

How to perform intrapartum fetal blood sampling

Introduction

Fetal blood sampling (FBS) is a procedure carried out in labour in which a sample of capillary blood is obtained from the fetal scalp using an amnioscope. The Royal College of Obstetricians and Gynaecologists (RCOG) recommends that hospitals using electronic fetal monitoring (EFM) by cardiotocograph tracing in labour should have ready access to FBS facilities (RCOG, 2001). Where delivery is contemplated because of an abnormal fetal heart rate pattern, i.e. in cases of suspected fetal acidosis, FBS should be undertaken in the absence of technical difficulties or any contraindications (RCOG, 2001).

While EFM is a 'screening' tool for fetal acidosis, FBS is a 'diagnostic' tool, and without FBS as an adjunct to EFM, obstetric intervention rates are higher (Neilson and Mistry, 2000). Therefore, FBS has an integral role in the management of the pregnant woman in labour. The decision to perform FBS must be taken seriously as it is an invasive procedure and failure to obtain a result should result in immediate delivery unless the decision to continue is made by a senior doctor.

Indications and contraindications

The major indication for performing FBS is a suspicion that there is fetal compromise during labour. The non-reassuring cardiotocograph is discussed fully in a subsequent article 'Cardiotocograph interpretation' which will run in the October issue of the journal. Contraindications to FBS include:

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- Maternal infections such as human immunodeficiency virus (HIV), the hepatitis viruses and herpes simplex virus as FBS in such circumstances increases the risk of maternal–fetal transmission (International Federation of Gynecology and Obstetrics, 1995)
- Fetal bleeding disorders such as haemophilia (Kadir et al, 1997)
- Prematurity (gestations less than 34 weeks). This is because the use of FBS in the presence of abnormal fetal heart rate patterns in such cases may be associated with an increase in adverse neonatal outcome. One randomized controlled trial, which examined the role of EFM in comparison with intermittent auscultation in a group of premature babies less than 1750 g, reported that the use of FBS in the EFM group significantly delayed the delivery of these babies and resulted in an increase in cerebral palsy in comparison with the group monitored with intermittent auscultation alone (Luthy et al, 1987).

Before the procedure

Preparation is a key point in successful FBS. The patient should be reassured that the procedure is carried out routinely and is not going to harm the fetus in any way. Explain the procedure carefully as patient cooperation is essential to success. It is recommended that FBS is performed with the patient in the left lateral position (*Table 1*). It obviously has the potential to be undignified from a patient point of view. Ensure the patient is aware that she is in control at all times and that if she wishes you to stop at any stage, e.g. because of discomfort, you will do so immediately. Verbal consent should be obtained.

While it is a relatively straightforward procedure FBS requires assistance, ideally from at least two staff members in addition to the operator. One member of staff needs to support the patient and ensure that fetal monitoring continues during the sampling while another must be on hand to provide additional equipment, adjust

Table 1. Advantages and disadvantages of the left lateral position

Advantages	Minimizes fetal compromise caused by aortocaval compression
	Patient more comfortable
	Requires less preparation of the bed
Disadvantages	Can be difficult to position and/or support right leg
	Head more likely to move away from amnioscope
	More difficult physically for the operator

the lighting and take the samples to the analyser. Make sure your assistants understand their role in the procedure before you begin. Collect all your equipment as illustrated in *Figure 1* and ensure you are familiar with the blood gas analyser used in your unit, particularly the size of sample required.

Preparation

It is essential that you are sure that it is possible for a FBS to be obtained. Ideally the cervix should be at least 3 cm dilated with the head presenting. While it is possible to take a fetal blood sample from a presenting breech this is an unusual procedure. The fetal membranes must be absent.

Equipment

Some units use disposable FBS sets which contain everything required for the procedure, other units use sets which need autoclaving following use. Whichever is

the case you should ensure you are familiar with all the equipment before starting the procedure.

- Amnioscope. These can be made from metal or plastic and come in a variety of diameters and lengths. The 'insert' should fit snugly but be easy to remove. Select the amnioscope based on cervical dilatation and the station of the fetal head
- Capillary tubing. This varies and can be straight or curved. The curved variety helps with estimating how much of a sample you have collected. Ensure you know what size sample is required by the blood gas analyser in your unit before you begin
- Lighting. Some amnioscopes have an attachment for a fiberoptic cable which provides light directly into the amnioscope. Others are lit from the mobile lamps or from a headlight worn by the operator. Ideally the light source is attached to the amnioscope

- Blood gas analyser. These machines are sophisticated pieces of equipment and as such seem to break down frequently. You must ensure that the analyser is ready to receive a sample before starting the procedure. It is very demoralizing to see a hard won sample go to waste because the analyser is on a wash cycle
- Other required equipment includes swabs, normal saline or warm water, lubricating gel for amnioscope, cotton wool and sponge holding forceps, ethyl chloride spray, pledgets, pledget holder, paraffin wax, blade and long blade holder.

Procedure

Ensure that you have everything to hand before you start (*Figure 1*). It is good practice to count out your swabs, cotton wool balls, pledgets and capillary tubes before and after performing the procedure. Position the patient in the left lateral position. At all times during the procedure you must ensure that fetal monitoring continues. If a fetal bradycardia occurs the procedure must be abandoned and resuscitative measures put in place.

Wash your hands and put on a pair of sterile gloves. Use sterile swabs and normal saline or warm water to clean the perineum and then perform a vaginal examination to confirm the procedure is technically possible. Pass the lubricated amnioscope into the vagina and position it against the fetal head, through the cervix. Remove the 'insert' and connect the light so you can check there are no maternal tissues trapped between the amnioscope and the fetal head. If there are, remove the amnioscope and reposition. Try to position the amnioscope away from the fontanelles and caput. Clean the fetal scalp using dry cotton wool in a sponge-holding forcep.

Spray the fetal scalp with ethyl chloride and wait approximately 30 seconds. Apply a thin film of paraffin wax using a gauze pledget on a pledget holder. Hold the blade firmly between finger and thumb and apply firm pressure to the fetal scalp with the blade. You should feel a give as the scalp is pierced and hear a quiet pop. Allow a small blob of blood to appear before applying the capillary tube. Aim to collect three good length samples to ensure you have a representative pH. Sometimes you will need to rapidly dot the puncture site in order

Figure 1. Equipment required to perform a fetal blood sample. Clockwise from top left-hand corner: dish for cleaning fluid, normal saline, sterile gel, amnioscope, sponge-holding forceps with cotton wool, paraffin wax, pledget in holder, blade in blade holder, capillary tubes, ethyl chloride spray, gloves, spare pledgets, cotton wool, gauze.



to keep the blood flowing. Once you have obtained three samples, without bubbles, press on the puncture site for 3–5 minutes to ensure haemostasis. Common problems encountered during FBS and tips on how to manage them are outlined in *Table 2*.

After the procedure

Check your counts and clear and dispose of sharps safely. The results must be discussed with the patient and a clear plan made.

Interpretation of results

Results must always be interpreted in the context of the clinical situation. This should include any previous FBS results, progress in labour, and the clinical features of both the mother and fetus. The key elements within the result are the pH and the base excess. Remember that this is a capillary sample and must be interpreted as such. Actions as recommended by the RCOG are outlined in *Table 3* (RCOG, 2001). Some units use pH and base excess/deficit in the algorithm to decide management but the RCOG advise management on basis of pH alone. **BJHM**

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Table 2. Trouble shooting

No bleeding	Ensure that you are not over a large area of caput Ensure that the pressure applied on the blade is constant Try wiping the scalp Try changing the blade and puncturing in a different area
Bleeding is not resulting in a droplet but a smear	Reapply paraffin wax
Head is floating away when pressure is applied with the blade	Carry out sampling during a contraction Change to lithotomy position
Fetal hair obscuring view	Reapply paraffin wax Try to shave away a small area of hair using the blade

Table 3. Classification of fetal blood sampling (FBS) results

FBS result (pH)	Subsequent action *
≥7.25	FBS should be repeated in 1 hour if the cardiotocograph abnormality persists
7.21–7.24	Repeat FBS in 30 minutes time or consider delivery if significant fall since previous sample
≤7.20	Delivery indicated

*Based on the Royal College of Obstetricians and Gynaecologists (2001) recommendations. Individual hospitals may have different guidance

KEY POINTS

- Clearly explain the procedure and possible outcomes to the patient before you begin.
- Ensure that assistants are fully briefed and understand their roles in the procedure.
- Maintain fetal monitoring at all times.
- Prepare trolley carefully.
- Clean fetal scalp carefully and ensure a good field of view.
- Apply firm pressure with the blade.
- Aim to collect three good length samples.
- Ensure haemostasis at end of procedure.
- If a result is unusual then ensure it is duplicated.