

## Chapter 7: Deaths and injury in infancy

# Still Births

- The definition of stillbirth vary from country to country , but the definition of England and Wales is:  
"The child must be of more than 24 weeks' gestational age and, after being completely expelled from the mother, did not breathe or show any signs of life"
- These 'signs of life', in addition to **respiration** and **heartbeat**, are taken to mean **movement, crying** or **pulsation of the umbilical cord**.
- As babies that are stillborn have never 'lived' in the legal sense, they cannot 'die' and so a death certificate cannot be issued.

# Infanticide

- When a mother kills her child during its first year of life.
- In England and Wales, Section 1 of the Infanticide Act 1938 states that:  
” Where a woman by any wilful act or omission causes the death of her child ... under the age of twelve months, but at the time ... the balance of her mind was disturbed by reason of her not having fully recovered from the effect of giving birth to the child or by reason of the effect of lactation consequent upon the birth of the child, then ... she shall be guilty of ... infanticide, and may ... be dealt with and punished as if she had been guilty of the offence of manslaughter of the child.”
- In order for a pathologist to prove that a child was born alive and had a separate existence, it must be shown that the infant breathed or showed other signs of life, such as movement or pulsation of the umbilical cord, after having been completely expelled from the mother.
- However, establishing that breathing had taken place is still not absolute evidence of a ‘separate existence’, as a baby in a vertex delivery can breathe after the head and thorax have been delivered but before delivery of the lower body.
- If there is milk in the stomach or if the umbilical cord remnant is shrivelled or shows an inflammatory ring of impending separation, the child must have lived for some time after birth.

# The estimation of maturity of a newborn baby or fetus

- The following are considered ‘rule of thumb’ formulae for estimating maturity (and should be considered to provide very rough estimates):
  1. Up to the twentieth week, the length of the fetus in centimetres is the square of the age in months (Haase’s rule);
  2. After the twentieth week, the length of the fetus in centimetres equals five times the age in months.

## Box 7.1 Estimation of fetal maturity

- 4 weeks – 1.25 cm, showing limb buds, enveloped in villous chorion
- 12 weeks – 9 cm long, nails formed on digits, placenta well formed lanugo all over body
- 20 weeks – 18–25 cm, weight 350–450 g, hair on head
- 24 weeks – 30 cm crown–heel, vernix on skin
- 28 weeks – 35 cm crown–heel, 25 cm crown–rump, weight 900–1400 g
- 32 weeks – 40 cm crown–heel, weight 1500–2000 g
- 36 weeks – 45 cm crown–heel, weight 2200 g
- 40 weeks (full term) – 48–52 cm crown–heel, 28–32 cm crown – rump, 33–38 cm head circumference, lanugo now absent or present only over shoulders, head hair up to 2–3 cm long, testes palpable in scrotum/vulval labia close the vaginal opening, dark meconium in large intestine

- Development can also be assessed using the femur length, ossification centres and the histo-logical appearances of the major organs. It may be necessary to seek expert advice, from radiologists and forensic anthropologists, when determining gestational age.



# Sudden infant death syndrome (SIDS)

- Also known as "cot death" or "crib death".
- SIDS has been defined as:  
'the sudden unexpected death of an infant <1 year of age, with onset of the fatal episode apparently occurring during sleep, that remains unexplained after a thorough investigation, including the performance of a complete autopsy and a review of the circumstances of death and the clinical history'.
- The following are the main features of the syndrome:
  1. Most deaths take place between 1 month and 6 months, with a peak at 2 months.
  2. There is little sex difference, although there is a slight preponderance of males similar to that seen in many types of death.
  3. The incidence is markedly greater in multiple births, whether identical or not. This can be partly explained by the greater incidence of pre-mature and low birth-weight infants in multiple births.
  4. There is a marked seasonal variation in temperate zones: SIDS is far more common in the colder and wetter months, in both the northern and southern hemispheres.
  5. There are apparent social, racial and ethnic differences, but these are explained by fundamental underlying socio-economic factors, which show that there is a higher incidence in any disadvantaged families such as those with poor housing, lower occupational status, one-parent families, etc. However, no class, race or creed is exempt from these devastating deaths.

# Sudden infant death syndrome (SIDS)

- The history is usually typical: a perfectly well child – or one with trivial symptoms – is put in the sleeping place at night only to be found dead in the morning.
- At autopsy, nothing specific is found in the true SIDS death, although in about 70 per cent of cases the autopsy reveals intrathoracic petechiae on the pleura, epicardium and thymus.
- The true aetiology of SIDS is unknown, but it is likely that there are many different causes, often multifactorial, which act via a final common pathway of cardiorespiratory failure.
- The main concern in the management of SIDS is to support the family by explanations and to make sure that the counselling services established.

# Child abuse

- Child abuse is a major social problem, which involves many medical specialties.
- Child abuse is a generic term that includes all forms of physical and emotional ill- treatment, sexual abuse, neglect and exploitation.

## ❖ Child physical abuse/non-accidental injury:

- The syndrome of physical abuse was recognized first by limb fractures and subdural haemorrhages.
- familial homicide in which an offence of causing or allowing the death of a child, is considered as child abuse.

## ❖ Epidemiology:

- Fatalities of child abuse are more common in children under the age of 2 years and the most common mode of death is head injury.
- Sexually abused children tend to be slightly older, although this may reflect the problems in perceiving and reporting sexual abuse in very young children.

## ❖ Injuries in the deceased:

### ○ Bruising:

- Bruising of the arms and legs, especially around the upper arms, forearms, wrists, ankles and knees, may be evidence of gripping by an adult.
- Bruises on the face, ears, lips, neck, lateral thorax, anterior abdomen, buttocks and thighs require an explanation, as these sites are less likely to be injured in childhood falls.
- The explanation given by the carers of how all of the injuries present on the child were caused must be noted with great care for two reasons:
  1. The doctor understands exactly what happened, allowing for a good interpretation of the injuries.
  2. Any changes in the explanation given by the carers over time or to different individuals can be compared.

### ○ Skeletal injury:

- The investigation of all cases of suspected child abuse under the age of 2 years requires a detailed whole-body radiological survey.
- Rib fractures are rarely accidental in children, generally they are a feature of the application of substantial force.
- String- of-beads appearance usually indicates an episode or episodes of forceful squeezing of the chest by adult hands.
- A skull fracture is a marker of significant trauma to the head, and skull fractures are common in fatal cases of physical child abuse, but they are not necessarily accompanied by brain damage.
- Abusive skull fracture is usually multiple, bilateral, or cross sutures. Rarely at the occipital or frontal bones.
- Skull fractures in dead children 'dropped' from a height can be caused by passive falls from only 80 cm onto carpeted floors.
- Furniture usually is at a height of less than 80 cm, so falls from furniture onto the floor are unlikely to be the cause of a skull fracture.



## ○ Head injuries:

- Head injuries are the most frequent cause of death in child abuse and, even when they are non-fatal, they may result in severe and permanent neuro- logical disability.
- “Shaken baby syndrome” is the most common head injury that can cause: (encephalopathy, subdural hemorrhage and retinal hemorrhage)

## ○ Ocular injuries:

- All children suspected of being physically abused should have their eyes examined by an ophthalmologist, and the eyes should be examined as an internal component of the post-mortem examination.
- Most common ocular injuries are: (retinal hemorrhage, retinoschisis and orbital content hemorrhage)

## ○ Oral injuries:

- The lips may be bruised or abraded by blows to the face.
- If the child is old enough to have teeth, the inner side of the lips may be bruised or lacerated by contact with the tooth edges.

## ○ Visceral injuries:

- Visceral injuries are the second most frequent cause of death.
- Visceral injuries are injuries to the organs of the abdomen: intestine, spleen, liver, stomach ... etc.
- Anterior abdominal wall of a child offers little or no protection against direct trauma.
- The liver is relatively large in a child and protrudes below the rib cage, so it can be ruptured directly by a blow to the abdomen.
- Spleen is rarely damaged because of its relatively sheltered position

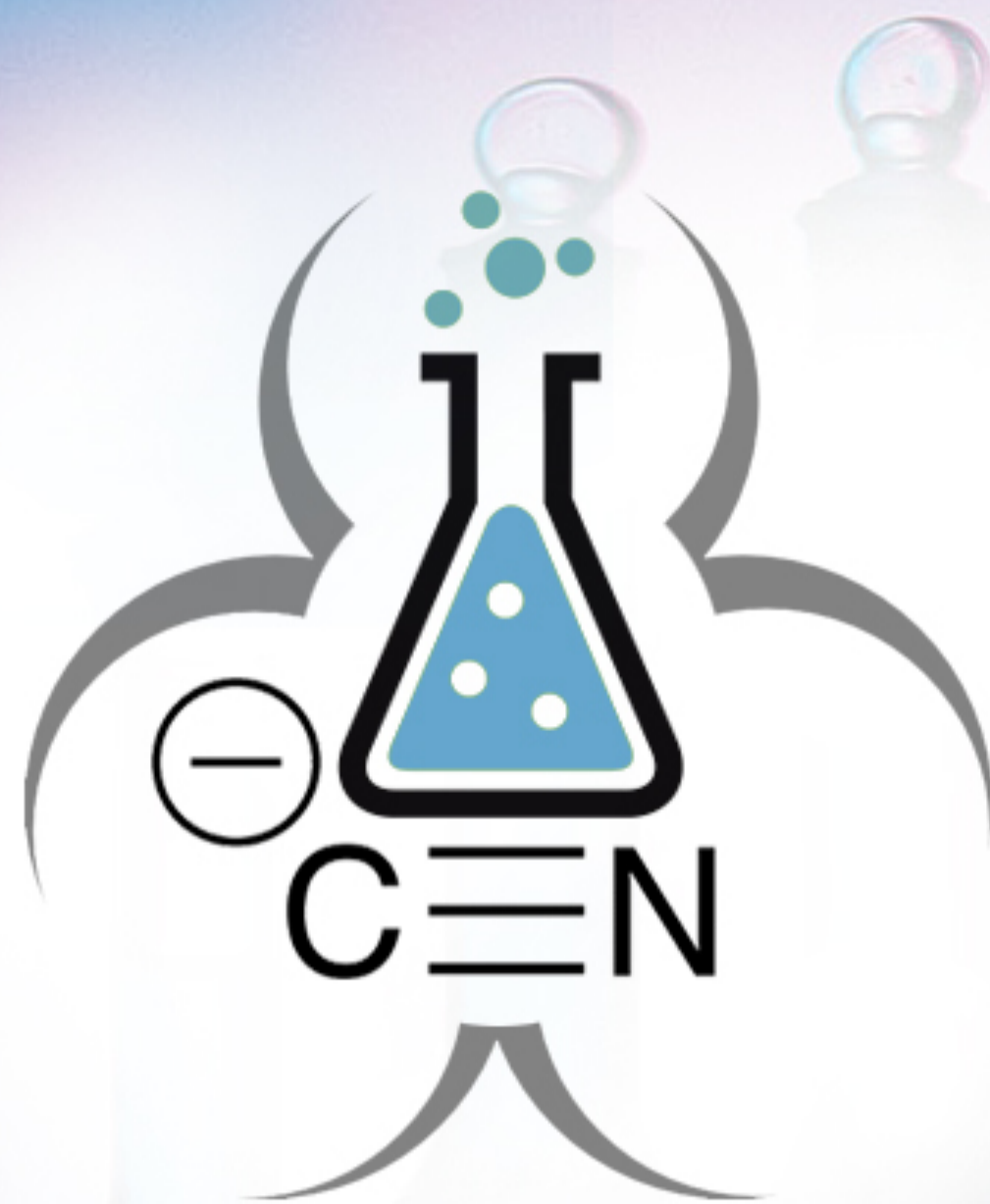
## ○ Other injuries:

- Other injuries include: burns and bites.
- Burns can be caused in many ways: from the of heated metal objects, or cigarettes to the hands, legs, buttocks or any other part.
- Burns can also be caused from splashing hot water to the child.
- Cigarette burns have a typical appearance: circular, and when fresh are pink or red in color, ash may be seen at the base of the burn, when healing it'll turn into silvery color in the center with a narrow red rim.
- Bites are commonly multiple, rarely single.
- Bites must be differentiated from bites from siblings or other children.
- Swabs from a fresh bite should be taken to do DNA analysis.
- The advice of a forensic odontologist should also be sought as soon as possible.
- Any doctor who examines children must always bear in mind the possibility of physical child abuse.

## ❖ Child sexual abuse:

- It is defined as the involvement of dependent, developmentally immature children and adolescents in sexual activities they do not truly comprehend, to which they are unable to give informed consent or which violate social taboos or family roles.
- The diagnosis and management of child sexual abuse are multidisciplinary involving not only doctors but also social agencies and sometimes law enforcement agencies.

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