It should not hurt to be a child

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Outline

- Intracranial haemorrhages in infants/children
  - Non-accidental injury syndrome
  - Shaken baby syndrome
- Procedure related deaths
  - Section 48 of the Health Professions Amendment Act 29 of 2007
- Human tissue
  - National Health Act 61 of 2003
- Sudden unexpected deaths
  - When and why to refer?
Non-Accidental Injury Syndrome (child abuse)

Legislation

- Constitution of the Republic of SA 108 of 1996 – Chapter 2 - Bill of Rights section 28
- Children Act 38 of 2005
- Prevention of Family Violence Act 133 of 1993 – section 4
- Criminal Law (Sexual Offences) Amendment Bill 50 of 2003
Children’s Act 38 of 2005

• Section 110: “Any correctional official, dentist, homeopath, immigration official, labour inspector, legal practitioner, medical practitioner, minister of religion, nurse, occupational therapist, physiotherapist, psychologist, religious leader, social service professional, social worker, speech therapist, teacher, traditional health practitioner, traditional leader or member of staff or volunteer worker at a partial care facility, drop-in centre or child and youth centre……”

Physical child abuse

• Silverman 1953 radiological lesions
• Caffey’s 3rd syndrome (1956)
• Battered baby syndrome (Kempe 1962)
• Non Accidental Injury Syndrome (NAIS)
• To be differentiated from child assault/homicide
Medical practitioners duty

• Clinical cases
  • Must be reported
  • Can be on request by police (SAP308)
  • Consult a partner to confirm diagnosis
  • Hospitalise the patient
  • Report to the Department of Health
  • J88 to be completed

Findings

• Skin lesions
• Retina
• Head injuries
• Fractures
• Abdominal injuries
Diagnosis

• Radiological lesions – variations in age
• Traumatic lesions
• Time between injury and seeking medical advice
• Discrepancy between nature of wound and explanation

• Practical problem with dr shopping…

Differential diagnosis

• Skin lesions
  • Haemophillia
  • Vit K deficiency

• Fractures
  • Osteogenisis imperfecta
  • Brittle bone disease
  • Normal variants
  • Syphilis
  • Vitamins
If...

- Dr was wrong – not abuse
  - Will not be legally held responsible for damages
- Dr did not report
  - Child ends up at forensic pathology
  - Dating of injuries...
  - HPSCA / criminally

Intra-cranial haemorrhages
Term newborns

- Incidence of ICH during birth...
  - Spontaneous delivery – 1 per 1900
  - Vacuum extraction – 1 per 860
  - Forceps delivery – 1 per 664
- Risk factors
  - Maternal
  - Neonate
  - Labour

Epidural haemorrhage (EDH)

- 2-3%
- Infants
  - Rare
  - Virtually always traumatic
    - Associated with forceps delivery
    - Birth trauma
    - Misplacement of catheters
    - Osteogenesis imperfecta
  - Venous haemorrhage
  - Skull fractures rare
EDH

• Location:
  – Minimal temporal region
  – Parietal region
  – Occipital region - fracture and dural sinus injury

• Older children
  – Arterial
  – Association with skull fracture

• Traumatic – low velocity impact

Spontaneous EDH

• Potential aetiologies
  – Middle ear and sinus infection
  – Complication of neurosurgery
  – Minor head trauma in child with coagulopathy
  – Invasive skull tumours
    • Langerhans cell histiocytosis
    • Solid tumour metastasis
  – Sickle cell anaemia with skull infarction
Subdural haemorrhages (SDH)

• “There is probably no other lesion that has greater forensic significance than subdural haemorrhage (SDH). Its causes and mechanisms are complex and in many ways poorly understood, and is its forensic significance in a given case.”

  – Jan E Leestma

Subdural haemorrhages in infants

- Spontaneous
- Traumatic
Subdural haemorrhages

• Spontaneous
  – Infants
    • Disorders of coagulation
    • Birthing process
    • Inherited disorders of metabolism
    • Vascular abnormalities/malformations
    • Meningitis
    • Sinus or cortical vein thrombosis
    • Artefacts...
      – Not all forensic pm’s conducted by pathologist...

SDH

• Geddes (review non-traumatic infant deaths)
  – Review of 50 post mortem cases of dura
  – COD – infection, hypoxia, SIDS, unascertained
  – Haemorrhage in 36/50
  – Reason for haemorrhage
    • Hypoxia
    • Brain swelling
    • Raised central venous pressure
    • Thus not rupture of bridging veins – phenomenon of immaturity
SDH

• Rooks (2008)
  – Study on 101 asymptomatic term infants
  – 46 neonates had SDH on MRI within 72 hours of delivery
  – Both vaginal and caesarean sections
  – Scans on 3-7 days, 2 weeks, 1 month, 3 months
  – Most less than 3mm and resolved by 1 month
    • Re-bleeding???

SDH

• Symptoms
  – Acute SDH evolve over minutes - days or longer
  – May or may not show symptoms
  – Result from raised ICP
• What happens over time?
  – Chronic SDH
    • Re-bleeding
    • Change underlying brain parenchyma
      – Deterioration with atrophy – walnut brain
Shaken baby syndrome (SBS)

Headlines 1997...

- Louise Woodward
- Baby Matthew Eappen (9 months)
Headlines…

• Grandmother Smith and baby Etzel (7 weeks)
• Sentenced to prison
Those in favour of SBS

Historical background

• Caffey
  – Anecdotal case histories - a child care nurse who apparently had the habit of shaking infants - to stop crying
  – Allegedly caused death in 3 cases and “maimed two others”
  – Cases never published
Case 1 - 1948

- 12-day-old female infant
- Admitted – crying with bulging anterior fontanel
- Died 3 hours after admission
- PM
  - No skull #
  - Bilateral SDH, SAH, subpial haemorrhage, lacerations cerebral parenchyma
  - Haemorrhage optic nerve sheath + retina

Case 2 - 1956

- 11-week-old female
- Bulging anterior fontanel
- Died 2 hours after admission
- PM (ltd to brain)
  - Bilateral SDH and SAH
Literature

• Link with alleged connection between:
  – Shaking trauma
  – Haemorrhages and other pathologies of the retina
  – SDH
  – No clear history of fall, MVA

Guthkelch (1971)

• One of most quoted papers
• First to invoke the mechanism of repeated acceleration/deceleration forces in infants to explain abusive brain injury (with no evidence of external injury)
Concluding statement in Guthkelch article

• “It follows that since all cases of infantile subdural haematoma are best assumed to be traumatic until proven otherwise it would be unwise to disregard the possibility that one of these has been caused by serious violence… when there are only trivial bruises or indeed no marks of injury at all, and (to) inquire, however guardedly or tactfully, whether perhaps the baby’s head could have been shaken”

Triad

• Subdural haemorrhage
• Brain swelling
• Retinal haemorrhage
Those against…

Biomechanics

- Duhaime (1987 1 month old baby)
- Forces on the neck – 1027-35910N
- Shaking to be forceful for at least 2 minutes
- Bandak (2005) – forces generated by shaking will exceed the cervical spine’s ability to resist such force
  – If you shake an infant you will injure the neck
Biomechanics

• Prange (2003) – forces from acceleration when falling from 3 foot onto a concrete floor is 40x greater than shaking

Retinal haemorrhages

• Shaking induced vitreous traction did not cause primary retinal haemorrhages, schisis or fold in an animal model subjected to >100000rad/sec2
• This is 40 times the upper limit which will be reached during shaking and more than 70 times greater than what Carole Jenny of AAP Committee on Child Abuse and Neglect was able to generate with the shaking of a model
PM examination of suspected cases

- Intra-cranial haemorrhages
- Retinal haemorrhages
- No evidence of neck injury

Retinal findings in infant with encephalopathy

- Increased intra-cranial pressure
- Hypoxia
- Coagulopathy
Case law – lessons learned

Canada

• Judge Goudge
• Dr Smith – 1982-2003
Canada

- Goudge report
- Review of 142 cases of SBS
- Tide turning scientifically against the syndrome
- Inquiry into Paediatric Forensic Pathology in Ontario (2007)
- Final report October 2008

Review of Eappen case

- Baby Matthew had sickle cell trait
- History of fall on kitchen floor 3 days prior to death
- Leestma – stressed that SDH can be occult initially until it reaches a critical size to produce symptoms
Grandmother Smith

- Spend 10 years in prison
- Appealed
- Baby was born prem, pm showed SDH of different ages, baby fell, appeal won…
- Released

Safer option – shaken impact syndrome
Section 48 of the Health Professions Amendment Act 29 of 2007

Case presentation
Subgaleal haematoma in the neonate

Subscalp haematoma

- Associated with vacuum assisted deliveries
- Incidence
  - 0.6/1000 all deliveries
  - 4.6/1000 vacuum deliveries
- 250ml blood can accumulate with only a 1cm increase in the skull circumference
- Mortality = 12-25%
• Clinical diagnosis
  – Delivery risk factors
  – Neonatal surveillance regimen
• Prevention
• Management
  – Stabilization should not be delayed by any attempts to confirm the diagnosis

Any alternative / additional medico-legal requirements
“The death of a person undergoing, or as a result of, a procedure of a therapeutic, diagnostic or palliative nature, or of which any aspect of such a procedure has been a contributory cause, shall not be deemed to be a death from natural causes as contemplated in the Inquests Act, 1959 (Act No. 58 of 1959), or the Births, Marriages and Deaths Registration Act, 1992 (Act No. 51 of 1992)"

Ventouse delivery

- Is this a therapeutic procedure?
- Was the baby a legal entity when the procedure was commenced?
- Should all these babies be referred?
Birth related head injuries

- Neonatal traumatic head injuries affect 0.31% of pregnancies
- 2% of neonatal deaths
- Study at PMLL – 4 cases in 5 years

Other procedures in paediatric/neonatal practice

- Insertion of umbilical catheters
- Intubation – increase pressure - pneumothorax – intercostal drain – severe haemorrhage with blood loss...
- When to refer???
Legislation pertaining to human tissue

Post mortem specimen collection

• Literature indicates
  – CSF – LP = diagnosis of metabolic abnormalities
  – Urine = metabolic / genetic screening

• Is the taking of specimens post mortem legally acceptable/justified?
Legislation

• Natural death
  – National Health Act 61 of 2003 – chapter 8
  – CONSENT – best in writing from next of kin
• Other than natural death
  – Inquests Act 58 of 1959
  – Not without permission of forensic pathologist

In South Africa

• Many post mortem examinations conducted by inexperienced doctors
• Mothers up for murder of infants
Sudden Infant Death Syndrome

Medical practitioner’s role

- No death certificate of natural causes
- Please refer the case!!!
- Follow up discussions with the family members
- Review of other siblings...
  – SUCD
What to expect in the investigation in Pta?

- Re-visit of the scene where the baby was found
- PM examination
- Ancillary investigations
- Feedback to the family members
  - Permission obtained from DOPP
References


• Goudge report – The inquiry into paediatric forensic pathology in Ontario.


Thank you
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