The incidence and severity of perinatal asphyxia and hypoxic ischemic encephalopathy in neonates born at Tembisa Hospital

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Introduction

"The object of this communication is to show that the act of birth does occasionally imprint upon the nervous and muscular systems of the nascent infantile organism very serious and peculiar evils. Nearly twenty years ago....I showed that premature, difficult labours, mechanical injuries during parturition to head and neck, where life had been saved, convulsions following the act of birth, were apt to be succeeded by a determinate affection of the limbs of new-born children, spastic rigidity from asphyxia neonatorum, and assimilated it to the trismus nascentium and the universal spastic rigidity sometimes produced at later periods of existence"

William James Little 1862 a London orthopaedic surgeon

Little WJ. On the influence of abnormal parturition, difficult labours, premature births, and asphyxia neonatorum, on the mental and physical condition of the child, especially in relation to deformities. Trans Obstet Soc Lond 1862;3:293-344.

Introduction

- Perinatal asphyxia if infant meets following criteria (ACOG and AAP)

	2003 (1st Ed)	2014 (2nd Ed)
Acidemia: pH or Base deficit	<7 or ≥12 mmol/l	<7 or ≥12 mmol/l
Apgar score	0 to 3 beyond 5 min	< 5 (at 5 & 10 min)
Neurological Sequelae	Seizures, coma, hypotonia	
Imaging	Imaging evidence	Brain MRI with 24-96hrs/Magnetic Resonance Spectroscopy (Repeat at 10days)
Multi-organ failure	Yes	Yes
		Types and timing of contributing factors that are consistent with an acute peripartum or intrapartum event
		Developmental outcome-spastic quadriplegia or dyskinetic CP

- Any of the above in isolation lack sensitivity and specificity **(Leuthner SR & Das UG low Apgar score and definition of birth asphyxia. Pediatr Clin N Am. 2004;51:737-745 vs World Health Organisation. Birth Asphyxia-Summary of the previous meeting and protocol overview. 11 June. http://www.curosive.com/health_professionals/news/pdf/10-09-2007_birth _asphyxia02.pdf)**

  » WHO clinical diagnosis definition of birth asphyxia as failure to initiate and sustain breathing at birth

Study Method

- Prospective audit (01/01/2015-30/06/2015)

- Inclusion criteria
  - Term infants at ≥37 weeks gestational age post conception born in the obstetrics department at Tembisa
  - Asphyxia defined according to

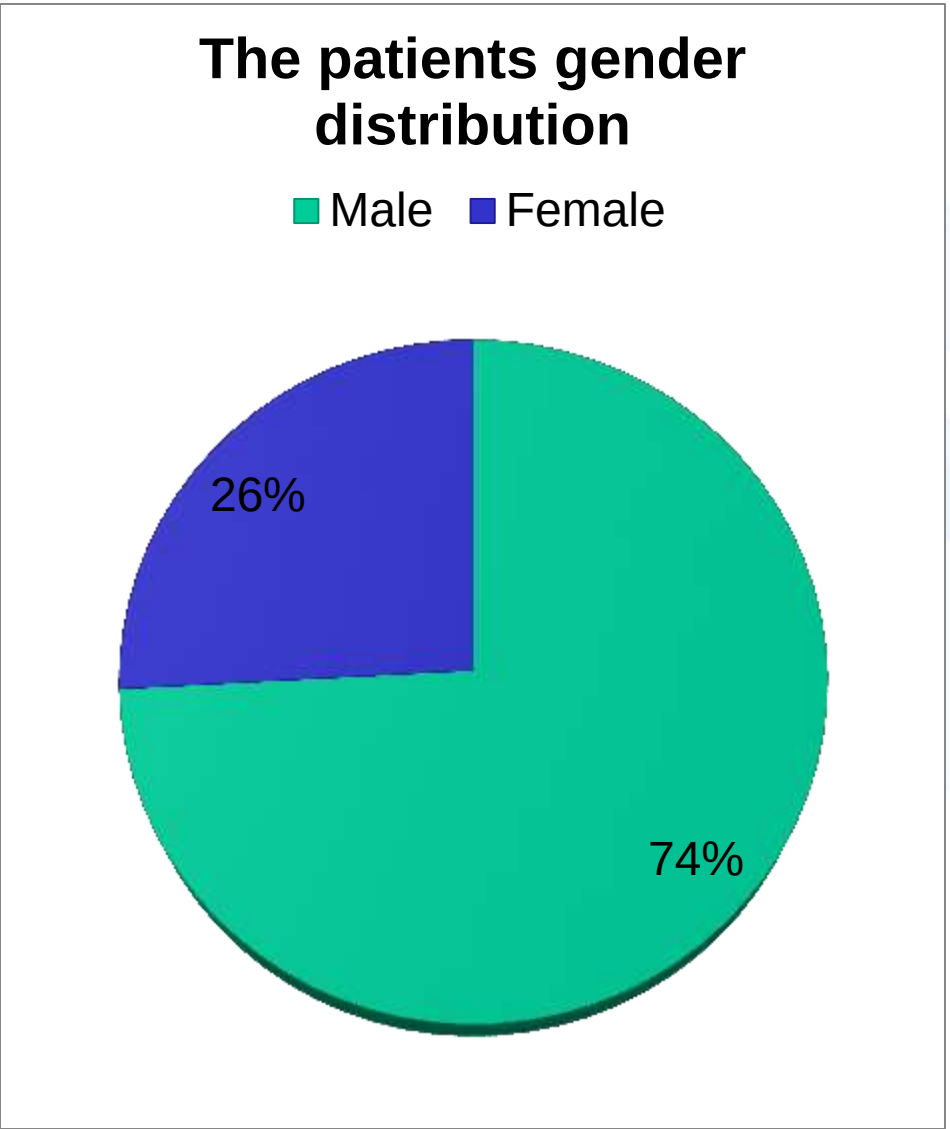
    "Task force on Neonatal Encephalopathy and cerebral palsy ACOG & AAP. Washington; 2003. International Cerebral Palsy Task force. BMJ. 1999;319: 1054-1059"

- Modified Sarnat encephalopathy grading and Thompson score of each neonate determined after birth

- Exclusion criteria
  - Neonates with congenital abnormalities, proven neonatal infections, born <37 weeks post-conceptional age, depressed neurological state other than perinatal asphyxia, & BBA

- Data on maternal demographics & antenatal care collected
- Intrapartum and immediate post partum events recorded

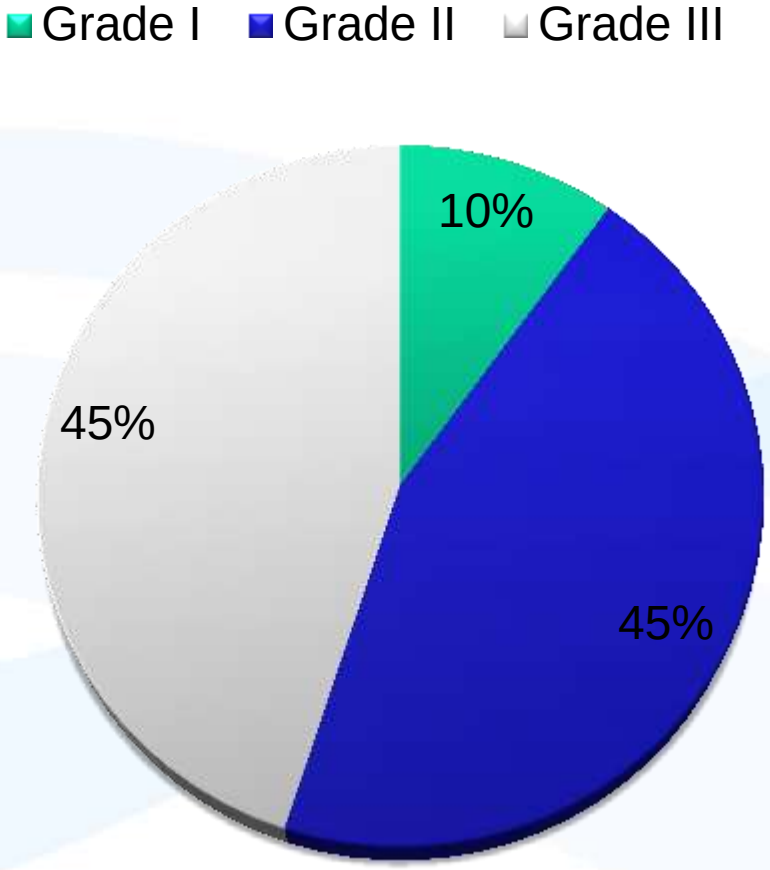
Results



- The ratio of male to female patients was Male 1:0.3

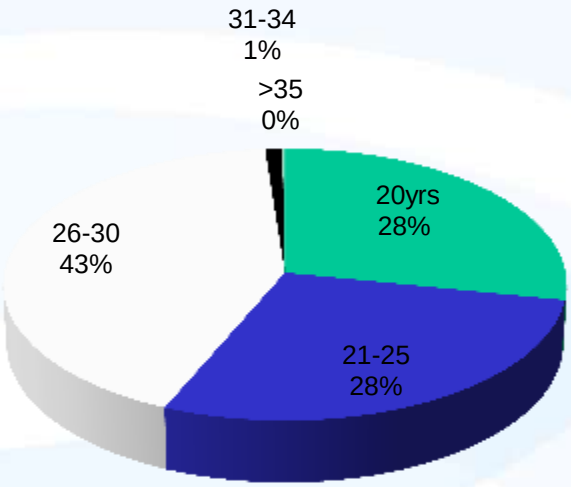
- Perinatal asphyxia incidence was 7.0 cases per 1000 live births (95% CI: 4.8-8.6)

Distribution of HIE severity (Modified Sarnat & Sarnat Classification)

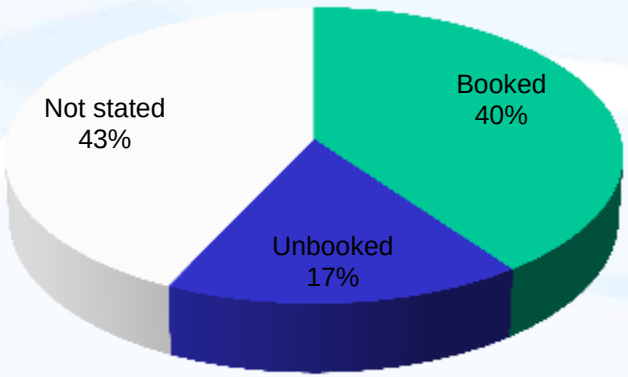


Maternal Demographics

Maternal Age in years



Antenatal Attendance



Mean gestational age 39 weeks

Table 2. Intrapartum risk factors

Variable	n (%)
Prolonged 2nd stage of labour	5 (10)
Fetal CTG Reactive Non reactive No CTG reported	 5 (10) 6 (13) 37 (77)
Mode of delivery NVD C-section	 37 (77) 11 (23)

*** n-** number of patients
CTG- cardiotocography
NVD- normal vaginal delivery

Table 3. Post partum risk factors

Variable	No (%)
Resuscitation Yes No	 35 (73) 13 (27)
Resuscitation duration <5 min 6-10 min > 11 min	 27 (56) 5 (10) 3 (6)

Table 3. Correlation between Modified Sarnat & Sarnat Classification and Thompson score

Modified Sarnat & Sarnat	Thompson score		
	Mean	SD	Median
Mild	8.00		8.00
Moderate	9.00	2.345	10.00
Severe	13.50	5.447	12.50

COMPARISON TO OTHER STUDIES

Country	Results	Perinatal Asphyxia Definition
Nigeria Garba *et al (2015)*	Prevalence 21%	Apgar score <5 at 5 min
South Africa Bruckmann *et al* (2015)	Incidence 8.7-15.2 per 1000 deliveries	Apgar score <7 at 5min base deficit >12mmol/l or bag mask ventilation alone
Cameroon Chiabi *et al (2013)*	Incidence 80.5 per 1000 live births	Apgar score < 7 at 5 min
Congo Biselele *et al* (2013)	Incidence 40 per 1000 live births	Apgar score <6 at 5min or Resus till 10 min or pH<7 base deficit >16mmol/l cord blood gas or 1hr post delivery
Sweden Thornberg *et al* (1995)	Incidence 1.8 per 1000 live born infants	Apgar score < 7 at 5 min
Canada Dzakpasu *et al* (2008)	Incidence 2.4 cases per 1000 live births.	Apgar score at 5 minutes of ≤3 Resus for ≥3 minutes and/or intubation, or neonatal seizures.

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Beyond Newborn Survival Paper 4

Intrapartum-related neonatal encephalopathy incidence and impairment at regional and global levels for 2010 with trends from 1990

Anne CC Lee[1], Naoko Kozuki[2], Hannah Blencowe[3], Theo Vos[4], Adil Bahalim[5], Gary L. Darmstadt[6], Susan Niermeyer[7], Matthew Ellis[8], Nicola J. Robertson[9], Simon Cousens[3] and Joy E. Lawn[10,11]

Conclusion

- Perinatal asphyxia (7 per 1000 live births) was still high compared to developed countries
- Consensus definition of perinatal asphyxia and criteria applicable in most settings
- Contributing factors to perinatal asphyxia
  - Maternal factors
    - Antenatal attendance
    - Gravidity
  - Intrapartum factors
    - Poor maternal and fetal intra-partum monitoring
  - There was poor record keeping on both sides of the obstetric and paediatric departments
  - Human resources
- Little can be done for a baby affected by severe perinatal asphyxia. So, prevention is unquestionably desired

Practical Issues

- Good record keeping
  - Antenatal History
  - Intrapartum and immediate postpartum events must be documented
  - Umbilical arterial cord blood gas or neonatal blood gas within 1 hour post delivery at least
- Follow up with detailed notes before discharge home
- Importance of continually counselling the parents

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