Fetal ECG: The Derby Experience

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Background: It is widely accepted that introduction of electronic fetal monitoring in labour has increased the rate of operative delivery. EFM is very sensitive but its specitivity is poor with a high false positive rate. Fetal blood sampling in labour helps to improve the sensitivity of EFM in detecting fetal hypoxia but FBS in labour has its limitations and in particular it provides intermittent information from a low priority tissue. To improve the specificity of cardiotocography additional information about the fetal response to labour is required and this role may be fulfilled by fetal ECG waveform analysis in labour given that the myocardium and fetal brain are equally sensitive to oxygen deficiency.
Equipment and setting: STAN S 21 fetal ECG monitor from Neoventa Medical (Gotenborg, Sweden). The setting was the Labour ward at Derby City General Hospital with 4,200 deliveries annually, a caesarean section rate of 20.96% (emergency- 12.3%, elective 8.66%) and instrumental delivery rate of 12.41%.
Methods: Ethical committee approval for an observational study of fetal ECG waveform analysis in labour was obtained from the Southern Derbyshire Local Ethics Committee (SDLEC). The maternity database was used to identify women who have reached 36 weeks gestation and after screening for adverse events in the antenatal period (miscarriage, IUFD, preterm delivery) information was mailed out to all women. The recruitment criteria stipulate women to be 36 completed weeks and willing to consent. Women in labour with an abnormal FHR pattern or if they had a fetal scalp electrode placed for any other indication were asked about participation in the study. Women were also approached if they were at high risk of developing abnormal FHR patterns such as IUGR, oligohydramnios, thick meconium staining of liquor and if agreeable to internal monitoring. After written consent they were connected to STAN S21 monitor. The labour was managed according to the CTG recording alone and this was made clear to the patients at the outset. Upon delivery, cord arterial and venous blood for blood gas analysis and lactate estimation were obtained and a data collection form was completed by the research midwives.
Results: The study is ongoing and the results of the first 75 cases are presented. There were 32 fetal scalp samples performed in 22 patients. Amongst the 32 FBSs the fetal ECG information was abnormal in 2 cases and analysis of the scalp samples yielded one with a pH <7.20 and one with a pH<7.15- both correctly identified by the ECG changes. Operative delivery for fetal distress was performed in eight cases. In six of these cases there were no fetal ECG changes, the cord arterial pH at birth was greater than 7.15 and no baby had an Apgar less than 7 at 5 minutes. In one case there were both ECG and CTG changes, Apgar score was nine at five minutes and cord artery pH was 7.080, while in the eighth case ECG recording was not available, having been disconnected from the STAN monitor for almost an hour pre delivery of an acidotic baby.

Conclusions: The preliminary results of this study, in line with the Plymouth trial and the Swedish trial results, suggest that use of fetal ECG data can significantly improve the specificity of the CTG and reduce unnecessary interventions in labour.