Physical Abuse in Children (Non-Accidental Injury Syndrome)

Part 1: The clinical examination

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Highlights - Hoogtepunte

- Risk factors for abuse.
- Clinical symptoms and signs of abuse.
- Colour atlas with clinical signs.
- Confirming the diagnosis - will be discussed in part 2 of this article in the next issue.

- Risikofaktore vir mishandeling.
- Kliniese simptome en tekens van mishandeling.
- Kleuratlas met kliniese tekens.
- Die bevestiging van die diagnose - word in deel 2 in die volgende uitgawe bespreek.

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INTRODUCTION

Child abuse is a major social and medical problem worldwide, with South Africa being no exception. The syndrome is difficult to define, but the important elements include the repetitive and non-accidental nature of such abuse, usually induced or brought about by an adult in a position of authority over the child. Adult perpetrators come from all social, professional and race groupings. Accurate prediction of abuse is difficult in any given instance, although retrospective identification of individual and social risk factors are helpful in establishing the diagnosis.

"Child abuse syndrome" is a generic term used to encompass all forms of abuse, including physical and nutritional neglect, emotional neglect and abuse, intentional or unintentional failure to adequately provide for the health of the child, inappropriate (intentional or unintentional) administration of medication and/or drugs, physical abuse (Non-Accidental Injury Syndrome or Battered Baby Syndrome) and sexual abuse. The underlying social and individual factors contributing to any of the abovementioned forms of abuse may be varied. It is therefore advisable that the diagnosis of a particular form of abuse be done in conjunction with professionals well-acquainted with the type of abuse in question, having regard for all factors and criteria that are known to be relevant to that particular form of abuse.

NON-ACCIDENTAL INJURY SYNDROME IN CHILDREN

(Battered Baby Syndrome)

Trauma is the child's Fifth Horseman of the Apocalypse: he roams the world with his squires – Accident, Neglect, Abuse.

The features of this syndrome were described by the French pathologist Tardieu more than a hundred years ago, although modern medical monographs only became prevalent subsequent to the well-known scientific publication in 1946 by radiologist dr J Caffey (this entity is sometimes therefore still referred to as Caffey's Third Syndrome). Noted subsequent authors and established experts include Cameron, Cooper and Kempe, to name but a few.

As stated above, a number of factors may be retrospectively identified which could assist in confirming physical child abuse. These factors may be broadly divided into socio-economic and personal factors pertaining to parents and guardians on the one hand, as well as individual factors pertaining to the child on the other.

Parental / guardian factors

- Unplanned and/or unwanted pregnancies.
- Young and emotionally immature parents, often unmarried or with pregnancy out of wedlock.
- Marital problems such as divorce, cohabitation or stepparents.
- Parents frequently have a history of unhappy childhood, and may themselves have been subjected to abuse.
- Personal ill health or chronic disease amongst parents, multiple further pregnancies, poverty and unemployment, poor and inadequate housing, poor family support systems and previous anti-social behaviour or criminal records (especially with regard to aggressive behaviour patterns) are commonly found. Alcohol and/or drug abuse further significantly increases the risk for physical child abuse.

The following factors with regard to the *pregnancy and early infancy* may also be indicators of the risk of abuse: Poor or sporadic antenatal attendance, poor bonding in hospital and poor preparations at home with regard to receiving and caring for the new family member, poor subsequent postnatal clinic attendance and immunisation, inappropriate or inadequate feeding patterns and poor healthcare of the infant.

Factors regarding the child

The following factors or circumstance may predispose to physical child abuse:

- Prematurely born infants, mental and/or physical handicap, chronically ill children, "difficult" or hypersensitive children with poor sleeping or feeding patterns.
- Boys are targeted for physical abuse more often than girls, although sexual abuse is more common amongst girls.
- Physical abuse is most common in young children, especially in the age range of three months to three years. During this period the child is not attending school yet, is often kept away from the scrutiny of other people, is well covered in baby suits and cannot readily communicate his injury or abuse to others. Nonetheless, physical abuse in older children is also common.

It is sometimes found that a specific child in the family is constantly targeted, with other siblings escaping injury ("Cinderella" syndrome).

DIAGNOSING PHYSICAL CHILD ABUSE

The implications of incorrect diagnosis of physical child abuse are enormous. Either false positive or false negative diagnosis may result in irreparable damage to the child, parent or both parties. It is vital that health and social workers do not fail to identify cases of physical child abuse. An abused child has a 60% chance of recurrence of abuse, and a risk of up to 10% for eventual fatal injury, in cases where no intervention is offered. On the other hand, incorrectly labelling the parent as an abuser can cause severe distress, adding severe anguish and even guilt to the already bereaved state of the loving parent who may have lost a child to accidental injury.

Because of the grave implications in confirming or excluding this diagnosis, it is essential that all professionals involved be acutely aware of the need *to be particularly conscientious and thorough in investigations and deliberations* when dealing with cases of suspected child abuse. To this end, meticulous attention to detail regarding the clinical history, physical examination, special investigations, medical and social reports, etc., is essential. All professionals involved should be well aware of the individual and background factors mentioned above which may be operative or relevant in a particular case, and should constantly attempt to integrate the entire spectrum of findings and factors in confirming or excluding the diagnosis.

It is often said that the single most important requirement for arriving at the diagnosis of child abuse is for the health worker to have a *high index of suspicion* whenever dealing with an ill or injured child.

HISTORY

The *parents or guardians* of children who have been physically abused, may exhibit one or more of the following warning signs:

- Due to the repetitive nature of injuries that the children sustain, the parents or guardians tend to *alternate or vary their visits* to different health workers or clinics, thereby minimising the risk of building up an incriminating medical record or history.
- Significantly *long delays* between the time of injury and the time of presentation for medical care may take place, even in cases of relatively severe injury.
- There may be significant *inconsistencies between the explanations* offered by the parent/guardian with regard to the manner in which the injury was sustained, and that observed by the medical practitioner. For example, it would be most unlikely that fractures of both forearms will be sustained in an uncomplicated fall from a bed.
- There is often *more than one version* of events offered by the parents, with inconsistency or discrepancy between themselves and from one consultation or discussion to the next.
- *Other parties (such as siblings or caregivers) are often implicated*, with the parent/guardian denying knowledge of how the injury may have been sustained. Specific denial with regard to involvement or knowledge of the event is often prominent.

PHYSICAL FINDINGS IN NON-ACCIDENTAL INJURY SYNDROME

A wide spectrum of injuries and abnormalities may be found, depending on the nature and scope of abuse and responsible agents.

Injuries to the skin

Bruises (contusions):

Multiple bruises, often of varying ages (as reflected in different colours of bruises) may be found on different sites of the body and often in places other than those where normal childhood injuries are usually found (the latter being for example on the shins of the lower legs, knees and elbows).

In particular, the following injuries may be suggestive of abuse:

- Bruises to the facial area such as a black eye or peri-orbital haematoma and bruised lips or ears.
- Multiple small bruises (one to two centimetres in diameter) on the trunk and limbs (often refferred to as "six-penny bruises") caused by the fingertips of adults roughly grabbing or shaking the infant or child.
- "Butterfly"-shaped bruises from pinching.
- Tears of the midline tissue fold on the inner aspect of the upper lip (frenulum) *may be almost diagnostic of abuse*, being the result of a blow to the mouth.
- Patterned injuries caused by recognisable objects such as belt buckles
- Bite marks (with or without penetrative or disruptive skin injury) may also be found, and are often suggestive of maternal involvement.
- Bruises and abrasions encircling the wrists or ankles may be suggestive of being cuffed or tied.
- Linear and "tram track" bruises would suggest beating with a rod or cane.

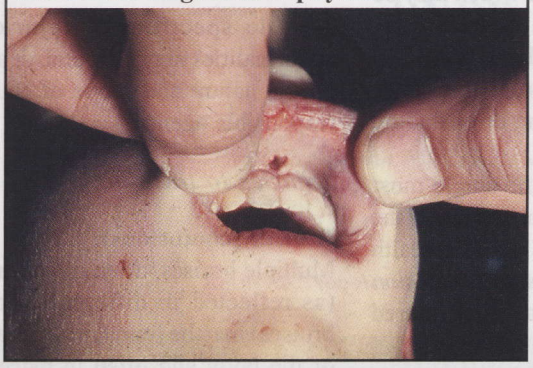
As stated previously, suspicion is highest when these injuries appear to be of different ages, as reflected by the colour changes that bruises typically undergo over time.

Burns:

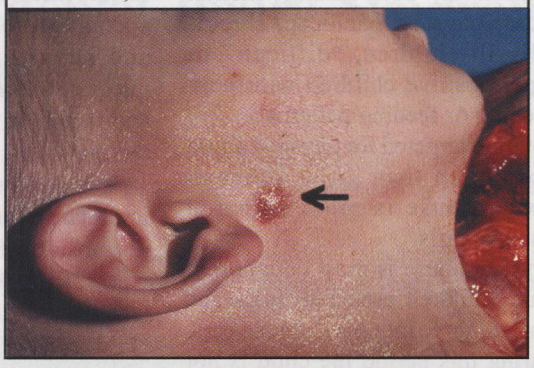
Burns may be the result of intentionally

Signs of physical abuse in children

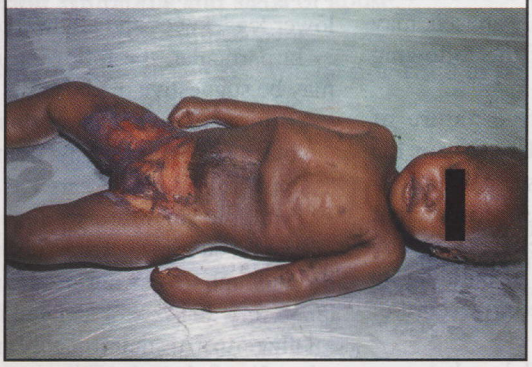
Lacerations of the frenulum of the upper lip are almost diagnostic of physical abuse



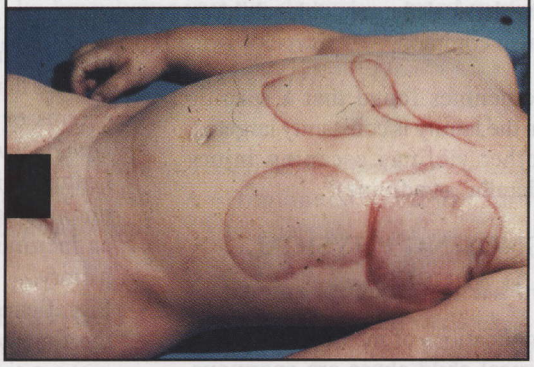
Cigarette burns are typically seen on the forearms, back and face.



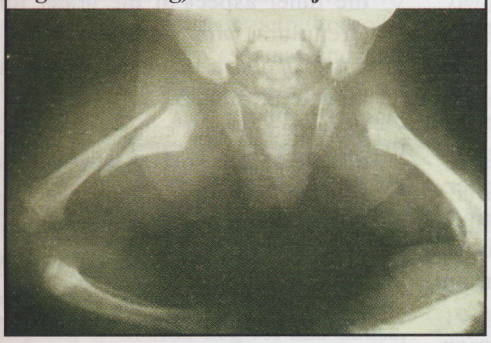
Thermal burns caused by hot water should be carefully differentiated from nappy rash and nutritional diseases.



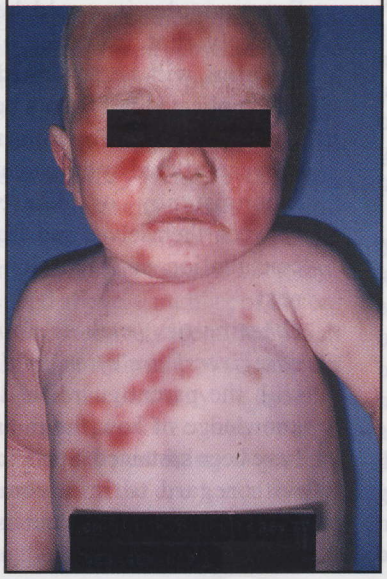
Defibrillator contusions. Especially in cases of fatal abuse, care must be taken to recognise iatrogenic injuries (including those caused by emergency care personnel and lay persons) – often seen in the face, neck and chest area.



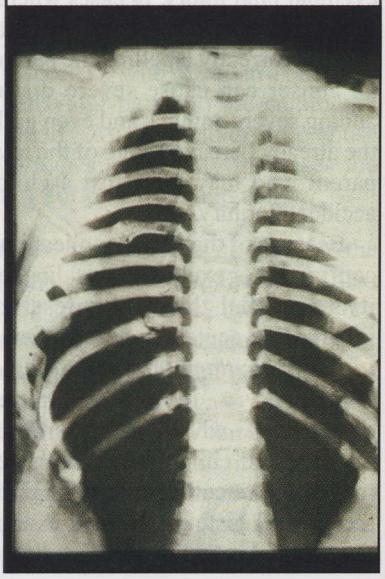
Whole body x-rays are vital in cases of suspected physical abuse. Multiple skeletal injuries of differing ages (with associated signs of healing) are the major feature.



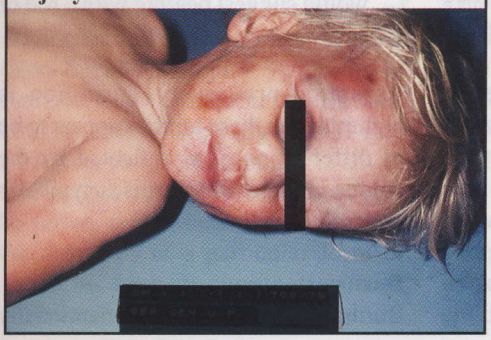
Multiple small contusions caused by fingertips during rough handling and shaking – so-called "sixpenny bruises".



Multiple rib fractures of varying ages – often seen as a "rosary" due to healing with callus formation.



Multiple bruises – of differing ages and in sites not usually associated with accidental injury.



inflicted injury with burning cigarette ends, often showing groupings on the outer aspects of the arms and on the backs of the hands, the neck and face, as well as possibly palms and foot soles (i.e. areas of the body that are generally exposed or not covered with clothing). These wounds may be regular in size and round to ovoid in appearance. Healed scars from previous similar injuries may be present and may be confused with skin infections (such as impetigo).

"Waterline" burn marks, consistent with placing the child in very hot water (often involving the hands and feet in a "glove and sock" distribution) or with a linear mark along the buttocks, thighs and heels, may be found. Similar injuries caused by hot stove plates may be found on the buttocks or posterior thighs.

Head injuries

Head injury remains the commonest cause of fatal child abuse. The full spectrum of head injuries may be found. A large body of literature reviews and research publications pertaining to head injuries in children, with particular reference to physical child abuse, has appeared over the past twenty to thirty years in an an attempt to scientifically strengthen the basis for conclusions arrived at in assessing head injuries in children.

Tears of the membranes surrounding the brain typically result in subdural haemorrhage (bleeding between the dura mater membrane and the surface of the brain), this being the single most important cause of death in abused children. Death is usually due to the associated raised intracranial pressure and cerebral injury itself. Such injury may, however, be caused by either accelerative injury (such as a blow to the head) or decele-rative injury (such as a fall), or even by violent shaking.

Impact injuries from a blow or being thrown/beaten against a wall or other hard surface, resulting in fractures of the skull, may be particularly difficult to differentiate from injuries sustained during a fall. In general, fractures with displacement of fracture components, depressed or fragmented fractures, fractures involving more than one bony element of the skull or those situated over the top of the skull, and fractures associated with extensive or multiple bruises of the scalp are suggestive of intentional or non-accidental injury. Numerous publications regarding the extent and nature of forces required to cause skull fractures exist, with many aspects remaining contentious.

In particular, the entity of **"shaken baby syndrome"** is an issues which is still highly debated. Although it is now commonly accepted that vigorous shaking can cause severe brain injury and intracranial haemorrhage (as well as other associated injuries to, for example, the neck structures and eyes), the condition is probably considerably less common than initially thought. In cases of severe head injury, impact mechanisms are still considered by forensic pathologists to be the most likely cause, and should be excluded as a primary entity. A combination of shaking and impact injury may also be found, resulting in the so called "shaken impact injury".

Although a high index of suspicion must be maintained in any child with a severe head injury, it should be remembered that such injuries can indeed be sustained from falls from relatively small heights, such as from surfaces of tables or feeding chairs. Severe injuries may be thus sustained, due to the inability of the child to protect his head by turning the head, tensing neck muscles or extending a protective arm. Even falls on carpeted surfaces may result in severe fractures or other injuries.

It should also be remembered, that severe impact injuries may be sustained without any associated or subsequent externally visible injury to the overlying skin or face. Absence of such overtly visible injuries may well be the reason why many clinicians tend to readily diagnose shaken baby syndrome when, in fact, mechanical impact injury had taken place.

In all cases of head injury, great attention should be paid to the precise clinical sequence of events and the manner in which the signs and symptoms present themselves. Immediate loss of consciousness, as opposed to progressive deterioration in mental state, may be vital in arriving at the correct clinical or pathological diagnosis, particularly in accepting or refuting the history supplied by the parent/guardian when compared with the pathological findings.

Injuries to the eyes

Ocular injuries are of the most important and often diagnostic injuries in cases of non-accidental injury syndrome in children. In particular, retinal detachment and haemorrhage, haemorrhages to the vitreous humour (eye fluid), dislocations of the lens and subconjunctival haemorrhages may be found. Diagnosis of such injuries may be difficult and easily overlooked, especially at post mortem examination. The involvement of a specialist ophthalmologist is highly recommended in all instances.

Injuries to the chest and abdomen

Impact injury to the abdomen (such as caused by a blow with the fist) is often complicated by rupture of the liver. This constitutes the second most common cause of death amongst these children, due to subsequent haemorrhage. In small children, a blow to the abdomen is more likely to result in serious injury as there is a relative inability to protect themselves due to poorly developed abdominal wall muscles (which cannot therefore tense adequately to prevent internal injury). This is because the child is more readily caught unaware of the impending blow. Also, it is relatively easy to compress the abdominal tissues and organs against the spinal column, thereby causing rupture of hollow viscera and, in particular, perforating or even transecting the small intestine. The late clinical presentation of this type of injury constitutes a diagnostic problem in many instances, with delays of a day or two not being unusual before severe or obvious signs manifest themselves.

Injuries to the skeletal tissues, joints and muscles

The initial syndrome as described by Caffey, referred to the presence of severe head injury (usually fractures and/or subdural haemorrhage) *in association with one or more fractures of long bones, the latter often being of different ages*. These fractures may have typical radiological features: subperi-

osteal haemorrhage and calcification, different stages of healing (with callus formation); non-union of previous fractures or poor alignment of fractures (sugggesting lack of previous medical attention); fractures of the growth plate (possibly resulting in stunted growth); or spiral fractures suggesting jerking and twisting actions in pulling the child forcefully by the arm or even leg. As these features may be subtle and difficult to diagnose, the expert help of a specialist radiologist should thus be called in, where at all possible.

Dislocations and sprains of joints from twisting, jerking or swinging the infant may be found, whilst soft tissue injuries from beating with blunt objects, and the open or fisted hand may result in severe and extensive haemorrhage in underlying soft tissues.

Other findings:

- It is often noted that infants and children who have been repeatedly abused tend to have a *"frozen awareness"* appearance and further have a tendency to *gaze avoidance*, i.e. not readily making eye contact.
- Areas of baldness on the scalp may suggest hair pulling but should not be confused with self-inflicted hair loss or underlying skin/hair disorders.
- Specific attention must be paid to the genital areas to exclude possible associated sexual abuse. These findings must be very carefully assessed, with only experienced practitioners conducting such examinations.

IN CONCLUSION

The effective and competent diagnosis (and hopefully, prevention) of this sad but prevalent social ill lies primarily in the following requirements being met:

- That all health care workers (especially those involved in primary health care of small children) be well aware of this condition, including the diverse nature thereof, the circumstances under which it may be found and the actual spectrum of clinical manifestations.
- That there be a meticulous and thorough approach in all cases of suspected abuse.
- That a multidisciplinary approach in diagnosis and treatment be followed.
- That a high index of suspicion be maintained, especially in cases of unusual or severe injury to children.
- That great care is taken in remaining objective at all times and in ensuring correct and scientifically validated diagnosis, which will stand the required test and scrutiny in a court of law, where necessary.

In Part 2 of this article, the steps and requirements in establishing or confirming the diagnosis of non-accidental injury syndrome are discussed. Please refer to the March 2003 issue.❐

References and recommended reading

Please refer to Part 2 of this article in the March 2003 issue.

Please refer CPD Questionnaire on pg 51.