



# Assessment of Fetal Well Being

## The Electronic Fetal Monitor: Friend or Foe?

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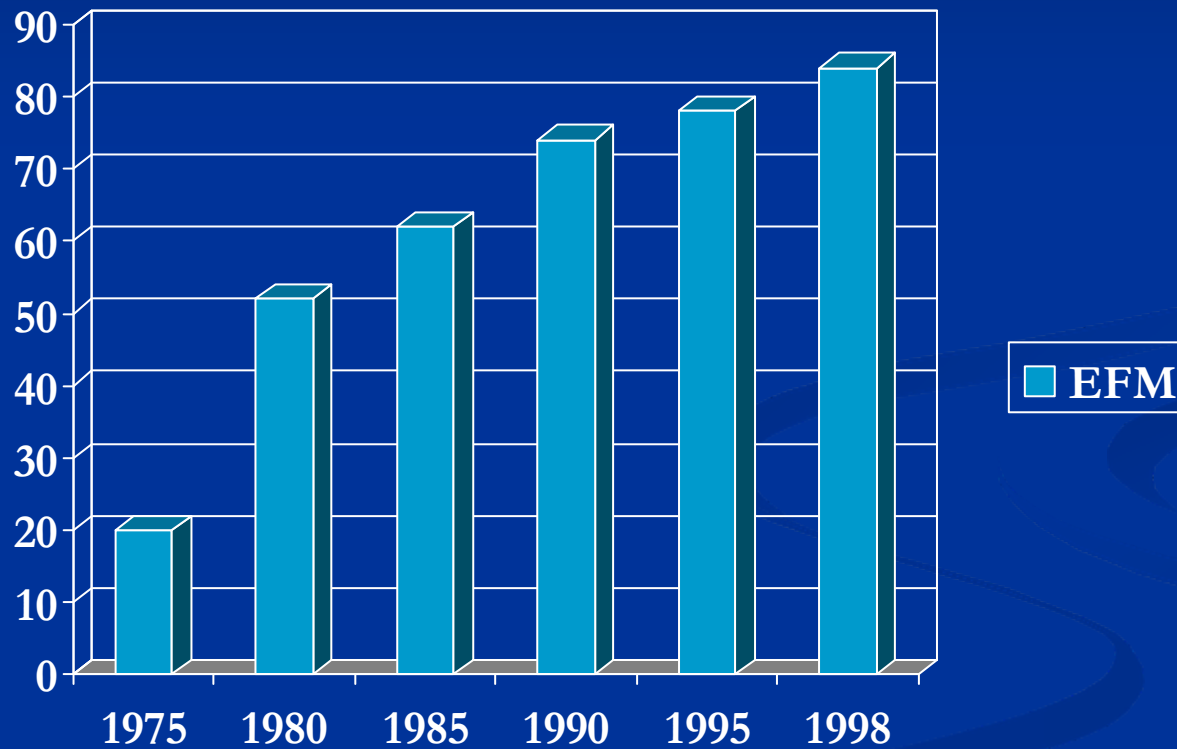
# A Brief History

- 1650 - Fetal heart sounds first heard and described
- 1821 - Discovery of the use of auscultation of the fetal heart
- 1825 - the first documented encounter between the fetal heart and litigation

# A Brief History

- Development of modern clinical electronic fetal monitors began in the 1960s and became commercially available by the late 1960s/early 1970s
- Initially designed to monitor high risk pregnancies, the use of EFM for all labours soon became widespread and it is now the most common method for monitoring the fetal heart during labour

# Growth in EFM



# EFM - Rationale

- At the time EFM was developed and implemented into clinical practice there was a belief that much of cerebral palsy and neurological morbidity in infancy was caused by lack of oxygen during labour and birth

# EFM - Rationale

- Thus - continuously tracing the fetal heart during labour would allow for early recognition of fetal compromise
- And allow for early intervention in such cases

# EFM - Rationale

- THUS - EFM would reduce the rate of cerebral palsy and neurological damage
  - *"now that the appropriate technology is available, the obstetrician may virtually eliminate intrapartum stillbirths and reduce morbidity associated with parturition to a minimum"*
    - (Filshie 1974)

# EFM - Rationale

- With this belief in mind EFM became established in clinical practice before extensive research was done to assess its relative risks and effectiveness

# What we now know

- The prevalence of cerebral palsy has not decreased (Winter et al 2002)
- In most cases the events leading to cerebral palsy occur in the fetus before the onset of labour, or in the newborn after delivery (MacLennan 1999)

# What we now know

- The specificity of the CTG for the prediction of cerebral palsy is low with a reported false positive rate as high as 99.8% even in the presence of multiple late decelerations or decreased variability
- Evidence from Randomised Controlled Trials comparing EFM and Intermittent Auscultation

# Current Evidence

- Most recent Cochrane Systematic Review -
- Continuous Cardiotocography (CTG) as a form of electronic fetal monitoring (EFM) for fetal assessment during labour
  - (Alfirevic, Devane, Gyte 2006)

# Current Evidence

## CTG group more likely to have:

- Continuous CTG Versus IA
- (low risk population)
- CS for abnormal FH pattern
  - (RR 2.31, 95%CI 1.49-3.59)
- Instrumental Birth
  - (RR 1.29, 95%CI 1.02-1.62)
- Babies admitted to neonatal unit
  - (RR 1.37, 95%CI 1.01-1.87)

# Current Evidence

## CTG group less likely to have:

- Continuous CTG Versus IA
- (low risk population)
- Babies with neonatal seizures
  - (RR 0.36, 95% CI 0.16-0.81)
- No evidence of difference in perinatal mortality
  - (RR 1.02, 95% CI 0.31-3.31)

# Current Evidence

## CTG group more likely to have:

- Continuous CTG Versus IA
- (high risk population)
- CS for abnormal FH pattern
  - (RR 2.46, 95%CI 1.69-3.59)
- Increase in Cerebral Palsy - (heavily influenced by one small trial - very preterm babies)
  - (RR 2.54, 95%CI 1.10-5.86)

# Current Evidence

- Continuous CTG Versus IA
- (high risk population)
- No Evidence of difference in perinatal mortality
  - (RR 1.02, 95% CI 0.31-3.31)
- Or Neonatal seizures
  - (RR 0.66, 95% CI 0.36-1.22)

# Recommendations

- *"Intermittent Auscultation of the FHR is recommended for low risk women in any birth setting"*
  - (NICE 2007)
- *"continuous CTG should be recommended for high-risk pregnancies where there is an increased risk of perinatal death, cerebral palsy and neonatal encephalopathy"*
  - (RCOG 2001)

# The Admission CTG

- Introduced to try and identify those babies that might benefit from continuous EFM during labour

# Current Evidence

- Most recent Systematic Review - prognostic value of the labour admission test compared with auscultation only
  - (Blix et al 2005)
- 3 RCTs - 11,259 women

# Current Evidence

- Women with an Admission CTG are more likely to have:
  - Epidural analgesia
    - (RR 1.2, 95% CI 1.1-1.4)
  - Continuous EFM during labour
    - (RR 1.3, 95% CI 1.2-1.5)
  - Fetal Blood Sampling
    - (RR 1.3, 95% CI 1.1-1.5)

# Current Evidence

- Women with an Admission CTG are more likely to have:
  - Trend towards more operative deliveries and CS but did not reach statistical significance

# Current Evidence

- No evidence of differences between groups:

- Augmentation
  - (RR 1.1, 95% CI 0.9-1.2)
- Perinatal mortality
  - (RR 1.1, 95% CI .0.2-7.1)
- Other neonatal morbidities

# Recommendations

- *"The use of the Admission CTG in low risk pregnancy is not recommended in any birth setting"*
  - (NICE 2007)

# In Ireland

- In 2004:
  - More than a third of units (n=8) used continuous EFM during labour for women with a normal uncomplicated pregnancy
  - The admission CTG was performed on all women in 96% of units - 1 unit restricted Admission CTG for women with risk factors
    - (Devane, Lalor, Bonnar 2007)

# Questions??

- Why continued use of EFM in low risk population despite mounting evidence?
- Clinical issues associated with EFM use?

# Threat of Litigation

- Perception that the use of the CTG is a justifiable defence against the threat of litigation
  - 'proof' that the baby was not compromised whilst in your care
  - *"I think it's a security blanket in many ways...its your word against theirs if there's a problem because you've not got the proof"*
    - (Hindley & Thompson 2007)

# Threat of Litigation

- However - use of CTG itself creating an atmosphere of blame when adverse outcome occurs
- The CTG now provides the central documentary evidence in claims of asphyxia
  - *In court the delivery of a baby happens all over again....but better this time*
  - *Its just like your looking for trouble....you always find something on the CTG*

# Threat of Litigation

- Ability to recognise normal from abnormal CTG traces:
  - A review of 110 cases of obstetric litigation for cerebral palsy - 70% of cases were based on abnormalities of the CTG and their interpretation (Williams & Arulkumaran 2004)
  - CESDI review of intrapartum-related deaths (1994-1995), the most frequent criticism related to failures in the use and interpretation of CTG tracings.

# CTG Interpretation

- While it may be easy to recognise a perfectly normal CTG and a grossly pathological CTG, problems arise while interpreting a suspicious CTG



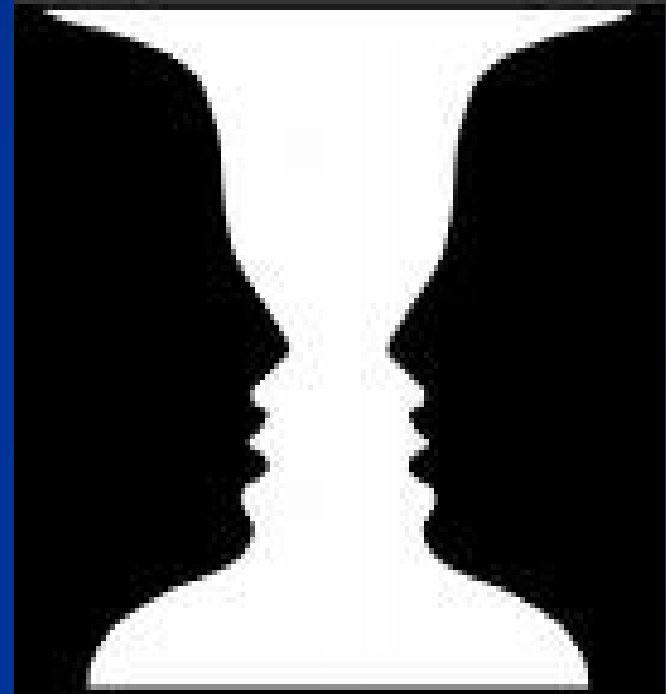
# CTG Interpretation

- Normal = all 4 features reassuring
- Suspicious = one feature classified as non-reassuring and the remaining reassuring
- Pathological = 2 or more features non-reassuring, or one or more abnormal
  - (NICE 2007)

Feature	Baseline	Variability	Decels	Accels
reassuring	110-160	≥5	none	Present
Non-reassuring	100-109 161-180	<5 for 40-90 mins	Typical variable with over 50% contractions >90 mins Single prolonged up to 3 mins	Absent with otherwise normal trace of uncertain significance
abnormal	<100 >180 Sinusoidal ≥ 10 mins	<5 for 90 mins	Typical variable with over 50% contractions or late, for over 30 mins Single prolonged up to 3 mins	

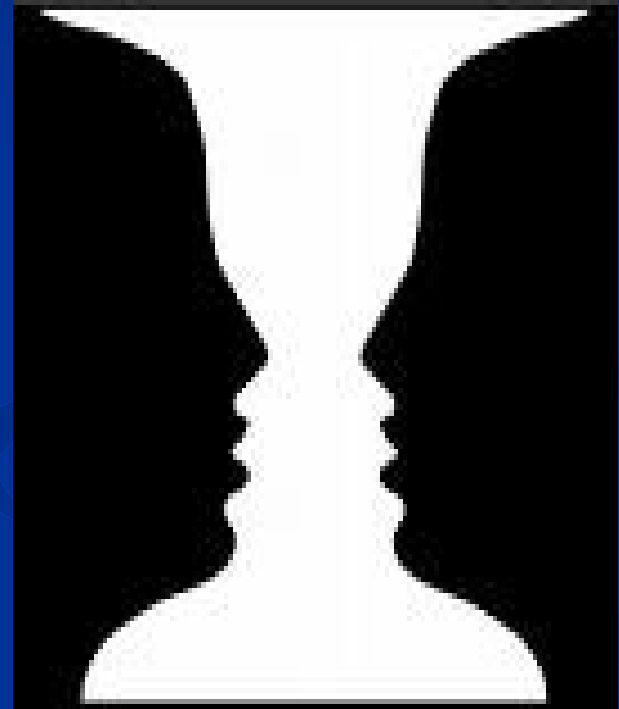
# CTG Interpretation

- Data difficult to standardise and subjective
- e.g. preterm birth and normal baseline?



# CTG Interpretation

- Subject to disagreement between observers
- Experts in interpretation of FHR patterns will agree on approx 60% of normal patterns but only 20% of pathological patterns
  - (Ayers-De-Campos 1992)



# Monitor as Midwife

- Busy units, unable to provide 1:1 care - so some monitoring is better than none???
- But if you cannot be with a woman all of the time you cannot watch a monitor all of the time so why put it on??

# Monitor as Midwife

- IA may demand no more time than EFM
  - Maintenance of equipment, cleaning etc.
  - Time correctly interpreting CTG - as long as it takes to implement IA?
  - Responding to Alarms etc.
  - Implementing IA involves engaging with woman - bigger clinical picture

# Monitor as Midwife

- *'intrapartum fetal death is not prevented by monitors; it is prevented by an alert nurse or doctor at the bedside of a labouring woman'*
  - (Shearer 1979)

# Local policies

- A guideline on the use of EFM should be available in every unit (available in 73% of units in Ireland in 2004)
- Conversion from IA to EFM - knowing when
- If EFM is used, then fetal blood sampling (FBS) should be available
  - FBS should be advised in presence of pathological FHR trace (NICE 2007)
- Fetal monitoring education workshops

# Final thought!



Those who are enamored of practice without science are like a pilot who goes into a ship without rudder or compass and never has any certainty where he is going. Practice should always be based upon a sound knowledge of theory.

(Leonardo da Vinci, Notebooks, 1508-1518).