Sudden Death In Infancy

DR BERNARD MIDIA

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Definition

- Sudden Infant Death Syndrome 'SIDS', Cot Death' or 'Crib Death'
- The sudden death of any infant or young child which is unexpected by history and in whom a thorough necropsy fails to demonstrate ands adequate cause of death
- There are other definitions some of which allude to other dimensions
  - Eg the National Institute of Child Health and Human Development(NICHD) in 1989
  - A three-tiered definition by Beckwith in 1992, Sydney during the Second SIDS International Conference
  - The 'Stavanger definition'

Incidence & Risk Factors

- Agreed age-range is 2 weeks to 2 years, majority between 2 and 7 months with peak at 3 to 4 months
- male>female
- > in twins
- > in cold months
- No geographical predilection but higher incidence is reported in the Western world. Incidence reducing in the western world due to a number of factors
- Often always during sleep usually in the early hours of the day
- > in lower socio-economic status

Usual Findings

- Case History:
  - Brief history with similarities
  - Often previously quite well
  - Then trivial symptoms which are often overstated

Usual Findings

- Scene Of Death & External Findings
  - Scene often unavailable
  - External findings may include: oedema fluid from mouth, stomach contents in mouth, nostrils or face, clenched fists, child found under clothes or upside down at the foot of the cot, sweaty, moist and raised body temperature, no external findings of significance

Usual Findings

- Autopsy Appearances
  - Essentially nil gross findings as per definition though some lesions may occasionally be found
  - Almost all SIDS are cot deaths but not all cot deaths are SIDS
  - Explainable cot deaths are usually from microscopic rather than gross findings
  - Incidental gross findings possible

Usual Findings

- Autopsy Appearances
  - Naked-eye features:
    - Petechiae on visceral pleura, thymus, epicardial surface,
    - Gastric content in air passages
    - Respiratory infections manifested by inflamed laryngeal and tracheobronchial mucosa
    - Pulmonary oedema

Histological Findings In SIDS

- Often controversial
- Lung changes mainly and observer's criteria threshold is important; peribronchial cell infiltration
- Other findings are inconstant; thickened pulmonary artery walls, gliosis in the brainstem, retention of brown fat in the adrenals, and abnormalities in the carotid body that suggest chronic hypoxia; changes in the myocardium, adrenals, parathyroids and liver

Theories Of Causation

- These include: allergy to cow's milk proteins, house-mite allergy, deliberate suffocation, spinal haemorrhages, botulism, calcium deficiency, selenium deficiency, biotin deficiency, vitamin E deficiency, vitamin C deficiency, vitamin D deficiency, thiamine deficiency, hypoglycaemia, hypothyroidism, magnesium deficiency, carbon monoxide poisoning, overlaying, pharyngeal hypotonia, nasal obstruction, tracheobronchitis, respiratory syncytial virus, prolonged sleep apnoea, deficient or abnormal pulmonary surfactant, cardiac conduction defects, sodium overload in feeds, narrow forumen magnum, hyperthermia, hypothermia, influenza infection, metabolic enzyme defects, hypogammaglobulinaemia, etc

Theories Of Causation

- SIDS as a final common pathway of a number of deleterious factors that come together
- The role of non-specific health-care improvements in reducing the incidence of SIDS
- The role of the pathologist is to perform a meticulous autopsy;
  - To exclude any overt natural disease or injuries
  - To offer sympathetic advice to those parents who want an explanation of the syndrome in comprehensive lay terms

The SIDS Autopsy

- A meticulous autopsy as for any infant
- Full measurements and weights
- Imagine studies especially in suspected child abuse
- Meticulous gross examination
- Full histopathologic survey
- Swabs for microbiological examination
- A definite pathological lesion rules out SIDS

Medico-Legal Problems In Cot Deaths

- Differentiating SIDS from external suffocation
  - The role of
    - petechiae
    - circumstantial or other non-medical history
- Multiple sudden infant deaths
  - A 2nd cot death per 250,000 births is reported
  - Rule out familial, genetic or metabolic illness and any elements of foul play in a more frequent occurrence
- Counselling of parents

Fatal Child Abuse

General Aspects

- Also called 'battered baby syndrome' or non-accidental inury in children
- A continuum from clinical to death in 10%
- Repetitive physical injuries inflicted by a parent or auardian, in circumstances that exclude accident
- Includes also psychological and sexual abuse though the forensic pathologist is often only concerned with physical damage

Modes Of Death In Child Abuse

- Most common are head injury and rupture of an abdominal viscus
- The majority of deaths are caused manually by; hitting or beating with the hands, shaking, throwing, dropping and less often through burning and suffocation.
- Shooting and stabbing smack of classical homicide which is distinct from child abuse syndrome

Clinical & Psychosocial Characteristics

- Lower socioeconomic status
- Culprit; often parent or guardian and occasionally older brother or sister
- Born out of wedlock
- Often unwanted
- Usually first born
- Suffering from subnormality or congenital defects
- Often <2 years and under school age

Clinical & Psychosocial Characteristics

- Males> Females
- Possible history of child being accident prone
- Battering parents often have a history of multiple social and psychiatric problems with violent home backgrounds
- Hesitation to seek prompt medical aid
- Usually poorly looked after and dirty
- Low body weight

Range Of Injuries

- Surface Bruising
  - Skin bruising is the most common
  - Predominant sites; limbs, buttocks, face, chest, abdomen, neck
  - Varying sizes and types, patterns and age
- Skeletal Injuries
  - Skull, ribs, long bones
  - Consider the effects of the deformability/pliability and thinness of infant skull bones, open suture line and fontanelles
  - 'Growing fractures' and sutural diastasis
  - Metaphyseal and epiphyseal injuries more often due to indirect forces of traction, torsion or angulation

Range Of Injuries…

- Skeletal Injuries…
  - There are at times characteristic radiological findings
  - Multiplicity and variation in fracture age are suspicious of abuse
  - 'Brittle bone diseases' (osteogenesis imperfect, infantile cortical hyperostosis, congenital syphilis, copper deficiency and Menke's syndrome) should be considered though they form only a small percentage
- Head injury…
  - Intracranial haemorrhage, classically subdural haemorrhage, and brain trauma are the commonest cause of death or permanent neurological impairment
  - Direct trauma or vigorous shaking

Range Of Injuries…

- Head Injury…
  - The 'strain rate' ie the rate of change and the duration of deceleration rather than a steady deceleration, is the most damaging.
  - The significance of diffuse axonal injury(DAI) and hypoxic brain damage
  - Most direct impacts are due to the moving head striking a fixed object rather than it being struck
  - Extradural haemorrhage is uncommon in child abuse
  - Subarachnoid haemorrhage is often an accompaniment of cerebral cortical contusion