive and psychosocial dwarfism. Several studies were carried out where dating of fractures with radiological surveys when done using certain criteria can give the time of injury [5-8].

Dating of fractures in cases of suspected child abuse [9]:

- A fracture that does not show the formation of periosteal bone is usually <7-10days old and seldom >20days old.
- A fracture with mild periosteal formation may be 4-7 days old.
- A fracture that shows an exuberant periosteal reaction or the formation of a callus is >14 days old.
- The disappearance of the fracture line requires more time than the formation of new bone, approximately 14-21 days.

Specificity of location of fractures in child abuse (modified from Kleinman 2015) [1011]:

Based on the location of fractures we can determine the specificity of the case and group them into high, moderate, and low specificity namely.

- If the fractures are present over classic metaphyseal regions, multiple ribs mainly of posterior side in the paravertebral gutter, scapula, spinous process, and sternum, it implies it is of high specificity.
- If there are multiple fractures which are bilateral, and a combination of recent and previous fractures, any epiphyseal separations, fractures and separations of vertebral bodies, fracture of digits and complex skull fractures are an indication of moderate specificity.
- The presence of sub periosteal new bone tissue formation, clavicular fractures, long bone fractures, linear skull fractures are of low specificity.

Various imaging modalities play crucial roles in diagnosing the constellation of findings associated with battered baby syndrome. X-rays are instrumental in identifying fractures, particularly those in various stages of healing. MRI scans provide detailed images, aiding in distinguishing fractures from conditions like Rickets or osteogenesis imperfecta. Technetium 99 methylene diphosphonate bone scintigraphy assists in detecting bone abnormalities indicative of trauma. Fluoride 18 labelled sodium fluoride positron emission tomography can uncover metaphyseal lesions, aiding in differential diagnosis from conditions like scurvy or Menkes syndrome.

Differential diagnosis [5-8]

There are many differential diagnoses for Battered baby syndrome and are discussed below. They are grouped under various headings for ease of understanding.

1. Acute abdomen comprises of conditions like intestinal gastrointestinal disease viz: peritonitis, inflammatory bowel disease etc., intrinsic urinary tract diseases, genital problems like torsion of spermatic cord, sickle cell crisis and these can be differentiated from BBS with investigations like radiographs, stool tests, culture, USG, intravenous

pyelogram, laparoscopy, angiography, and sickle cell studies etc.

2. Bruising can also be due to conditions like hemophilia, von Willebrand's disease, Henoch Schoenlein purpura, Purpura fulminans, Ehler Danlos syndrome, Mongolian spot. These conditions can be differentiated from BBS by doing prothrombin time, partial thromboplastin time, von Willebrand's panel etc.
3. Fractures of BBS can be confused with osteogenesis imperfecta, rickets, birth trauma, hypophosphatasia, leukemia, neuroblastoma, osteomyelitis, septic arthritis and are distinguished with radiology, decreased alkaline phosphatase, CBC, bone marrow biopsy etc.
4. Skin lesions like Bacterial cellulitis, Pyoderma gangrenosum, Staphylococcal impetigo, herpes zoster/ simplex, epidermolysis bullosa, allergic or irritant contact dermatitis which can be differentiated from BBS by culture, gram stain, scrapings, skin biopsy etc.
5. Metaphyseal lesions of BBS have a close resemblance to those caused by scurvy, Menkes syndrome, syphilis, Birth trauma, physiological striae which are differentiated by decreased copper and ceruloplasmin levels etc.

There are numerous risk factors for violence against children, stemming from causes at individual, close relationship, community, and societal levels. At the individual level, biological and personal aspects such as age, sex, lower levels of education, low income, disabilities, mental health problems, and identification as lesbian, gay, bisexual, or transgender, as well as the use of alcohol or drugs, and a history of exposure to violence, all contribute to vulnerability. At the close relationship level, factors such as lack of emotional bonding between children and parents or caregivers, poor parenting practices, family dysfunction, separation, and witnessing violence between parents or caregivers, along with early or forced marriage, heighten the risk.

On a broader scale, at the community level, issues like poverty, high population density, and easy access to alcohol and illicit drugs exacerbate the problem. At the societal level, social and gender norms that normalize violence, policies perpetuating economic, gender, and social inequalities, inadequate social protection, post-conflict situations or natural disasters, weak governance, and poor law enforcement all contribute to a climate where violence against children can thrive. Addressing these multifaceted issues at their respective levels is crucial to creating a safer world for our children, who represent the future of mankind.

Conclusion

In conclusion, this case underscores the alarming persistence of violent manifestations in various forms of child abuse. It highlights the critical role of the initial clinical encounter, where physicians must remain vigilant and cognizant of the potential for child abuse, particularly when discrepancies exist between the reported history and nature of injuries, as well as their timing. Moreover, when the caregiver is implicated as the perpetrator, identifying, and addressing instances of abuse becomes even more challenging. Hence, pediatricians must maintain a heightened level of suspicion to effectively recognize and intervene in cases of child abuse, thereby safeguarding vulnerable

individuals from further harm and preventing tragic outcomes.

Ethical concerns

All ethical concerns to be addressed to the authors.

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

Acknowledgements

We would like to express our gratitude to Vinay Sheel, Resident in the Department of Pediatrics at GMC, Nizamabad.

References

1. Adelson L, Adelson. Pathology of Homicide. Thomas, Charles C, Publisher; Illinois 1994.
2. Biswas G. Recent advances in forensic medicine and toxicology - 2: Good practice guidelines and current medicolegal issues. New Delhi, India: Jaypee Brothers Medical; 2018. 465–502 p.
3. Mason et al J. Pathology of Trauma. 3rd edition. Taylor & Francis; 2000. 155–173 p.
4. Hillis S, Mercy J, Amobi A, Kress H. Global prevalence of past-year violence against children: A systematic review and minimum estimates. Paediatrics 2016;137. https://doi.org/10.1542/peds.2015-4079.
5. Gilbert Barness E, Debich Spicer DE, Steffensen TS. Handbook of pediatric autopsy pathology. 2nd edition. New York: springer; 2014. p 7-83.
6. Ignatius et al P. Textbook of Forensic Medicine and Toxicology. 5th edition. Elsevier; 2022. pp. 420-421.
7. Aggrawal A. Textbook of Forensic Medicine and Toxicology. 2nd edition. APC publishing company; 2021. pp. 483-485.
8. Kleinman PK. Diagnostic imaging of child abuse. 2nd ed. London, England: Mosby; 1998. pp. 168-177.
9. Prosser I, Maguire S, Harrison SK, Mann M, Sibert JR, Kemp AM. How old is this fracture? Radiologic dating of fractures in children: a systematic review. AJR Am J Roentgenol. 2005;184(4):1282–6. Available from: http://dx.doi.org/10.2214/ajr.184.4.01841282
10. Kleinman PK, editor. Diagnostic imaging of child abuse. 3rd ed. Cambridge, England: Cambridge University Press; 2015. pp. 393-494.
11. Kliegman RM, Stanton B, Geme J, Schor NF, Behrman RE. Nelson textbook of paediatrics. 19th ed. London, England: Grune & Stratton; 2011.