Chapter 14
Fetal Heart Rate Monitoring

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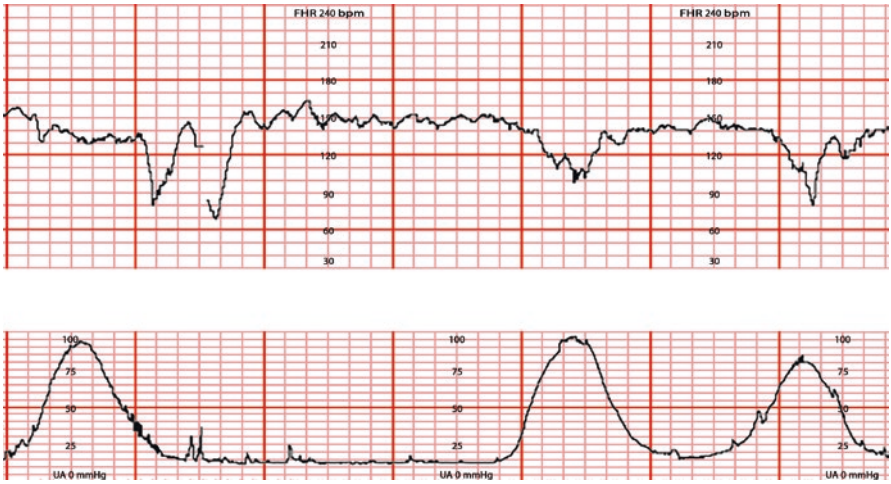

Fig. 14.1 Fetal heart tracing

1. What pattern is this heart rate tracing in Fig. 14.1?
2. What does this tracing tell you about the condition of the fetus?
3. What is the significance of "V"-shaped decelerations in this tracing?
4. How would acidemia present on the fetal heart tracing?
5. What action if any should be taken?
6. What are the characteristics of a normal fetal heart tracing (FHR)?
7. What are the categories of FHR tracings?
8. What are limitations of electronic fetal monitoring (EFM)?

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Answers

1. This tracing contains multiple decelerations. Decelerations are characterized by a decrease from baseline of at least 15 beats per minute (BPM), lasting at least 15 s and no longer than 2 min. A deceleration is considered prolonged when it lasts beyond 2 min. Specifically, the tracing above depicts variable decelerations. Variable decelerations have inconsistent shape and timing in relationship to uterine contractions. Variable decelerations are caused by cord compression.

   By contrast early decelerations occur in sync with contractions such that the nadir of the deceleration occurs at the peak of the contraction. Early decelerations relate to fetal head compression during contraction. Late decelerations are also closely associated with contractions with the decrease in heart rate beginning immediately after the peak of the contraction, mirroring the contraction in shape. Late decelerations represent uteroplacental insufficiency and may be due to hypotension or other factors [1].

2. Fetal heart rate is a surrogate measurement for fetal oxygenation and acid/base status. Anytime there is a deceleration, there is presumed to be a decrease in delivery of oxygen to the fetus. This may be mild and of little concern, as in the case of early decelerations, or clinically significant as in the case of late, variable, or prolonged decelerations. With repeated decelerations, hypoxia may lead to acidosis, which could eventually lead to neurologic injury. In particular injury may occur when umbilical artery pH decreases below 7.0 or there is a base deficit of greater than 12 [2].

3. There is no evidence in the literature to support older terms for describing decelerations, such as the presence of "shoulders," variable with late component, or shape of the deceleration. Similarly it is a distraction to categorize the deceleration pattern by severity.

4. The absence of variability is a marker for acidemia. Moderate variability or the presence of accelerations is a very sensitive measure for a normal acid/base status. This strip still has the presence of moderate variability, defined by changes in the baseline heart rate that are nonuniform, which essentially rules out metabolic acidosis.

5. This strip would be defined as a category 2 tracing, which would require careful observation at the least. Further action or intervention would depend on the clinical situation. Recurrent decelerations, in the presence of good variability, usually would be treated by oxygen, repositioning, augmentation of maternal blood pressure, and/or reduction or discontinuation of oxytocin if infusing.

6. A normal fetal heart varies between 110 and 160 beats per minute. It fluctuates irregularly in amplitude and frequency with variability from baseline of at least 6 BPMs. It may include accelerations, which are sudden increases in heart rate with a change from onset to peak in less than 30 s, lasting no longer than 2 min. There may be the presence of early decelerations, which mirror uterine contractions.

7. The American Congress of Obstetricians and Gynecologists has a three-tier interpretation and intervention system that represents a common language and framework to discuss FHTs [3]:
   (a) Category 1 FHR tracings have a normal baseline rate, the presence of at least moderate variability, may lack accelerations, and do not have clinically significant decelerations (anything other than early). These strips are considered normal and do not require any specific action.
   (b) Category 2 tracings lack clear signs of acidemia and are indeterminate. These strips require careful surveillance and may suggest the need for further testing to ensure the health of the fetus.
   (c) Category 3 tracings have absent variability, recurrent late or variable decelerations, or bradycardia, or a sinusoidal pattern. These strips indicate fetal acidemia, are abnormal, and require immediate action.
8. Fetal heart monitoring is prone to many errors and shortfalls. Fetal heart rate may be difficult to consistently observe due to changes in positioning of the mother or fetus. There is significant variability in interobserver interpretation and responses. While the presence of variability may ensure a normal acid/base status, its absence does not assure acidemia, leading to potentially unnecessary action. Finally, continuous fetal heart monitoring alone has not been definitively proven to reduce perinatal mortality; despite its increased use, it has not impacted the rate of cerebral palsy, which has remained constant over decades [4].

References

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