OBJECTIVE: The goal of this study was to measure capillary oxygen saturation during late fetal heart rate decelerations in the term human fetus to support or refute evidence that suggests the well-oxygenated fetus may exhibit periods of late decelerative heart rate events.

STUDY DESIGN: The study group was composed of term human fetuses enrolled in an intrapartum fetal pulse oximetry study who subsequently developed late decelerations during labor. A Nellcor N-400 reflexion fetal oximeter applied to the fetal presenting part was used to measure fetal hemoglobin saturation (SpO2). The fetal heart rate was measured with a direct spiral electrode and fetal EEG signals were used to validate fetal plethysmographic data. Tocodynamometers were used to measure uterine activity and intrapartum pressure catheters were placed when clinically indicated. Clinicines were blinded to fetal Sp02 results, and analysis was performed retrospectively at the conclusion of each case.

RESULTS: 167 patients were initially included in the study. All were term cephalic presentation and in active labor. Mean gestational age (±SD) was 39.4 weeks (±3.5). Late decelerations were identified in 40 patients. The corresponding fetal hemoglobin saturation responses were divided into two groups: increased and decreased fetal Sp02. Increased saturation was measured in 30 fetuses during late decelerations; baseline and maximal saturations were 57.1% ± 12.6 and 71.3% ± 10.6 respectively. Nineteen fetuses decreased saturation during late decelerations; baseline and maximal saturations for this group were 60.4% ± 10.3 and 50.3% ± 10.8 respectively. There was no difference in neonatal outcome between the groups. No relationship between sequence, severity or frequency of late decelerations and the change of fetal SpO2 was observed.

CONCLUSIONS: Late deceleration heart rate patterns occur in healthy fetuses with normal baseline preductal oxygen saturation values. The two patterns of fetal Sp02 change (increased and decreased Sp02) suggest a biphasic response that may occur with late decelerations. This may represent a physiologic protective mechanism whereby oxygenated fetal blood is selectively shunted to the fetal upper body during intrapartum stress.


OBJECTIVE: Previous studies evaluating the effect of maternally-administered oxygen on the human fetus during labor have conflicting conclusions and have failed to evaluate the fetal SpO2 after oxygen was discontinued. The objective of this study was to confirm or disprove previously reported conclusions and to additionally evaluate the fetal SpO2 alter oxygen was discontinued. The objective of this study was to measure capillary oxygen saturation in the term human fetus.

STUDY DESIGN: The study group was composed of term human fetuses enrolled in our intrapartum fetal pulse oximetry study who subsequently developed late decelerations during labor. A Nellcor N-400 reflexion fetal oximeter applied to the fetal presenting part was used to measure fetal hemoglobin saturation (SpO2). The fetal heart rate was measured with a direct spiral electrode and fetal EEG signals were used to validate fetal plethysmographic data. Tocodynamometers were used to measure uterine activity and intrapartum pressure catheters were placed when clinically indicated. Clinicians were blinded to fetal Sp02 results, and analysis was performed retrospectively at the conclusion of each case.

RESULTS: 66 patients were initially included in the study. All were term cephalic presentation and in active labor. Mean gestational age (±SD) was 39.4 weeks (±3.5). Late decelerations were identified in 40 patients. The corresponding fetal hemoglobin saturation responses were divided into two groups: increased and decreased fetal Sp02. Increased saturation was measured in 30 fetuses during late decelerations; baseline and maximal saturations were 57.1% ± 12.6 and 71.3% ± 10.6 respectively. Nineteen fetuses decreased saturation during late decelerations; baseline and maximal saturations for this group were 60.4% ± 10.3 and 50.3% ± 10.8 respectively. There was no difference in neonatal outcome between the groups. No relationship between sequence, severity or frequency of late decelerations and the change of fetal SpO2 was observed.

CONCLUSIONS: Late deceleration heart rate patterns occur in healthy fetuses with normal baseline preductal oxygen saturation values. The two patterns of fetal Sp02 change (increased and decreased Sp02) suggest a biphasic response that may occur with late decelerations. This may represent a physiologic protective mechanism whereby oxygenated fetal blood is selectively shunted to the fetal upper body during intrapartum stress.


OBJECTIVE: RPOX is a non-invasive method to estimate the arterial oxygen saturation (Sao2) continuously and may become a monitoring technique during labor. We investigated the accuracy of 2 types of RPOX sensors, the currently used sensor with a Light Emitting Diodes (LED's) combination of 660/890 nm (Nellcor, CA) and a new combination of 735/890 nm (Nellcor, CA).

STUDY DESIGN: Under general anesthetic (0.6% enflurane in 50/50 O2 and N2O), 6 Dutch piglets were instrumented. Sensors were placed randomly left or right on the groin. Saturation values of the prototype Nellcor N-400 oximeter (Sp02) were compared to blood sample Sao2 values obtained from the carotid artery. Stepwise desaturation levels were achieved by changing the gasmixture from 30% O2 to 7%.

RESULTS: The figure shows the results of the 660/890 nm and 735/890 nm sensors, respectively. The overall precision was 12.9% (n=199) for the currently used 660/890 nm sensor. The overall precision for the new 735/890 nm sensor was 5.4% (n=176) and showed a very good correlation between 25-100% Sao2.

CONCLUSION: The new 735/890 nm RPOX sensor has a much better performance than the old 660/890 nm sensor in piglets, which could be of great advantage for the development of accurate fetal RPOX systems.