



# Fetal Heart Rate Monitoring

# 118

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## Indications

- Fetal heart rate (FHR) monitoring is important because it provides basic patterns that can be correlated to the acid-base status, circulatory volume, and oxygenation status of the fetus through brainstem detection and subsequent cardiac response. It has numerous uses during the antepartum and intrapartum stages [1].
- Antepartum indications include:
  - Nonstress test (consists of monitoring FHR in conjunction with fetal movements)
  - Contraction stress test (consists of monitoring FHR during contractions, which are induced pharmacologically)
  - Biophysical profile (BPP; consists of a nonstress test with an additional ultrasound)
- Intrapartum indications include monitoring FHR during:
  - Uterine contractions
  - Pain medications/anesthetic administration to the mother during labor
  - Procedures performed during labor
  - Second stage of labor
  - High-risk pregnancies, which can be defined by a number of conditions including [2, 3]:
    - Maternal diabetes, asthma, and preeclampsia/eclampsia
    - Multiple gestations
    - Intrauterine growth restriction
    - Premature rupture of membranes
    - Lack of prenatal care

## Contraindications

- Contraindications for internal FHR monitoring:
  - Presence of placenta previa
  - Lack of ability to identify the portion of the fetal body where device application is being considered
  - Active herpes, active hepatitis, or human immunodeficiency virus (HIV) in the mother
- Contraindications for external FHR monitoring:
  - None

## Methods

- Two methods for FHR monitoring:
  - Auscultation monitoring:

Defined as auscultating FHR every 15 minutes in the first stage of labor and auscultating every 5 minutes in the second stage

Does not provide strips with information on FHR variability or the shape of FHR accelerations and decelerations
  - Electronic FHR monitoring:

Allows for real-time continuous monitoring of FHR activity.

Provides strips with information on FHR variability or the shape of FHR accelerations and decelerations.

Can be performed by Doppler ultrasound or internal fetal electrocardiography (ECG).

When comparing the two methods for electronic FHR monitoring, both are equally reliable in most settings. Thus, external monitoring is the preferred method because it is noninvasive. However, in instances in which external monitoring becomes difficult owing to poor quality or technical difficulties, invasive monitoring is indicated.

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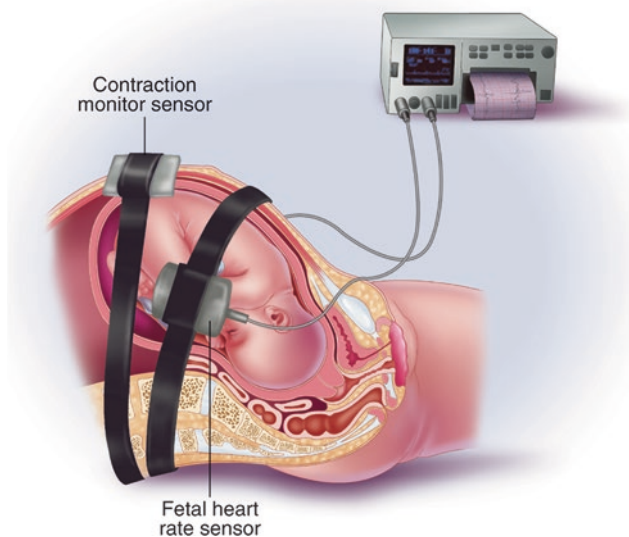
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## Equipment and Procedures

Multiple methods exist for electronic FHR monitoring. The most commonly used are external monitoring by Doppler ultrasound and internal monitoring by fetal ECG.

### Doppler Ultrasound Is a Noninvasive Method to Monitor FHR (Fig. 118.1)

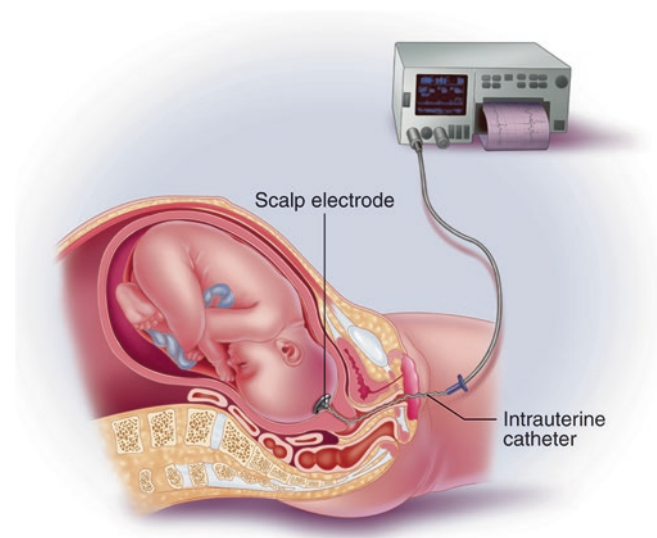
- Equipment
  - Electronic FHR monitor
  - Contraction monitor sensor with belt
  - FHR sensor with belt (consists of ultrasound transducer and ultrasound sensor)
  - Ultrasound coupling gel
- Procedure (Fig. 118.1)
  1. Place the patient in a supine position.
  2. Palpate the fetal anatomy through the maternal abdomen to find the approximate location of the fetal heart.
  3. Place ultrasound coupling gel on the maternal abdomen at the sight of suspected fetal cardiac activity.
  4. Place the transducer probe on gel and locate the fetal heart tones.
  5. Once the fetal heart tones are located, secure the FHR sensor to the maternal abdomen with the attached belt.
  6. Place the contraction monitor sensor near the fundus in order to monitor uterine contractions.
  7. Attach the FHR sensor and contraction monitor to the electronic FHR monitor to obtain printouts of FHR and uterine contractions.



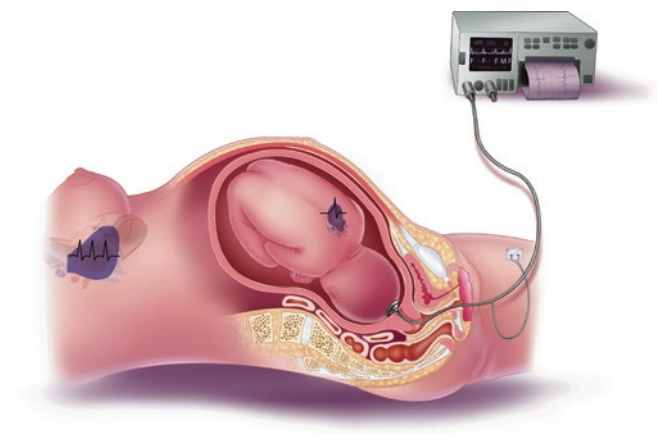
**Fig. 118.1** External fetal heart rate monitoring

### Internal Fetal ECG Is an Invasive Method to Monitor FHR and Is Used Only in the Intrapartum Period (Fig. 118.2)

- Equipment
  - Fetal scalp monitoring electrode
  - Leg plate electrode
  - Sterile vaginal lubricant
  - Electronic FHR monitor
- Procedure (Fig. 118.3)
  1. Place the patient in a dorsal lithotomy position.
  2. Sterilize the perineal area.
  3. Perform a bimanual vaginal examination to identify the presenting fetal head. (Note: rupture of membranes must occur before scalp electrode placement.)
  4. Place the spiral electrode guide tube on the fetal scalp, and advance the electrode until it contacts the scalp.



**Fig. 118.2** Internal fetal heart rate monitoring



**Fig. 118.3** Internal fetal heart rate monitoring

5. Rotate the drive tube clockwise approximately one rotation while maintaining pressure on the guide tube and drive tube.
6. Release the electrode locking device by pressing together the arms on the drive tube grip.
7. Carefully slide the drive and guide tubes off the electrode wires while holding the locking device open.
8. Attach the leg plate to the inner thigh of the mother as a means to eliminate electrical interference.
9. Attach the spiral electrode wires to the color-coded leg plate, which is then connected to the electronic fetal monitor.
10. Do not forget to sterilize the area of electrode placement after delivery is completed and the scalp electrode is removed.

When comparing the two methods, both are equally reliable in most settings. Thus, external monitoring is the preferred method because it is noninvasive. However, in instances in which external monitoring becomes difficult owing to poor quality or technical difficulties, invasive monitoring is indicated.

## Complications

- Complications of external FHR monitoring:
  - Confusing maternal aortic pulsations with FHR
  - Inability to locate FHR
- Complications of internal FHR monitoring:
  - Fetal or maternal hemorrhage and fetal infection (usually scalp abscess at the site of insertion)
  - Uterine perforation
  - Subsequent fetal infection due to the invasive nature of the procedure

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