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# Procedures in Family Practice

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## Fetal Scalp Blood Sampling

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The use of fetal scalp blood sampling to confirm ominous fetal heart rate tracings can result in decreased operative intervention by more accurately assessing the fetal status during parturition. This sampling technique allows the physician to safely monitor the potentially distressed fetus and thus avoid the extra morbidity and costs that accompany unnecessary cesarean sections.

Continuous monitoring of the fetal heart rate (FHR) to detect fetal distress during labor is utilized in most hospitals in the United States. The continuous FHR monitor has a high sensitivity rate (few false negatives), assuring good outcomes (Apgars greater than 7) for 99 percent of all newborns who have normal FHR tracings. Unfortunately, however, the interpretation of the FHR monitor tracings has a significant false-positive rate, estimated as high as 30 to 50 percent.<sup>1</sup> Therefore, reliance solely on the continuous FHR monitor can lead to unnecessary cesarean sections for suspected fetal asphyxia.

Fetal scalp blood (FSB) sampling has been advocated as an adjunct procedure to verify equivocal findings derived from the FHR monitor. It is estimated that combining these two tests may eliminate over 50 percent of cesarean sections now being performed for suspected fetal distress.<sup>1</sup> Although FSB sampling is a relatively simple procedure, it is infrequently performed outside academic centers.

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### Materials

In order to perform FSB sampling routinely, the hospital must be capable of performing blood gas analysis on microsamples on a 24-hour call basis with turnaround time of 5 to 10 minutes. Materials to perform FSB sampling must be readily available in the obstetrical unit. An assistant should be present to help hold the patient in position, direct the light source, and accept the filled capillary tube. The sampling physician should be familiar with the technique and use aseptic precautions.

A sterile tray (commercially available with disposable items) should contain the following: (1) four 200- $\mu$ L heparinized capillary tubes, (2) an endoscopic cone, (3) a 2-mm blade on a long handle, (4) silicone grease, (5) three to six long-handled swabs, (6) magnets for mixing sample, and (7) light source (Figure 1).

### Technique

Fetal blood can be sampled from a vertex or breech presenting part provided that adequate exposure is possible through the dilating cervix. The technique is facilitated by exposure of the largest

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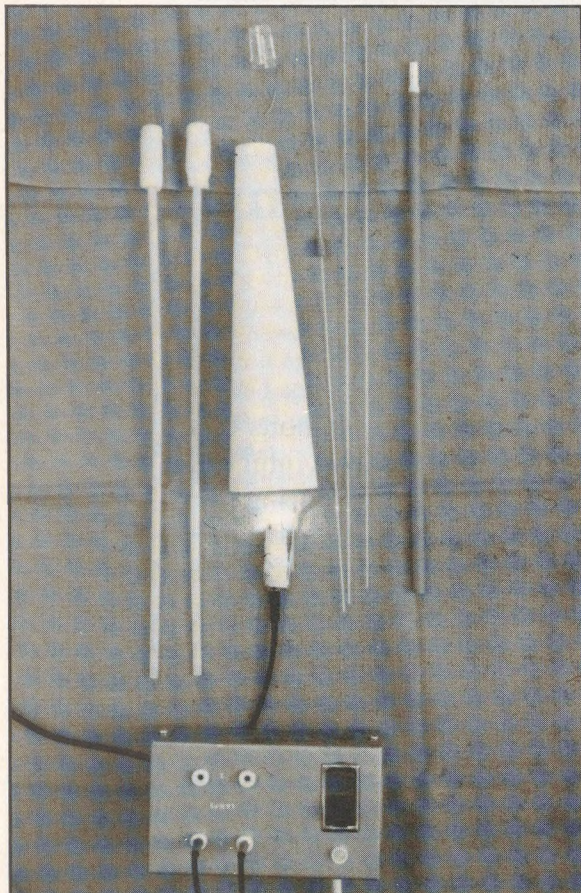


Figure 1. Materials for performing fetal scalp blood sampling: swabs, endoscopic cone with light source, heparinized capillary tubes with magnet, and calibrated scalp blade

area of fetal scalp by using a fiber-optic light and by ensuring the fixation of the fetal head. When necessary, an assistant provides gentle suprapubic pressure to hold the presenting part in the pelvis. The parturient patient is placed at the edge of the labor bed in the lithotomy position, and a pillow is inserted under one of the buttocks so that she tilts at least 15 degrees to minimize the effects of aorta-caval occlusion. The procedure may also be performed in the lateral Sims' position.

After the patient is positioned, the cone is inserted into the vagina under direct visualization (Figure 2). Once the cone is inserted past the anterior lip of the cervix, the cone is angled



Figure 2. Insertion of endoscopic cone and swab into vagina

anteriorly into the cervical os, and the presenting part is visualized. Vigorous rubbing of the scalp with a swab cleanses the site and produces hyperemia of the area. Ethyl chloride spray directed on the site of incision for at least 20 seconds produces scalp hyperemia as the freezing effect wears off. Silicone grease is applied to the site to form a nonwettable surface, which will allow the fetal scalp blood to form an easily accessible bead. The calibrated scalp blade is then used to make a stab incision 2 mm deep. Once blood appears, the heparinized capillary tube is inserted to touch the drop of blood; keeping the tube pointed downward, the blood is allowed to flow into the tube (Figure 3). A pH determination can be made after only one fourth of the capillary tube is filled with blood. If more blood is withdrawn, complete blood gases



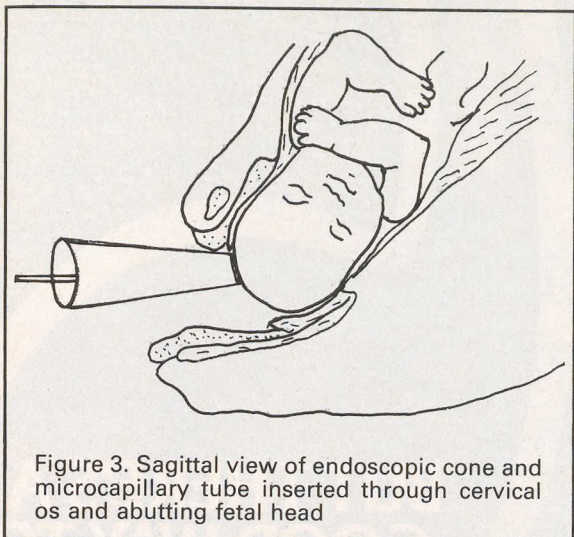


Figure 3. Sagittal view of endoscopic cone and microcapillary tube inserted through cervical os and abutting fetal head

can be measured; however, these values are usually not necessary in evaluating the condition of the fetus. After taking the sample, the tube is handed to the assistant for sealing and mixing with a magnetic "flea." The flea is inserted in the tube and rapidly run throughout the contents of the tube using an external magnet. Pressure should be applied to the scalp during the following two contractions to ensure clotting, and then the puncture site is observed for further bleeding during two more contractions. The only potential complication besides bleeding is scalp infection; however, the rates of infection are no higher than for fetal scalp electrode placement.

### Indications

Scalp blood sampling is limited to patients who are in active labor with ruptured membranes and the cervix dilated to at least 3 cm. FSB sampling is done when fetal heart rate abnormalities are present and no potential reversible cause of the FHR abnormality is evident. FHR abnormalities that are indications for scalp sampling are as follows: a basal rate greater than 180 or less than 110 beats per minute, the presence of early or variable onset of decelerations greater than 30 beats per minute,

the presence of late decelerations of any magnitude, loss of beat-to-beat irregularity, sinusoidal FHR patterns, and accelerations of greater than 30 beats per minute in relation to the contractions.<sup>2</sup> Other indications for fetal pH sampling are the presence of severe pre-eclampsia, post datism, abruptio placenta, or severe intrauterine growth retardation (eg, suspected placental insufficiency). In these instances acidosis can occur in the presence of little or no FHR change.

### Interpretation of Results

Many studies have shown general correlation between the FHR pattern and fetal blood scalp pH.<sup>3-5</sup> Kubli et al<sup>6</sup> showed that it was rare to have scalp blood pH values below 7.20 with an innocuous FHR pattern. However, many patterns of late decelerations and moderate to severe variable decelerations were associated with false-negative results in which the fetal scalp blood pH was above 7.20.

If fetal scalp blood pH is above 7.25, it is reasonable to continue to observe the patient. If the ominous FHR persists, however, it is mandatory to resample the FSB pH every 20 to 30 minutes depending on the evolution of the FHR pattern. When the FSB pH is between 7.20 and 7.25, re-sampling should occur immediately to determine the trend. If fetal acidosis is confirmed, then maternal acidosis should be excluded by taking a simultaneous maternal arterial blood pH. Unless vaginal delivery is imminent, operative intervention is indicated for persistent FSB pH between 7.20 and 7.25. If the initial sample is below 7.20, intervention is clearly indicated, providing maternal acid-base abnormalities are ruled out.

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