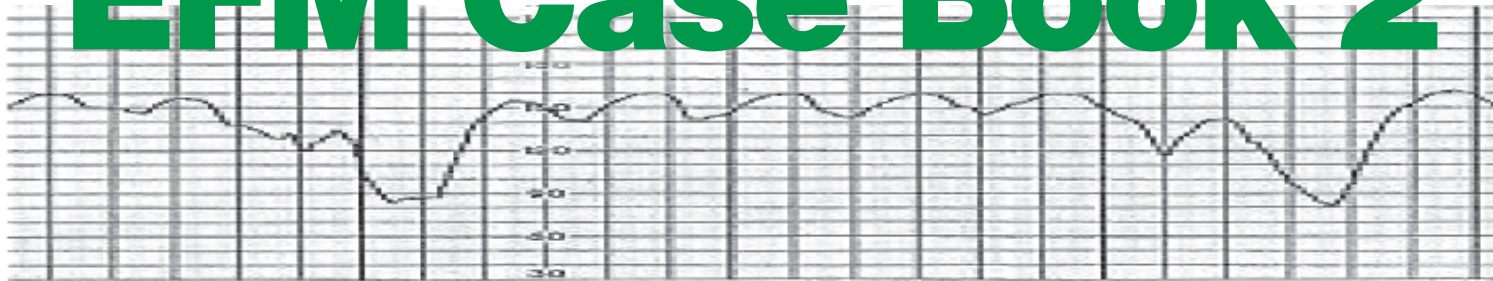


EFM Case Book 2



Electronic Fetal Monitoring

- ✓ Case Histories
- ✓ Sample Tracings
- ✓ Recommended Interventions
- ✓ Case Outcomes



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How to Use the EFM Casebook

The EFM Casebook was designed to provide hands on interpretation of a variety of electronic fetal monitoring tracings. The casebook addresses basic, intermediate and advanced cases. The EFM Casebook can have many applications including preparatory review for the NCC EFM subspecialty examination, a competency validation tool for the labor and delivery unit or a self-assessment exercise for the individual nurse.

Each case contains the following:

- **Worksheet:** The worksheet lists the pertinent patient data including history, reason for monitoring and components of labor status. A series of questions are listed in the worksheet, which should be completed by the participant in evaluating the corresponding EFM tracing.
- **Answers:** On the Answers page, interpretation of the tracing is provided including such parameters as baseline, variability, decelerations, and accelerations as well as a determination of the reactivity of the tracing. Contraction description and reassuring and nonreassuring components of the tracing are also identified.
- **Interventions:** The recommended interventions are identified in this section.
- **Rationale:** Rationale for the indicated management is listed in this section.
- **Outcome:** A description of the case outcome is provided in this section.

The participant should review their answers with the provided answers and note differences. References are cited for further study.

In addition to a worksheet and answers for each case, there is a series of questions provided which should be answered once the Casebook is completed.

Earn Continuing Education Credit:

Participants can earn 10 contact hours of continuing education credit through the purchase and completion of the EFM Post Test. Provider approved by the California Board of Registered Nursing, Provider Number 13249, for 10 contact hours. Participants are required to obtain a score of at least 70% to earn CE credit. The EFM Post Test can be purchased for \$30.00.

To earn continuing education credit, you must submit your answer sheet by one of the 4 scoring deadlines. Deadlines are shown in the chart below.

<u>Scoring Deadlines</u>			
2002		2003	
Deadlines for Answer Sheets	Score Reports Mailed	Deadlines for Answer Sheets	Score Reports Mailed
February 15	March 15	February 15	March 15
May 15	June 15	May 15	June 15
August 15	September 15	August 15	September 15
November 15	December 15	November 15	December 15

To place an order for the EFM Post Test call CCPR at (312) 951-9195.

Introduction

In the United States, electronic fetal monitoring (EFM) has become a widely accepted assessment tool that is used for antepartum fetal surveillance as well as to assess intrapartum fetal well-being. EFM reflects the modern trend to recognize the fetus as a patient, subject to both health and illnesses.

EFM is not a perfect system. Controversy exists about many of its components. There is lack of consensus regarding who should be monitored electronically, how long the monitoring should continue and even the definitions of the terms and interpretation of the patterns under some circumstances. To help bring clarity to the latter, a multidisciplinary committee convened by The National Institute of Child Health and Human Development held a research planning workshop. The specific purpose was to develop standardized and unambiguous definitions for fetal heart rate patterns. It is their recommended terms that are used throughout this document as published in JOGNN November/December, 1997. This was the first step in an endeavor to create uniformity and standardization in the area.

Today, as EFM has become a standard practice in the care of the obstetrical patient, many novice maternity nurses feel that "to monitor" a woman in labor must mean EFM. Yet, intermittent auscultation can be of equal value. Conversely, EFM which is never assessed, or when improperly assessed by an inexperienced individual may be of worse value than no assessment at all. These cases are designed to help the nurse interpret EFM in a standardized manner consistent with the current knowledge in the area.

Assumptions

Information regarding each case is presented in a standardized manner. In order to best utilize this format, the reader needs to be aware of certain assumptions that are inherent in the presentation of each case.

PATIENT DATA

Gravidity/Parity

Gravidity and parity are included in the basic information. **Parity is reported as a single number, conveying the number of births.** The four-digit system (term, preterm, abortions, and living children) is used in some regions, but it is felt that the single digit is more universal.

Gravidity and parity may be of value when uterine activity is to be assessed in view of labor progress. It is well known that multiparous women have shorter labors than their nulliparous counterparts. According to Friedman (1991) the average first stage of labor for a nulliparous woman is 13.3 hours, and 7.5 hours for a multiparous woman.

Gestational Age

Electronic fetal monitoring generally is acceptable at or after 23-24 gestational weeks of age (Murray, 1997, pg. 282). It is reported that fetal heart rate (FHR) averages 160 beats per minute (bpm) at 20 gestational weeks and progressively decreases until term (Tucker, 2000, pg. 15).

Various regions/institutions use different ways to document gestational age. For example, some may report gestational age as

38-39 weeks; 38 2/7 weeks or 38 weeks +2. **For the sake of convenience for discussion, gestational age is reported in these cases as weeks averaged to a whole number.**

Prenatal Care

In these cases, when prenatal care is identified as being provided “according to standard,” this refers to the standard of care during pregnancy that is recommended by the various professional organizations. In some cases, it will be stated that the woman has received no prenatal care.

Prenatal History

All history pertinent to each case is included for interpretation of the fetal monitor patterns since various maternal and/ or fetal conditions can directly influence the fetal heart rate (FHR) tracing. The term “unremarkable” when used, refers to the lack of any pertinent information related to the case. As cases grow in complexity, as in real life, cases may include information that has no relevance on the management or outcome. Discrimination of relevant material is one of the hallmarks of an excellent clinician.

Reason for Monitoring

The primary reason for monitoring the fetus during the antepartum period or during labor is to assess for signs of fetal well-being. If signs of fetal well-being are not present, interventions are initiated to promote fetal oxygenation in an attempt to facilitate optimal fetal outcome.

There are two methods to assess the fetal heart rate: intermittent auscultation with a fetoscope or Doppler device and electronic fetal monitoring. Institutional policy may direct the method utilized during labor. Other considerations in selecting the method to be used include: nurse:patient ratio, available equipment, maternal or fetal risk factors present, the staff’s competency, and the woman’s preference.

Antepartal tests such as the nonstress test, the contraction stress test, and the biophysical profile must be performed with an electronic fetal monitor. For more information about these tests, as well as assessment of fetal activity which requires no monitoring equipment, refer to appendices A, B, C, and D.

Although some of the cases discussed will have EFM initiated according to hospital policy, most have a specific reason to perform the intervention.

Some of the cases use electronic fetal monitoring for antepartal testing such as the nonstress test.

It is important to remember, however, that currently ACOG (1995, pg. 2) and the Guidelines for Perinatal Care (1997, pgs. 100-101) conclude that during labor, properly performed intermittent auscultation with a 1:1 nurse-to-patient ratio is equivalent to continuous electronic fetal monitoring, even in the presence of risk factors. (For more information on the procedure for intermittent auscultation with a fetoscope or Doppler device, see Appendix E). Regardless of the method that is used to assess the fetal heart rate, the frequency of assessment and documentation is the same. (For a review of frequency and documentation of fetal heart rate assessments, see Appendix F). Although intermittent electronic fetal monitoring is also being used during labor, there are currently no

standards/guidelines to direct its use in practice, nor is it the intention that the cases in this book attempt to set such standards.

The nurse should remember that when EFM is utilized, it is only one aspect of nursing care. All of the complement of nursing assessment skills should be utilized to make the best determination of fetal status.

Type of Monitoring

The type of monitoring specifies which mode(s) of electronic monitoring are being used; **each case describes the external and/or internal method and includes any of the following variations:**

- external tocodynamometer
- external ultrasound transducer
- intrauterine pressure catheter (IUPC)
- internal spiral electrode (FSE)

It should be noted that an IUPC provides the only electronic method of assessing uterine resting tone and intensity or strength of contractions.

When monitoring more than one fetus, it is important to ensure that the provider is obtaining separate FHR tracings. Many monitors will signal if the tracing suggests that it is too synchronous and is not reflecting separate heart rate tracings.

Intrapartum History

Intrapartum history includes any pertinent information related to the woman's labor. If there is no pertinent information or if the woman is not in labor, the term "N/A" is used to mean not applicable.

Status of Membranes

The status of membranes often impacts fetal well-being. Prolonged rupture of membranes may indicate an increased risk of infection with accompanying EFM changes; meconium may indicate other fetal problems and potentially a malpresentation such as a breech. Therefore, color and length of time membranes have been ruptured is reported when appropriate. Unless otherwise noted, time is rounded to the closest hour for convenience of discussion. **The cases also indicate if the rupture of membranes is spontaneous (SROM) or artificial (AROM).**

Position/Presentation

Position/presentation may be determined by Leopold's maneuvers and confirmed by a pelvic examination and/ or a sonogram. **In these cases, presentation and position will be specified when appropriate.**

Pelvic Examination

The clinical decision-making of a provider is influenced by a woman's progress in labor and expected time of delivery. This information is obtained by performing a pelvic examination. This exam also assists with evaluation of the fetus, since the fetal heart rate pattern may vary during different stages of labor.

Information regarding pelvic exams is provided to include:

Dilatation

FHR may change with imminent birth. Decelerations sometimes indicate early maternal involuntary pushing since the maternal effort provides more compression on the fetal head. Dilatation (dilation) is expressed in the standard centimeter format.

Effacement

As the cervix thins, it usually becomes more closely applied to the fetal head. Although this close application can result in increasing dilating power, it also may cause decelerations due to compression of the head.

Station

Station is expressed throughout these cases in centimeters in relation to the ischial spines. Sometimes this is termed the rule of 5, with -5 indicating a presenting part above the pelvic brim; and +5 indicating the presenting part as it emerges. The use of centimeters is distinct from the rule of 3 wherein the pelvis is subdivided into 3 parts above the spines and 3 parts below. The rule of 5, or centimeter method is used throughout the cases since it is felt to be more quantifiable and more standard in today's practice (Cunningham, et. al., 1997 pg. 328,).

Labor Status

In the cases presented, labor status during Stage I will generally be defined by cervical dilatation as the following phases:

Latent (early) phase: 0 to 3-4 centimeters
Active phase: 4 to 8 centimeters

Transition phase: 8 to 10 centimeters

Stage II indicates the woman is fully dilated and if she is pushing, this is specified. In some cases, such as antepartal testing or recent initiation of an induction, when the woman is not in labor this is indicated by the phrase "not in labor." Some cases use a diagnostic term of "ruling out labor" if the intention is to use EFM to help assess the uterine contraction pattern.

Medications

Since some medications can have effects on FHR, all pertinent pharmacological agents are listed. As cases progress in complexity, some nonpertinent information is included to help the reader develop discrimination. Since most women in the United States take vitamins and/or iron during pregnancy, those medications are assumed and not listed specifically.

TRACING INTERPRETATION FOR CASES

The following definitions are from National Institute of Child Health and Human Development Research Planning Workshop Guidelines unless otherwise noted.

Baseline

Baseline is the approximate mean FHR rounded to increments of 5 bpm during a 10 minute segment, excluding:

- periodic or episodic changes
- periods of marked FHR variability
- segments of the baseline that differ by greater than 25 bpm

In any 10-minute window, the minimum baseline duration must be at least 2 minutes or the baseline for that period is indeterminate. When the baseline is indeterminate, one should refer to the previous 10-minute segment(s) to determine the baseline.

If the baseline FHR is less than 110 bpm, it is termed bradycardia; if the baseline FHR is greater than 160 bpm, it is termed tachycardia.

Variability

Perhaps the most important heart rate characteristic in predicting the status of the fetus is variability. Variability is defined as fluctuations in the baseline FHR of 2 cycles per minute or greater. These fluctuations are irregular in amplitude and frequency and are visually quantified as the amplitude of the peak-to-trough in bpm as follows:

- Absent FHR variability: amplitude range undetectable

- Minimal FHR variability: amplitude range greater than undetectable but less than or equal to 5 bpm
- Moderate FHR variability: amplitude range 6 - 25 bpm
- Marked FHR variability: amplitude range greater than 25 bpm

Decelerations

Any deceleration is quantified by the depth of the nadir in bpm below the baseline (excluding transient spikes or electronic artifact). The duration is quantified in minutes and seconds from the beginning to the end of the deceleration. Accelerations are quantified similarly. Decelerations are tentatively defined as recurrent if they occur with greater than or equal to 50% of uterine contractions in any 20-minute segment.

Early deceleration

An early deceleration of the FHR is a visually apparent **gradual decrease** (defined as onset of the deceleration to the nadir in greater than or equal to 30 seconds) and return to baseline FHR associated with a uterine contraction. The decrease is calculated from the most recently determined portion of the baseline. It is coincident in timing, with the nadir of the deceleration occurring simultaneously to the peak of the contraction. In most cases, the onset, nadir, and recovery of the deceleration are coincident with the beginning, peak and ending of the contraction, respectively.

Late deceleration

A late deceleration is a visually apparent, **gradual decrease** (defined as onset of deceleration to nadir greater than or equal to 30 seconds) and return to baseline FHR associated with a uterine contraction. The decrease is calculated from the most recently determined portion of the baseline. The deceleration is delayed in timing, with the nadir of the deceleration occurring after the peak of the contraction. In most cases, the onset, nadir, and recovery of the

deceleration occur after the beginning, peak and ending of the contraction, respectively.

Variable deceleration

A variable deceleration of the FHR is a visually apparent, **abrupt decrease** (defined as onset of deceleration to the beginning of nadir less than 30 seconds) in FHR below the baseline. The decrease is calculated from the most recently determined portion of the baseline. The decrease in FHR below the baseline is greater than or equal to 15 bpm, lasting greater than or equal to 15 seconds, and less than 2 minutes from onset to return to baseline.

When variable decelerations are associated with uterine contractions, their onset, depth and duration commonly vary with successive uterine contractions. An atypical feature of a variable deceleration is one in which overshoot occurs. An overshoot is a transitory acceleration of the FHR that occurs at the end of a variable deceleration. After the variable deceleration has reached its nadir the FHR increases and temporarily “overshoots” and then returns to the baseline rate. Overshoots generally follow moderate to severe variable decelerations, have absent variability and usually last more than 20 seconds (Tucker, 2000, p. 115).

Prolonged deceleration

A prolonged deceleration of the FHR is a visually apparent decrease in FHR below the baseline. The decrease is calculated from the most recently determined portion of the baseline. The decrease from the baseline is greater than or equal to 15 bpm, lasting greater than or equal to 2 minutes, but less than 10 minutes. A prolonged deceleration of greater than or equal to 10 minutes is considered a baseline change.

Preterminal Pattern

A preterminal pattern, often referred to as agonal or ominous, is one that precedes fetal death. It is usually characterized by absent FHR variability and atypical patterns. For more information regarding this pattern, see Murray, 1997, pages 221 and 290.

Accelerations

An acceleration is defined as a visually apparent **abrupt increase** (defined as onset of acceleration to peak in less than 30 seconds) in FHR above the baseline. The increase is calculated from the most recently determined portion of the baseline. The acme is greater than or equal to 15 bpm above the baseline, and the acceleration lasts greater than or equal to 15 seconds and less than 2 minutes from the onset to return to baseline. Before 32 weeks of gestation, accelerations are defined as having an acme greater than or equal to 10 bpm above the baseline and a duration of greater than or equal to 10 seconds.

A **prolonged acceleration** is greater than or equal to 2 minutes and less than 10 minutes in duration. An acceleration of greater than or equal to 10 minutes is a baseline change.

Reactivity

Reactivity is a clinical judgment that allows the interpreter to state whether or not the tracing is adequate and reflects fetal well-being. Reactivity is defined as two or more FHR accelerations above the baseline in a twenty-minute period. The accelerations must be at least 15 bpm above the baseline lasting 15 seconds (Tucker 2000, pg. 191).

Contractions

Contractions are recorded on the FHR tracing at a rate of 3 centimeters per minute. Frequency and duration can be calculated based on minute lines on the tracing paper.

Note that resting tone and intensity cannot be assessed through an external tocodynamometer, but requires manual palpation.

Alternatively, an IUPC can provide assessment of tone and intensity. As a general rule, the resting tone usually ranges from 5-15 mm Hg but a resting tone of 20 mm Hg is normal (Tucker, 2000, pg. 130). However, there may be various ranges of normal for resting tone based upon the type and brand of IUPC. The practitioner should consult the manufacturer's guidelines. Intensity during a contraction is usually 30 - 80+ mm Hg with the acme of the contraction approximately 50 – 100 mm Hg. Maternal blood flow to the utero placental unit ceases with intrauterine pressures of 50-60 mm Hg during normal labor contractions. **In these cases, resting tone of the uterus and frequency, duration and intensity of contractions will be noted as appropriate. The intensity of contractions with an IUPC in place will be defined as the peak pressure of contractions in mm Hg.**

The definition of uterine hypertonus and hyperstimulation is controversial. The definition of uterine hyperstimulation that is applied to these cases is consistent with AWHONN's (1997, p. 125) definition as follows:

- Uterine contractions that occur more frequently than every 2 minutes;
- Uterine relaxation < 30 seconds between contractions; and/or
- Uterine contractions that continue longer than 90 seconds
- Uterine hypertonus is defined as an elevated resting tone or peak pressure of the uterine contractions > 80 mm Hg or both.

Reassuring components

The majority of labors and births are normal. Often even an ominous appearing tracing will have some reassuring components. Women do not always present with classical findings, but in reality may have various findings that require the nurse to critically think, prioritize and individualize.

The National Institute Health (1997, p. 639) defined a normal tracing as:

1. normal baseline rate
2. normal (moderate) variability
3. presence of accelerations
4. absence of decelerations

When these components are present, it is highly predictive of a well-oxygenated fetus.

Non-reassuring components

Non-reassuring fetal heart rate includes any pattern that may indicate fetal stress, fetal hypoxia or lead to hypoxia if it continues. Examples include: late decelerations, tachycardia, bradycardia, absent variability, and repetitive variable decelerations.

Overall interpretation

The reassuring components and non-reassuring components provide direction for the overall interpretation of the tracing according to the clinical judgment of the professional.

INTERVENTIONS

EFM is one assessment in the intrapartum arena. Interventions such as labor support, nonpharmacologic and/or pharmacologic pain relief

methods, education, ambulation and hydration are assumed to be part of nursing care of the birthing woman and child. Omission of these interventions in the cases should not be interpreted as diminishment of their importance, but simply lack of space in a document focused on EFM. It is assumed that the health care provider will continuously inform the woman and family about her health and that of her fetus.

When a non-reassuring pattern is discovered, usual treatment includes the following:

- repositioning the woman on her side to increase placental perfusion, avoid uteroplacental compromise, associated with supine hypotension and decreased compression of the umbilical cord
- administering of oxygen, usually at 10 liters per minute per face mask
- infusing a fluid bolus of 300-500 cc of an isotonic solution such as lactated ringers (LR)
- notifying the health care provider such as the physician, certified nurse-midwife or whomever is deemed a legal provider

These interventions typically take place simultaneously but in this document, they are ranked in the usual order of importance.

Nursing judgment of the fetal and maternal response to oxytocin will dictate the nurse's actions when uterine hyperstimulation occurs.

Depending upon the individual situation, the nurse may decrease or discontinue the oxytocin. If a nonreassuring fetal heart rate as a result of uterine hypertonus is suspected, her first response will be to discontinue the oxytocin. Awareness of the differences between AWHONN and ACOG definitions and recommendations for treatment of oxytocin induced uterine hyperstimulation may help explain why nurses and physicians respond differently. (See Appendix G for further information).

Other actions/interventions based upon specific patterns include: vaginal exam, assessing maternal temperature, and assessing maternal blood pressure.

Tocolytics for Nonreassuring Fetal Heart Rate Patterns

When a nonreassuring fetal heart rate pattern associated with increased uterine activity is present that is not responsive to the usual interventions, 0.125 to 0.250 mg of IV or subcutaneous Brethine® (Terbutaline) is commonly administered. Terbutaline is faster acting (3-5 minutes after IV administration) than magnesium sulfate. Decreasing the uterine activity may correct the nonreassuring fetal heart rate pattern. For more information about tocolytics as an intervention for a nonreassuring fetal heart rate pattern, refer to Tucker (2000), pages 153-154 or Brown (1998), pp 257-261.

Scalp Stimulation

Fetal scalp stimulation is a diagnostic tool used to rule out metabolic acidosis or to reassure the provider when abnormal fetal heart rate patterns are present. Fetal scalp stimulation can be performed by applying firm digital pressure to the fetal scalp between contractions. Application of the spiral electrode also may be used. An acceleration in the FHR of 15 bpm for 15 seconds is indicative of a scalp blood pH of greater than 7.19. The absence of an acceleration after scalp

stimulation is not indicative of acidosis. For further information about scalp stimulation, refer to Murray (1997), pp. 317-318.

Vibroacoustic Stimulation

A number of falsely nonreactive NSTs may be due to fetal sleep states. Vibroacoustic stimulation has been suggested as a method to generate a state of reactivity after a ten minute nonreactive NST tracing is obtained. An artificial larynx or similar device is placed on the maternal abdomen over the fetal head and the sound emitted for 1-2 seconds. There is some controversy over how long the sound should be emitted or frequency of repeat trials when the initial attempt is nonreactive.

It is generally recommended that the fetal monitoring tracing should be observed for accelerations for one minute before reapplying the acoustic stimulation. "Repeat the stimulus after 1 minute if there is no acceleration response. An additional repeat with 2 seconds of VAS may be done if necessary" (Tucker, 2000, p. 193).

RATIONALE

Explanations for the interventions chosen are provided in this section. Additional references for more detailed discussion may be included for the reader if so desired.

OUTCOME

When possible, the outcome of the case is included for the reader's benefit. It should be noted that these cases may include situations in which nursing standards are not met. This is not to imply that the plans of management surrounding electronic fetal monitoring usually are correct, simply that readers often learn well from realistic clinical situations.

EFM Case Book 2

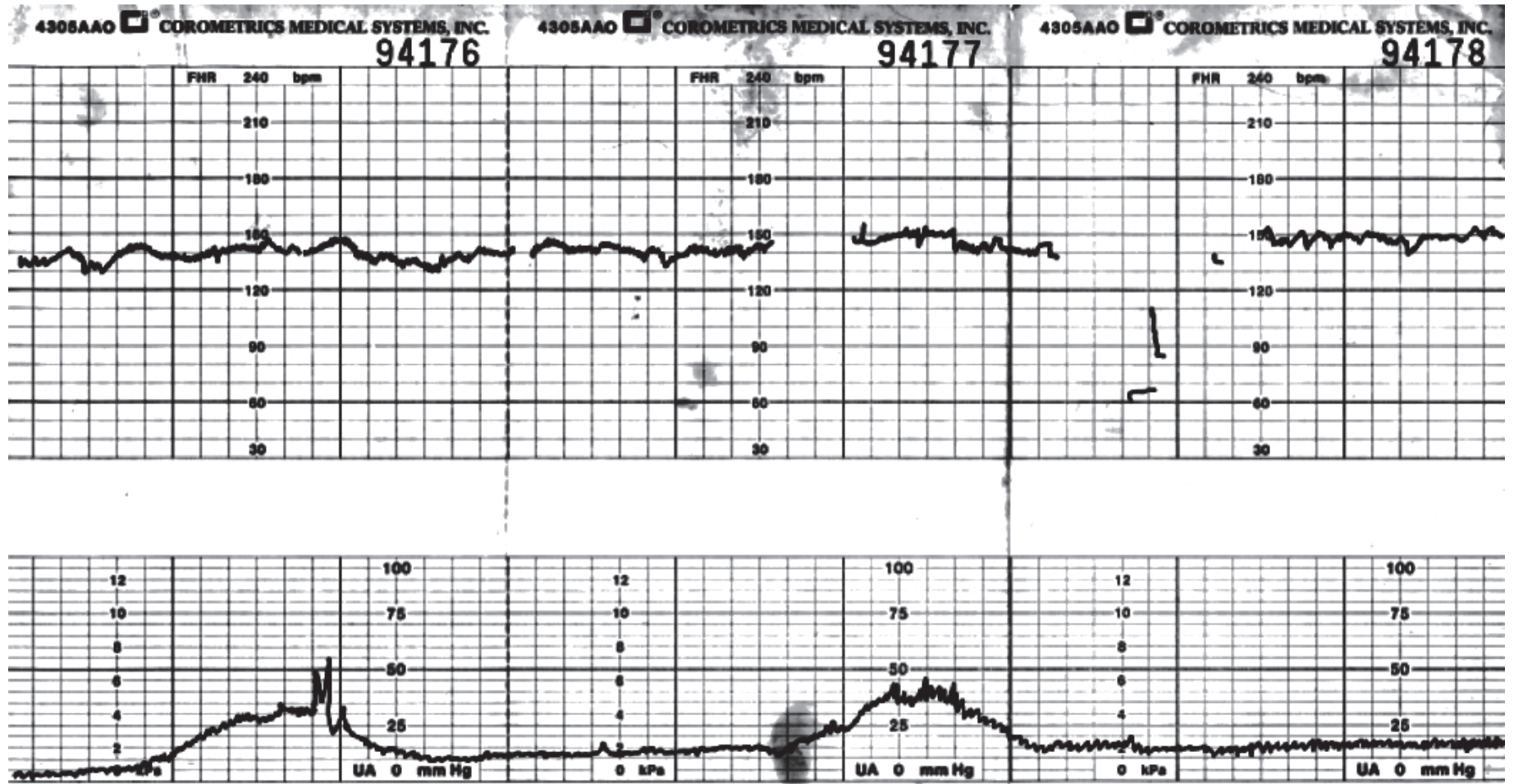
Cases 1 - 23



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Case 1



CASE 1 (INTERMEDIATE)
Worksheet

PATIENT DATA

Gravidity/Parity G2P1
Gestational Age 40 weeks
Prenatal Care According to standard
Prenatal History Unremarkable
Reason for Monitoring Rule out labor
Type of Monitoring Ultrasound, tocotransducer
Intrapartum History Irregular uterine contractions
for 4 hours
Status of Membranes Intact
Color N/A
Length of Time Ruptured N/A
Position/Presentation Vertex
Pelvic Examination
Dilatation 2 cm
Effacement 40%
Station Ballotable
Labor Status Latent phase
Intrapartum Medications None

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
Duration _____
Resting Tone _____
Intensity _____

What are the reassuring components?

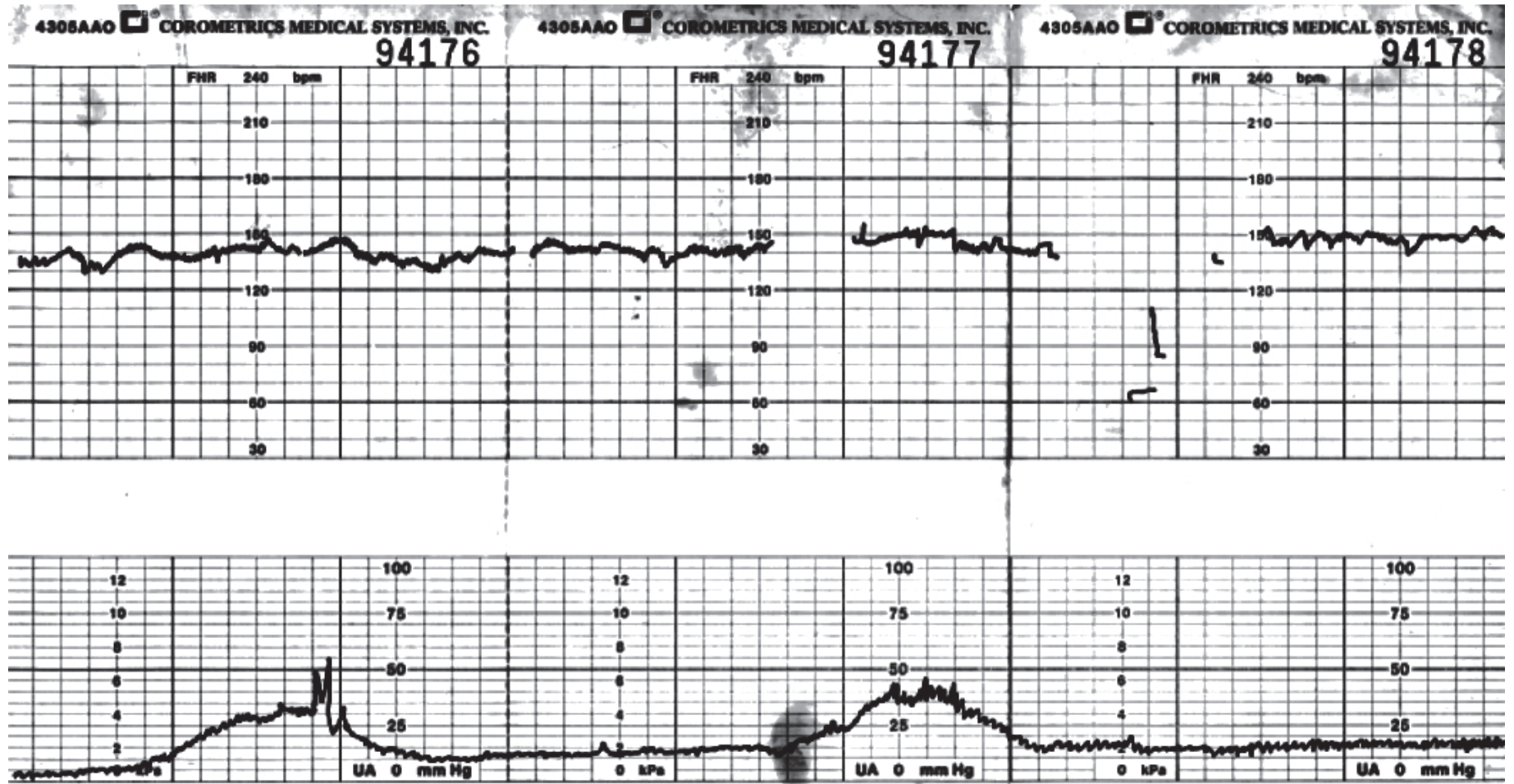
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 1



CASE 1
Answers

TRACING INTERPRETATION

Baseline	140 – 150 beats per minute
Variability	Moderate
Decelerations	Unable to determine
Accelerations	None
Is this tracing reactive?	No
Contractions	
Frequency	Every 3 ½ minutes
Duration	80 – 90 seconds
Resting Tone	Palpation required
Intensity	Palpation required
Reassuring components	
• Baseline FHR within normal limits	
• Regular uterine activity	
• Moderate variability	
Non-reassuring components	
• Inadequate tracing	
Overall interpretation of the tracing:	Unable to ascertain due to inadequate tracing.

INTERVENTIONS

- Change maternal position
- Hand hold the ultrasound transducer during contractions to maintain continuous tracing

RATIONALE

Frequently secundigravidas will have some difficulty identifying initiation of labor. Primigravidas usually begin labor and proceed sequentially through the process, but multigravidas often are plagued by Braxton Hicks contractions and they may present in a labor and delivery unit several times in “false” labor. Even when labor is essentially ruled out by lack of progressive cervical change, fetal status should be assessed before a woman is reassured and sent home.

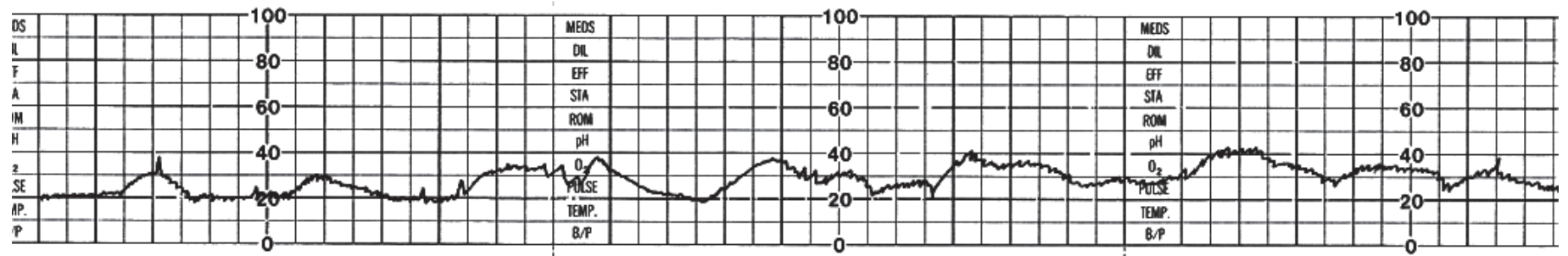
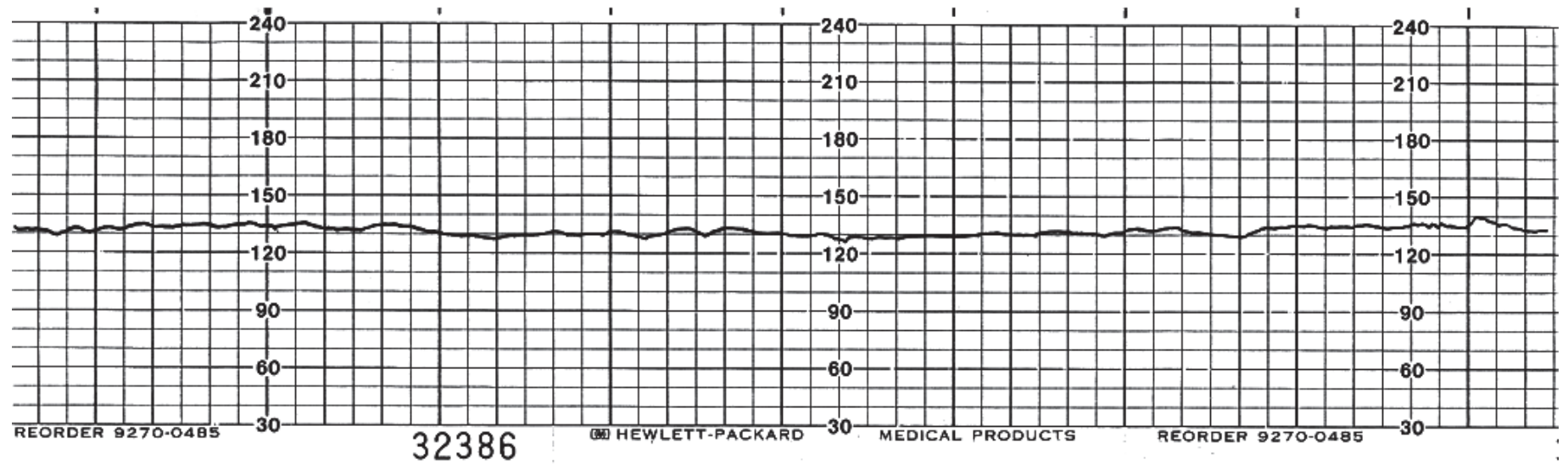
In this case, the EFM tracing illustrated was inadequate to ascertain fetal well being. The inability to continue to assess the fetus during a contraction was a major problem in this tracing.

OUTCOME

This tracing was continued and the ultrasound transducer was hand held during the next six contractions to maintain continuous tracing. No decelerations were noted. After repositioning, the contractions ceased entirely, within 30 minutes variability was apparent and accelerations with fetal movement seen. This woman was discharged and returned 5 days later in active labor and delivered a 7 pound, 2 ounce (3240 gm) male infant without complications.

Note that in this situation, the nurses did not discharge the woman until they were able to achieve a reactive tracing. Moreover, although it is common, feeding a woman to enhance the possibility of obtaining a reactive tracing has no basis in research. Tucker (2000, p. 189) states that the efficacy of maternal ingestion of food or fluids to stimulate the fetus has not been established. However, a nonreactive EFM tracing often can be resolved with a little creative problem solving (e.g. hand held ultrasound transducer), some provider patience and “tincture of time”.

Case 2



CASE 2 (ADVANCED)
Worksheet

PATIENT DATA

Gravidity/Parity G1P0
 Gestational Age 32 weeks

Prenatal Care According to standard
 Prenatal History Unremarkable

Reason for Monitoring Rule out preterm labor
 Type of Monitoring Ultrasound, tocotransducer
 Intrapartum History Patient presents after cramping for several hours. Despite an attempted fluid bolus, oxygen, repositioning and fetal stimulation, the fetus was not reactive or able to meet the criteria for even minimal variability. An ultrasound showed fetal hydrops and a biophysical profile score was 4/10. The mother's blood type is A+.

Status of Membranes Intact
 Color N/A
 Length of Time Ruptured N/A

Position/Presentation Vertex

Pelvic Examination
 Dilatation Closed
 Effacement Thick
 Station Ballotable

Labor Status Cramping for several hours

Intrapartum Medications None

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

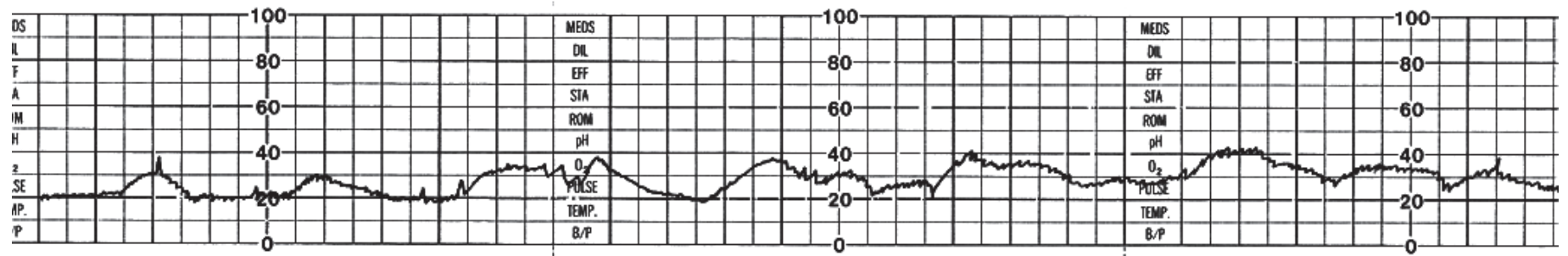
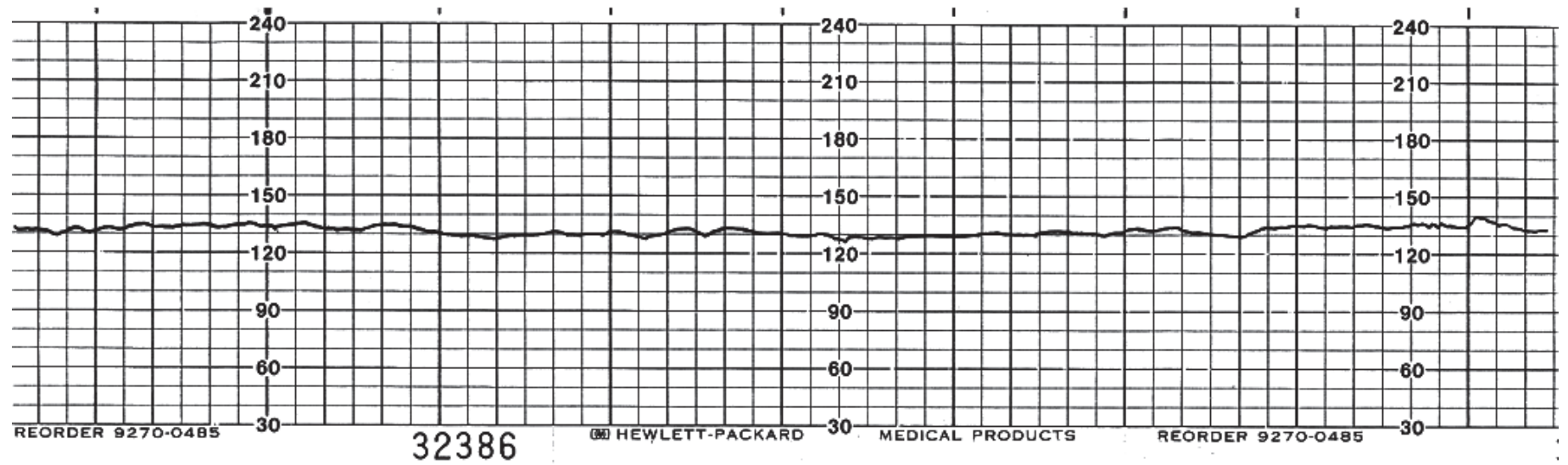
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 2



CASE 2
Answers

TRACING INTERPRETATION

Baseline	130 – 135 beats per minute
Variability	Minimal to absent
Decelerations	None
Accelerations	None

Is this tracing reactive? No

Contractions	
Frequency	Every 1 minute, "irritable"
Duration	30 – 50 seconds
Resting Tone	Palpation required
Intensity	Palpation required

Reassuring components

- None

Non-reassuring components

- Minimal to absent variability
- No accelerations
- Irritable uterine pattern
- Ultrasound findings

Overall interpretation of the tracing: Non-reassuring

INTERVENTIONS

- Discuss fetal condition with mother and family
- Prepare for cesarean section

RATIONALE

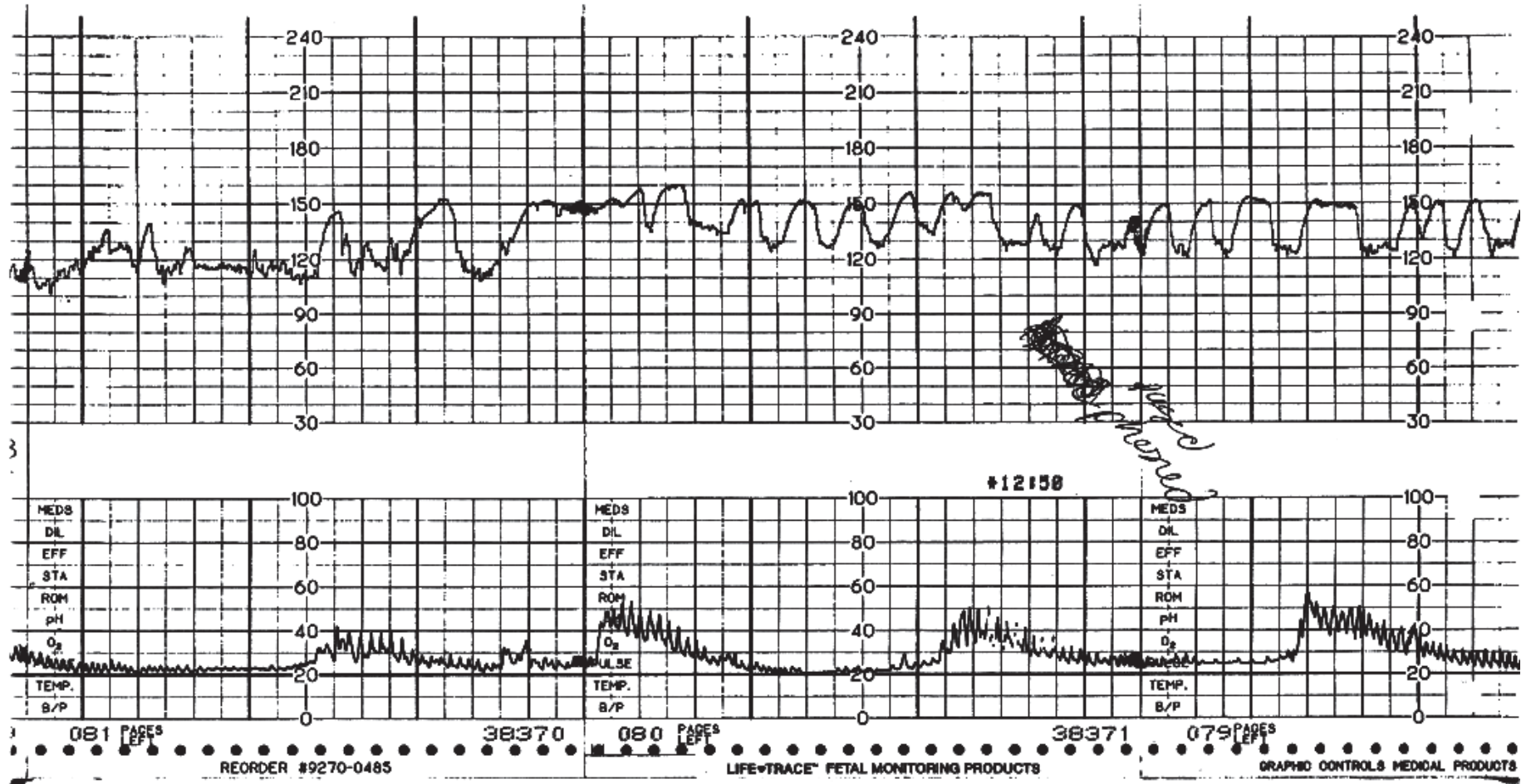
In this case, the woman presents with possible preterm labor. She complained of "cramping" for several hours. However, upon further evaluation the condition of preterm labor was less of a concern than that of the fetal condition. During the hospital admission, her cervix did not change, thus progressive cervical changes as the definition of preterm labor was not met. However, this tracing was troublesome in view of the less than optimal fetal condition, as outlined in the patient data.

OUTCOME

Due to these findings, a cesarean birth occurred within 30 minutes after this tracing. Apgar scores were 7/9 and the cord gases demonstrated that the infant was well oxygenated at the time of delivery and further confirmed that the FHR changes were not due to current hypoxia. The 3 pound 4 ounce (1474 gm) male infant was found to have ventriculomegaly and died in the hospital at three days of age.

Ultrasound can be of major assistance in fetal assessment. When a tracing suggests central nervous system abnormalities, sometimes a sonogram can identify lethal anomalies that ultimately prevent unnecessary interventions. In this case, the low biophysical profile, combined with the fetal hydrops, indicates a hostile intrauterine environment.

Case 3



CASE 3 (ADVANCED)
Worksheet

PATIENT DATA

Gravidity/Parity G3P0
 Gestational Age 42 weeks

Prenatal Care According to standard
 Prenatal History Unremarkable

Reason for Monitoring Induction
 Type of Monitoring Ultrasound, tocotransducer
 Intrapartum History Unremarkable

Status of Membranes AROM
 Color Clear
 Length of Time Ruptured 2 hours 20 minutes

Position/Presentation Vertex

Pelvic Examination
 Dilatation 4 cm
 Effacement 100%
 Station 0 - +1

Labor Status Active labor

Intrapartum Medications Stadol® 0.5 mg given 10 minutes before tracing obtained;
 Oxytocin 8 mU/minute

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

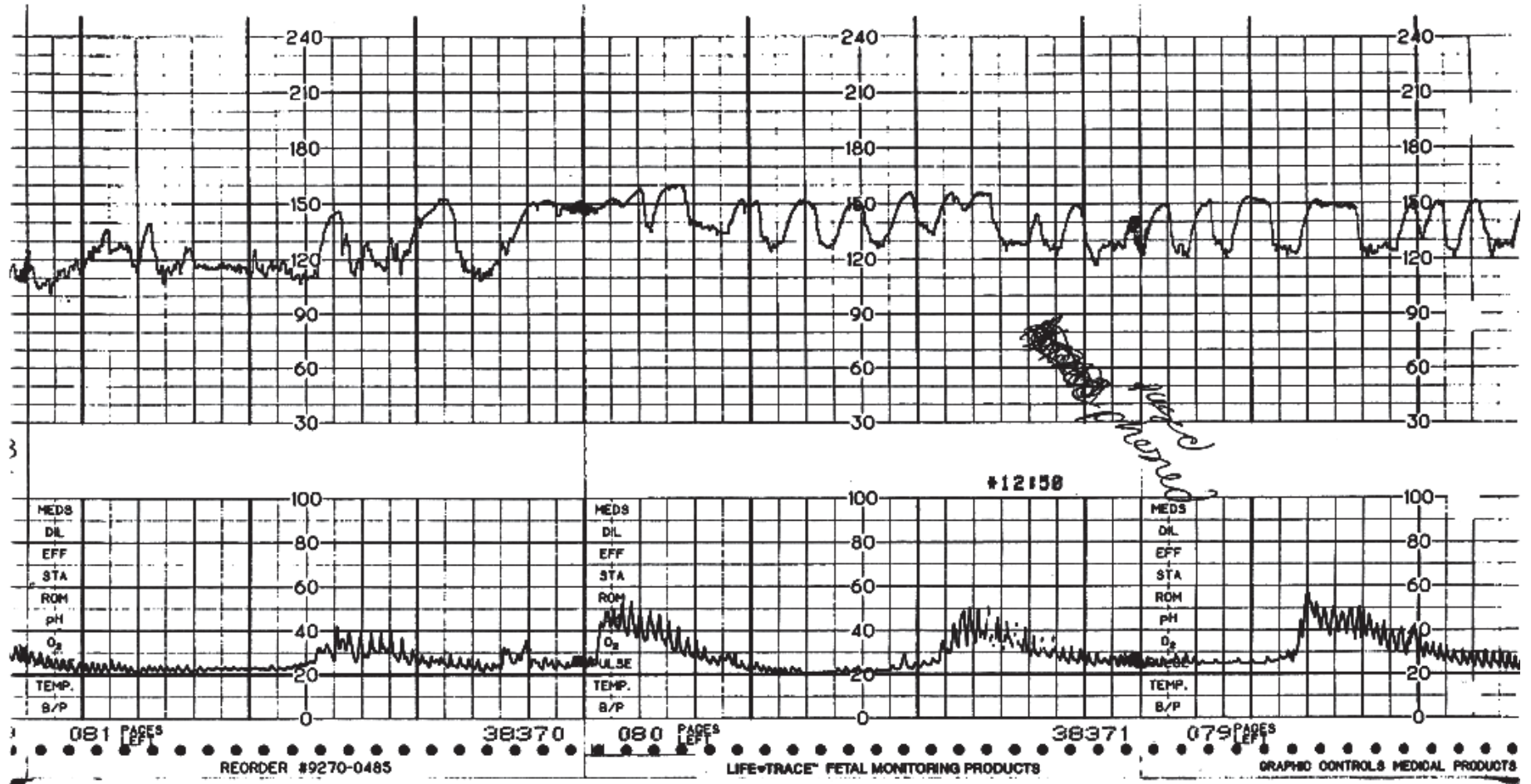
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 3



CASE 3
Answers

TRACING INTERPRETATION

Baseline	Initially, 110-120 beats per minute; then 120-150 beats per minute (would confirm by continuing tracing)
Variability	Moderate to increased, undulating variability
Decelerations	None
Accelerations	2 accelerations prior to undulating pattern
Is this tracing reactive?	Yes
Contractions	
Frequency	Every 1 ½ to 2 minutes
Duration	40 – 50 seconds
Resting Tone	Palpation required
Intensity	Palpation required
Reassuring components	
• Baseline within normal range for gestational age	
• Variability moderate	
• Accelerations present	
Non-reassuring components	
• None	
Overall interpretation of the tracing:	Reassuring

INTERVENTIONS

- Continue to observe

RATIONALE

This case illustrates the effect that medications can have on FHR patterns. Butorphanol (Stadol®) is a pharmaceutical agent that can cause a nonsinusoidal undulating pattern. This is not a sinusoidal pattern, although it meets several criteria of sinusoidal patterns. namely:

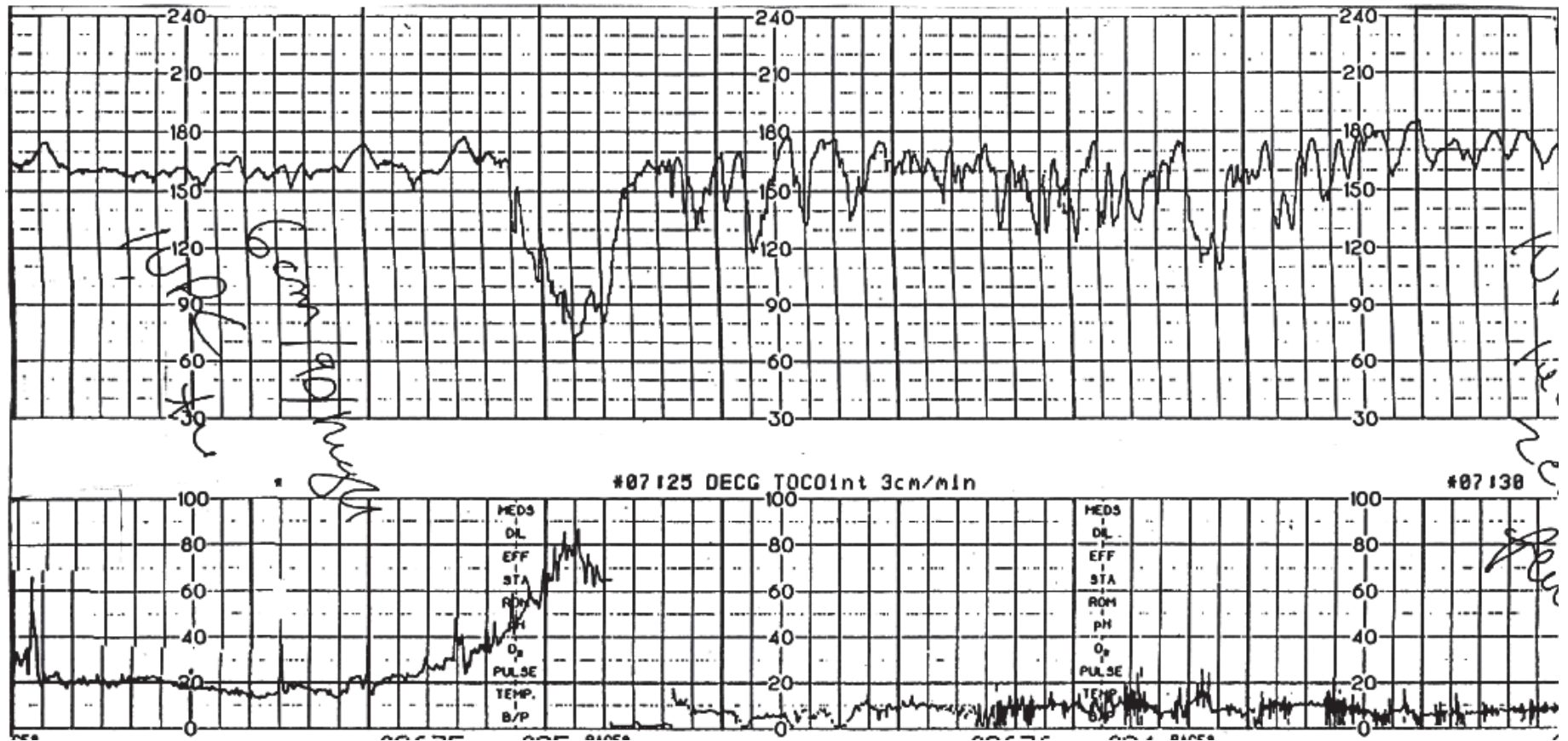
- Regular oscillations of normal ranged frequency
- Reasonable amplitude
- Stable baseline

However, it is not a sine wave. It is not unusual for peaked oscillations to occur not only above the baseline, but also with equal magnitude below the baseline. This normal phenomenon is called a sawtooth pattern. Note that some accelerations occur with fetal activity. Sometimes it is possible to convert the pattern to normal by stimulating the fetus.

OUTCOME

With this type of tracing, the caregiver should be reassured. Eventually an 8 pound, 10 ounce (3910 gm) female neonate was born vaginally without complications.

Case 4 Part 1



CASE 4 PART 1 (ADVANCED)
Worksheet

PATIENT DATA

Gravity/Parity G6P2
 Gestational Age 41 weeks

 Prenatal Care Unremarkable
 Prenatal History 36 years old; Abnormal 3 hour glucose tolerance test, managed by diet and exercise; Jehovah's Witness – refuses blood products

 Reason for Monitoring Hospital policy; gestational diabetes
 Type of Monitoring FSE, external toco
 Intrapartum History Unremarkable

 Status of Membranes AROM
 Color Clear – then particulate meconium
 Length of Time Ruptured 4 hours

 Position/Presentation Vertex

 Pelvic Examination
 Dilatation 6 cm
 Effacement 90%
 Station -2
 Labor Status Active labor for 6 hours

 Intrapartum Medications Continuous epidural

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

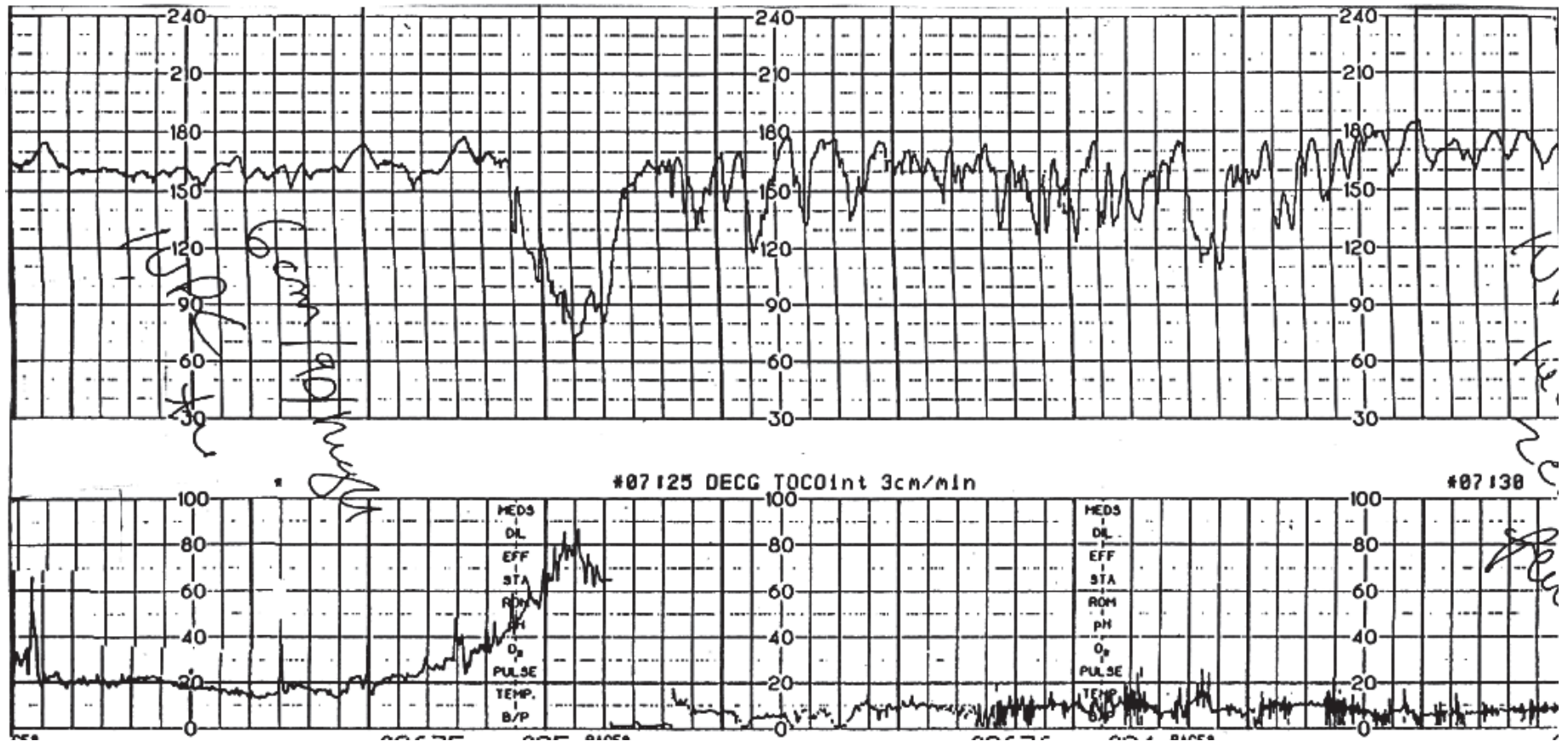
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 4 Part 1



CASE 4 PART 1
Answers

TRACING INTERPRETATION

Baseline	Probably 155 – 165 beats per minute
Variability	Moderate at beginning to marked after the deceleration
Decelerations	Variable
Accelerations	Yes
Is this tracing reactive?	Yes
Contractions	
Frequency	Irregular
Duration	Unknown
Resting Tone	Palpation required
Intensity	Palpation required

Reassuring components

- Accelerations – borderline reactive
- Moderate variability at beginning of tracing

Non-reassuring components

- Slightly increased baseline
- Marked variability
- Variable decelerations
- Hypotonic uterine pattern
- Meconium stained fluid

Overall interpretation of the tracing: Fetus compensating

INTERVENTIONS

- Change maternal position
- Initiate IV fluid bolus
- Provide oxygen
- Assess blood pressure
- Monitor maternal temperature
- Consider amnioinfusion for lavage and variable decelerations

RATIONALE

This case will illustrate the advantages of interpretation and then reinterpretation of an ongoing tracing. This first tracing provided some cause for concern. The baseline of 155 – 165 is higher than usually found among fetuses post 40 weeks. The hypotonic uterine pattern further complicated the situation, and meconium always should increase the index of suspicion of fetal difficulty, although the accelerations and variability should be reassuring. According to Cabaniss (1993, page 76), increased variability following variable decelerations is a response to mild hypoxia such as can occur with transient cord compression. Just as with increased variability alone, the fetus is presumed to be healthy and responding to stressful stimuli. Sharp oscillations are key to the interpretation of the pattern as a compensated state. Attempts should be made to abolish this pattern through the interventions listed. A continuation of this pattern for a prolonged period of time may result in decompensation. Smoothing of the features of either the increased variability or the variable decelerations is less reassuring.

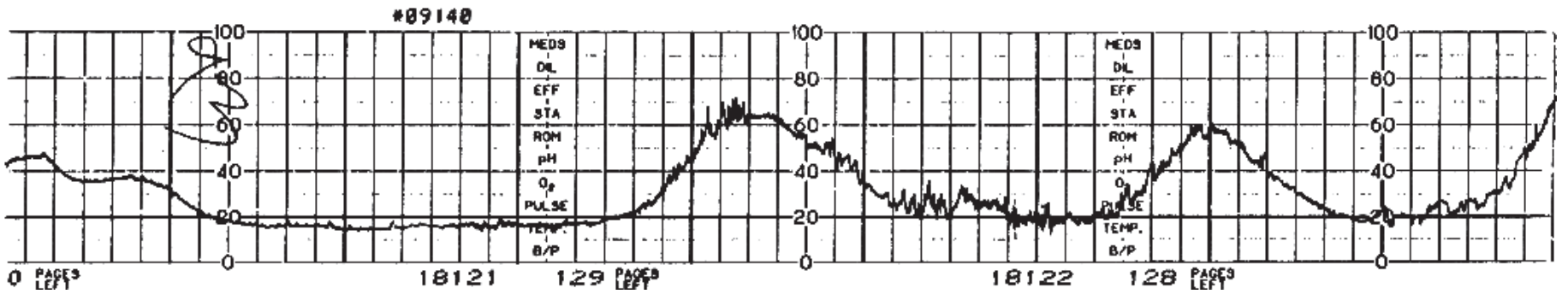
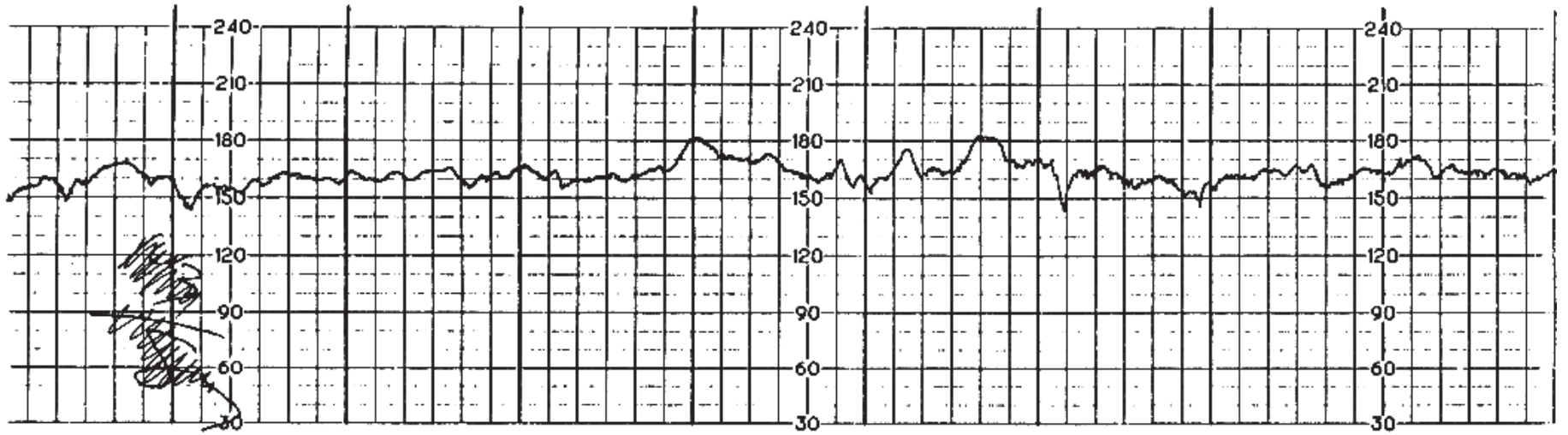
One explanation for the increased baseline as well as hypotonic pattern could be intrauterine infection such as intraamniotic infection. If maternal infection exists, it is imperative to treat early and aggressively since maternal treatment can help promote fetal well being. In addition, infection as well as hypotonia may be associated with postpartum hemorrhage. An IUPC assists in the evaluation of hypotonia by more accurately determining the contraction pattern. Obviously it is desirable always to avoid hemorrhage, but never as important as among women who refuse blood products on religious grounds. An efficient and effective way to assess for maternal infection is maternal temperature. In this case the temperature was 99.4° F (37.4° C), still within the normal range.

To evaluate if hypotonia exists, an IUPC enables the labor contraction's duration and resting tone to be evaluated. Such a device also allows for amnioinfusion to be performed. Amnioinfusion has been found to be of value in situations of particulate meconium and may reduce the incidence of meconium aspiration (Gabbe, 1996, page 414).

OUTCOME

See Part 2

Case 4 Part 2



CASE 4 PART 2 (ADVANCED)
Worksheet

PATIENT DATA

Gravidity/Parity G6P2
 Gestational Age 41 weeks

Prenatal Care Unremarkable
 Prenatal History 36 years old; Abnormal 3 hour glucose tolerance test, managed by diet and exercise; Jehovah's Witness – refuses blood products

Reason for Monitoring Hospital policy; gestational diabetes

Type of Monitoring FSE, IUPC
 Intrapartum History Unremarkable

Status of Membranes AROM
 Color Clear – then particulate meconium
 Length of Time Ruptured 6 hours 15 minutes

Position/Presentation Vertex

Pelvic Examination
 Dilatation 8 cm
 Effacement 100%
 Station 0

Labor Status Active labor for 8 hours 15 minutes

Intrapartum Medications Continuous epidural

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

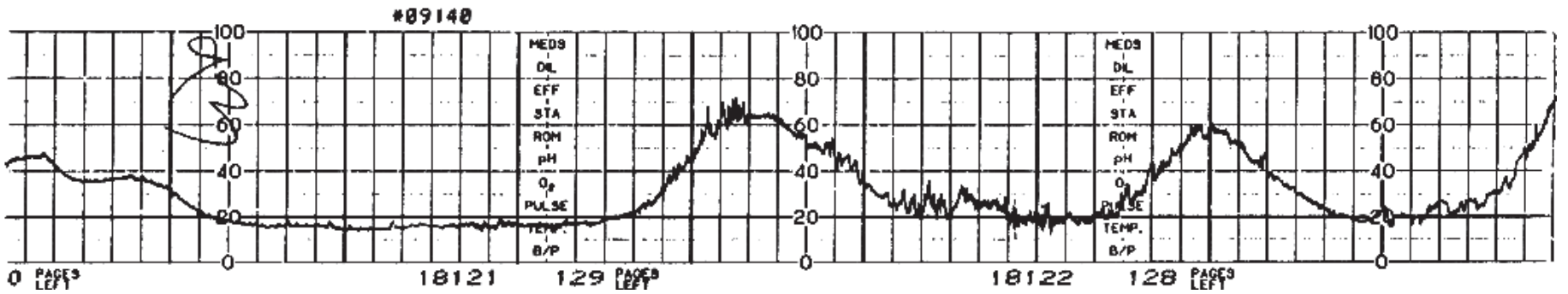
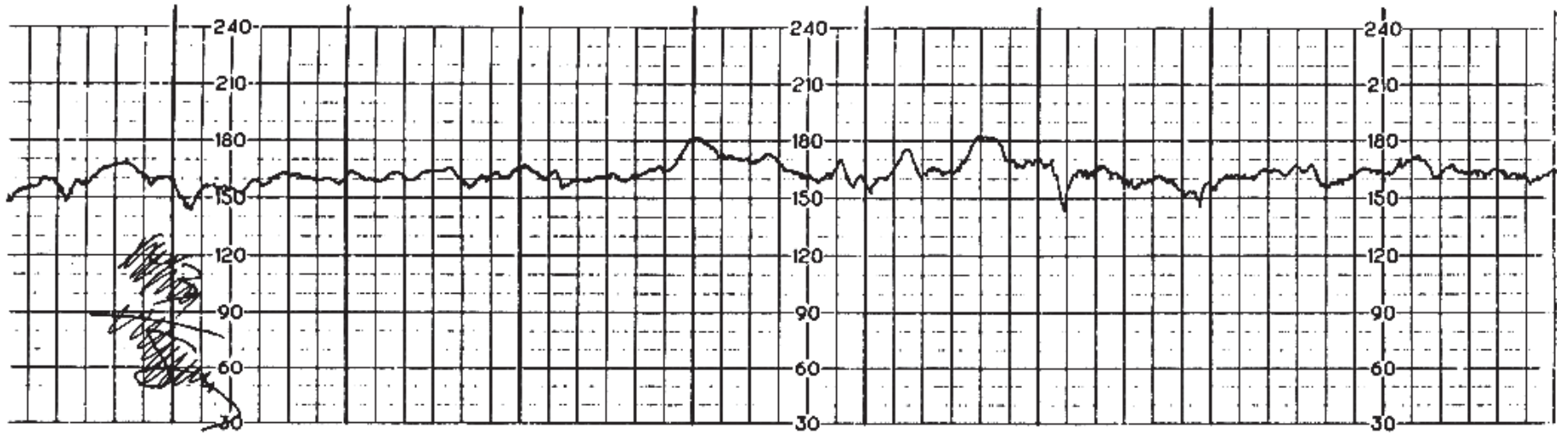
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 4 Part 2



CASE 4 PART 2
90 MINUTES POST INSERTION OF IUPC AND INITIATION OF AMNIOFUSION
Answers

TRACING INTERPRETATION

Baseline 155 – 165 beats per minute
 Variability Moderate
 Decelerations None
 Accelerations Yes

Is this tracing reactive? Yes

Contractions
 Frequency 2 to 2 ½
 Duration 70 – 90 seconds
 Resting Tone 15 – 20 mm Hg
 Intensity 60 – 70 mm Hg

Reassuring components

- Moderate variability
- Resolution of variable decelerations
- Increased uterine activity
- Accelerations

Non-reassuring components

- Slightly increased baseline
- Non-rhythmic uterine activity

Overall interpretation of the tracing: Reassuring

INTERVENTIONS

- Continue to monitor maternal temperature
- Continue to monitor uterine activity for both hyper and hypotonicity

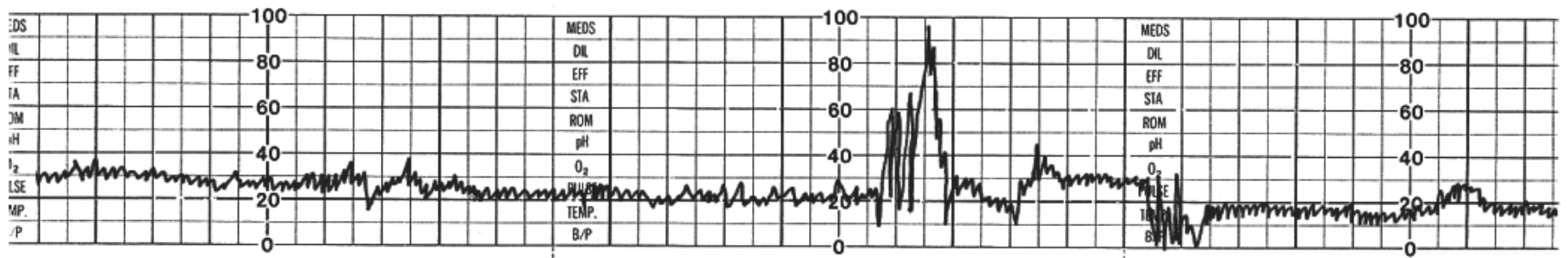
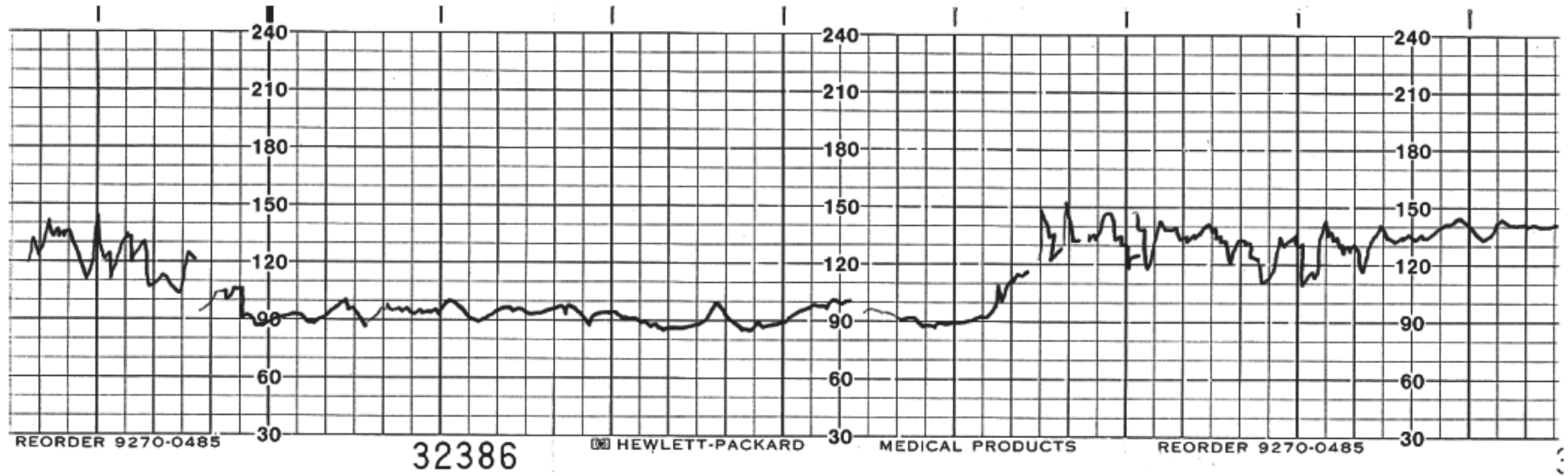
RATIONALE

Ninety minutes later variability was moderate and decelerations were no longer apparent. The baseline remained stable at 155-165 bpm. Although the contractions appeared non-rhythmic, cervical dilatation was occurring. Maternal temperature remained below 100°F (37.8°C).

OUTCOME

At the time of delivery, the fluid was still stained with meconium, but no particulate matter was visible. The head was delivered and suctioned on the perineum. The infant was handed to a pediatric provider immediately at birth and suction was performed. No meconium was visualized below the cords. The baby weighed 6 pounds, 5 ounces (2863 gm) and had a nuchal cord X 2 that was reduced and the body delivered through it. Apgar scores were 5 and 8. The first score may have reflected the delay in stimulation until status of meconium was determined. Cord gases at time of birth indicated a mild respiratory acidosis.

Case 5



CASE 5 (BASIC)
Worksheet

PATIENT DATA

Gravidity/Parity G1P0
Gestational Age 40 weeks

Prenatal Care According to standard
Prenatal History Unremarkable

Reason for Monitoring Hospital policy
Type of Monitoring Ultrasound, tocotransducer
Intrapartum History Unremarkable

Status of Membranes Intact
 Color N/A
 Length of Time Ruptured N/A

Position/Presentation Vertex

Pelvic Examination
 Dilatation 5 cm
 Effacement 100%
 Station +1

Labor Status Active labor for 3 hours

Intrapartum Medications Continuous epidural

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

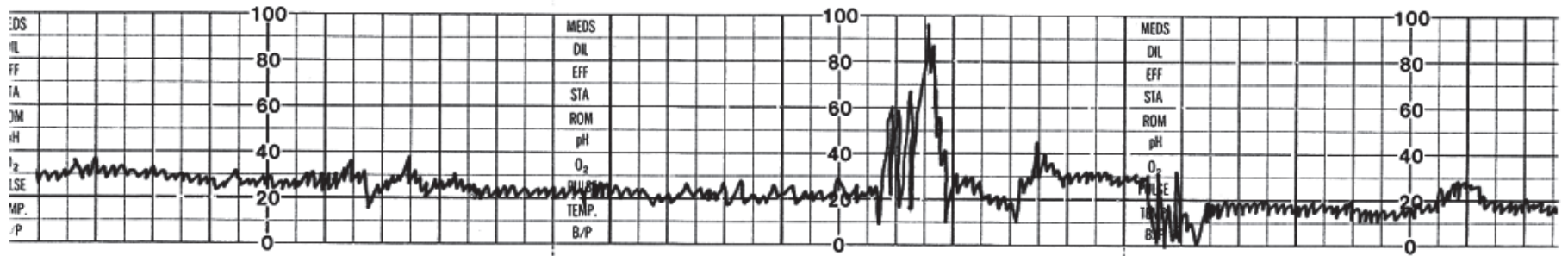
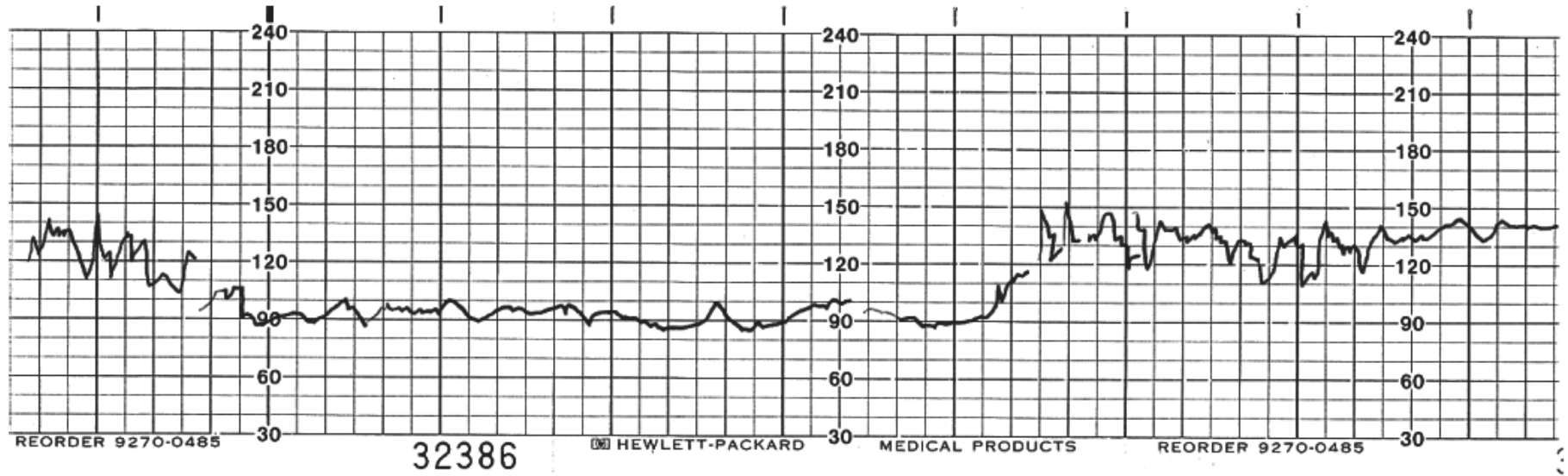
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 5



CASE 5
Answers

TRACING INTERPRETATION

Baseline Unable to define without a longer tracing
Variability Marked before and after deceleration
Decelerations Prolonged
Accelerations None

Is this tracing reactive? No

Contractions
 Frequency Palpation required
 Duration Palpation required
 Resting Tone Palpation required
 Intensity Palpation required

Reassuring components
• FHR appears to be returning to baseline

Non-reassuring components
• Prolonged deceleration for approximately 5 minutes
• Possible deceleration after the prolonged deceleration
• Uterine activity is indeterminable with external fetal monitoring

Overall interpretation of the tracing: Non-reassuring

INTERVENTIONS

- Change maternal position
- Initiate IV fluid bolus
- Provide oxygen
- Assess blood pressure
- Perform vaginal examination
- Palpate uterine activity and readjust tocotransducer; consider internal monitoring
- Notify provider

RATIONALE

This case illustrates that one period of tracing may be inadequate for evaluation. A prolonged deceleration for five minutes with return to baseline, causes concern but without understanding the etiology, no resolution can be assured.

In this type of a situation, one must assume that a problem might exist. Therefore, while continuing to trace the FHR, the woman should be supported.

Two of the most common causes of prolonged deceleration can be ruled out by the vaginal examination – a prolapse of the umbilical cord or a rapid descent of the fetus.

Other causes include maternal hypotension, hypertonic uterine contractions or maternal hypoxia resulting from maternal seizures or respiratory depression.

OUTCOME

A vaginal exam ruled out a prolapsed cord and rapid fetal descent. Maternal hypotension and hypertonic contractions were also ruled out as a possible cause. The FHR returned to the baseline and no further prolonged decelerations occurred. Five hours later, a 7 pound, 10 ounce female infant was delivered spontaneously with Apgars of 8 and 9.

Case 6

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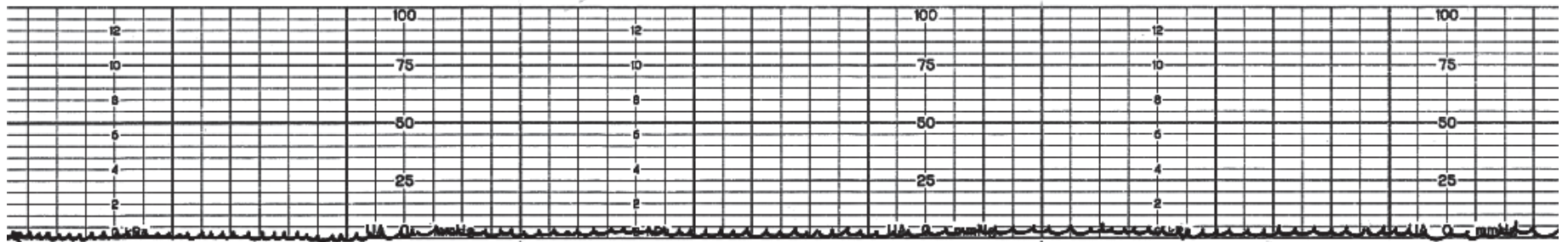
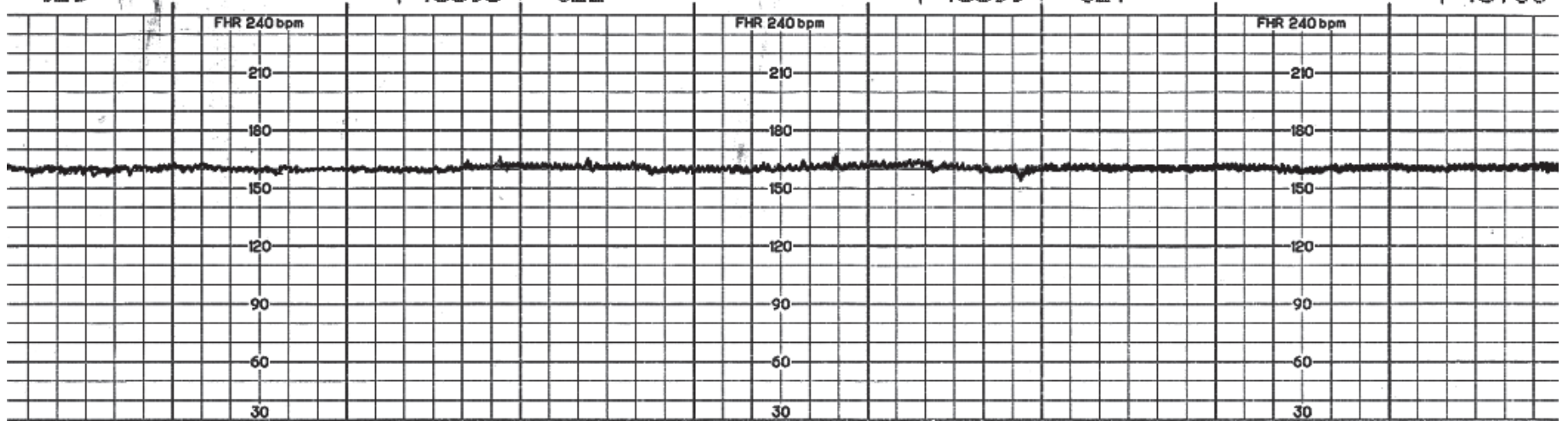
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US: 800-669-1009

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CASE 6 (INTERMEDIATE)
Worksheet

PATIENT DATA

Gravidity/Parity G3P0
 Gestational Age 33 weeks

Prenatal Care None
 Prenatal History Insulin dependent diabetic

Reason for Monitoring Diabetic ketoacidosis, preterm
 Type of Monitoring Ultrasound, tocotransducer
 Intrapartum History On admission: Blood sugar 373 mg/dL, 1+ serum ketones, pH 7.19

Status of Membranes Intact
 Color NA
 Length of Time Ruptured NA

Position/Presentation Vertex

Pelvic Examination Deferred
 Dilatation
 Effacement
 Station

Labor Status Not in labor

Intrapartum Medications ½ NS 250 ml with 125 units regular insulin

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 6

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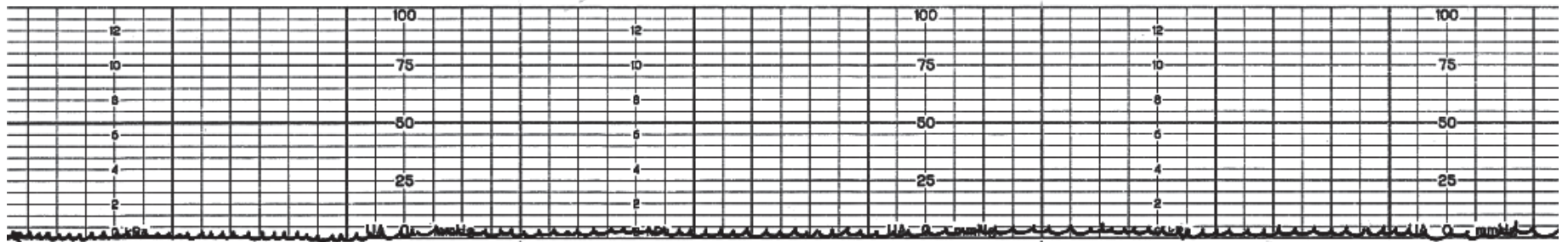
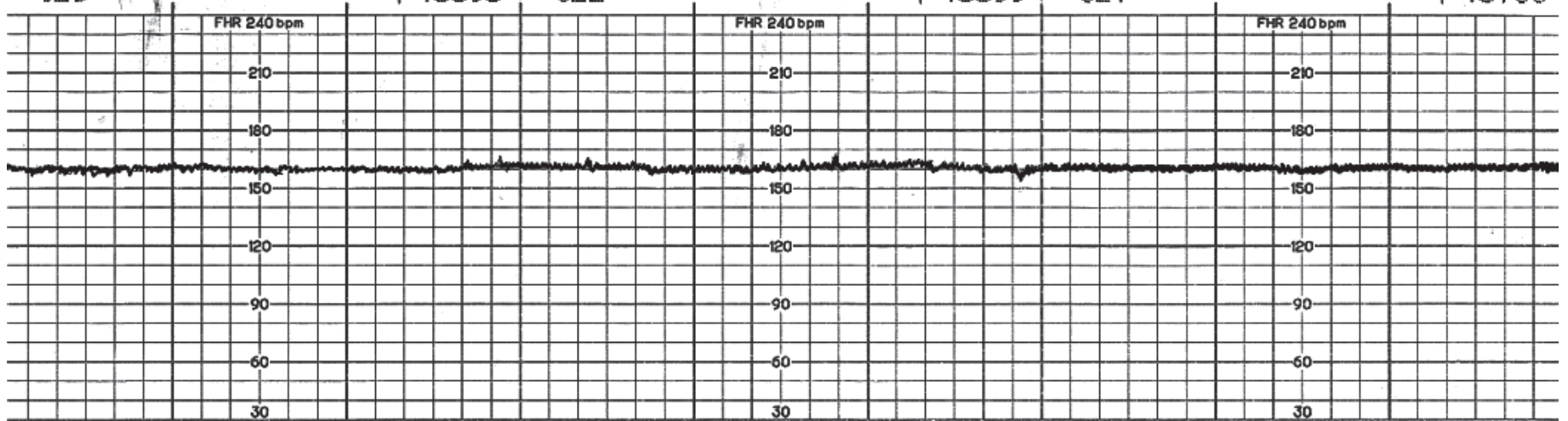
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CASE 6
Answers

TRACING INTERPRETATION

Baseline	160 beats per minute
Variability	Absent
Decelerations	None
Accelerations	None
Is this tracing reactive?	No
Contractions	
Frequency	Suspicious – there may be some contractions not being accurately detected by the monitor
Duration	Unknown
Resting Tone	Palpation required
Intensity	Palpation required
Reassuring components	
<ul style="list-style-type: none">• Baseline is stable within normal range for gestational age• Absence of late decelerations	
Non-reassuring components	
<ul style="list-style-type: none">• Absent variability• No accelerations	
Overall interpretation of the tracing:	Non-reassuring

INTERVENTIONS

- Notify provider for orders
- Stabilize the mother – correct ketoacidosis (monitor blood sugar and maternal acid base status)
- Continue to palpate fundus and adjust tocodynamometer

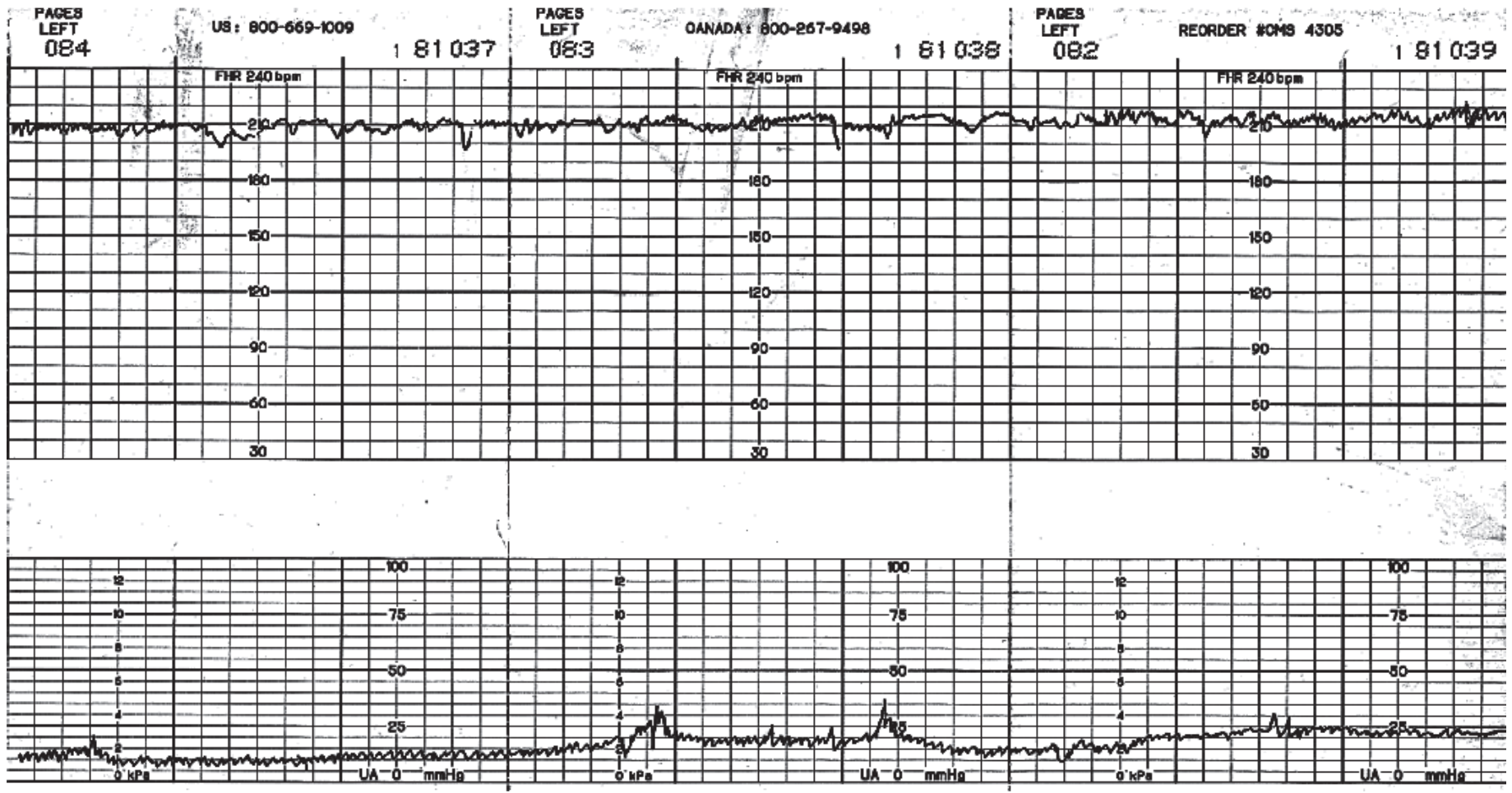
RATIONALE

This tracing reflects monitoring of a pregnant woman with pregestational diabetes. In this situation, the woman was admitted in the middle of the night in diabetic ketoacidosis. Not only is the woman seriously ill, but not surprisingly, the tracing is nonreactive. There is minimal variability and no accelerations. Fortunately, the baseline is stable and within normal range for the gestational age. At this time, it is imperative to stabilize the woman by correcting her blood sugar levels while continuing to monitor the fetus. Diabetic ketoacidosis alters the maternal acid-base balance and decreases the oxygen available to the fetus, thus, decreasing the variability. Stabilization of the mother will enhance the fetal oxygenation status and then improve the fetal heart tracing. The nurse should continue to palpate for contractions, in case the external tocotransducer is misplaced and not appropriately monitoring contractions or uterine activity. Every attempt should be made to resuscitate the fetus while intrauterine. It would be an error to move toward a surgical delivery based on the fetal tracing since this could compromise the health of both the mother and fetus.

OUTCOME

Over the next four hours, the insulin infusion was titrated to restore the woman's blood sugar and thus, serum ketones and pH, to normal. As the maternal acid base status improved, so did the fetus. The variability returned, reflecting normal oxygenation. After stabilization, the woman was dismissed with close follow-up by the physician.

Case 7



CASE 7 (BASIC)
Worksheet

PATIENT DATA

Gravidity/Parity	G1P0
Gestational Age	39 weeks
Prenatal Care	According to standard
Prenatal History	Unremarkable
Reason for Monitoring	Hospital policy
Type of Monitoring	Ultrasound, tocotransducer
Intrapartum History	Unremarkable
Status of Membranes	Intact
Color	N/A
Length of Time Ruptured	N/A
Position/Presentation	Vertex
Pelvic Examination	
Dilatation	Fingertip
Effacement	Thick
Station	-2
Labor Status	Latent phase
Intrapartum Medications	None

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
Duration _____
Resting Tone _____
Intensity _____

What are the reassuring components?

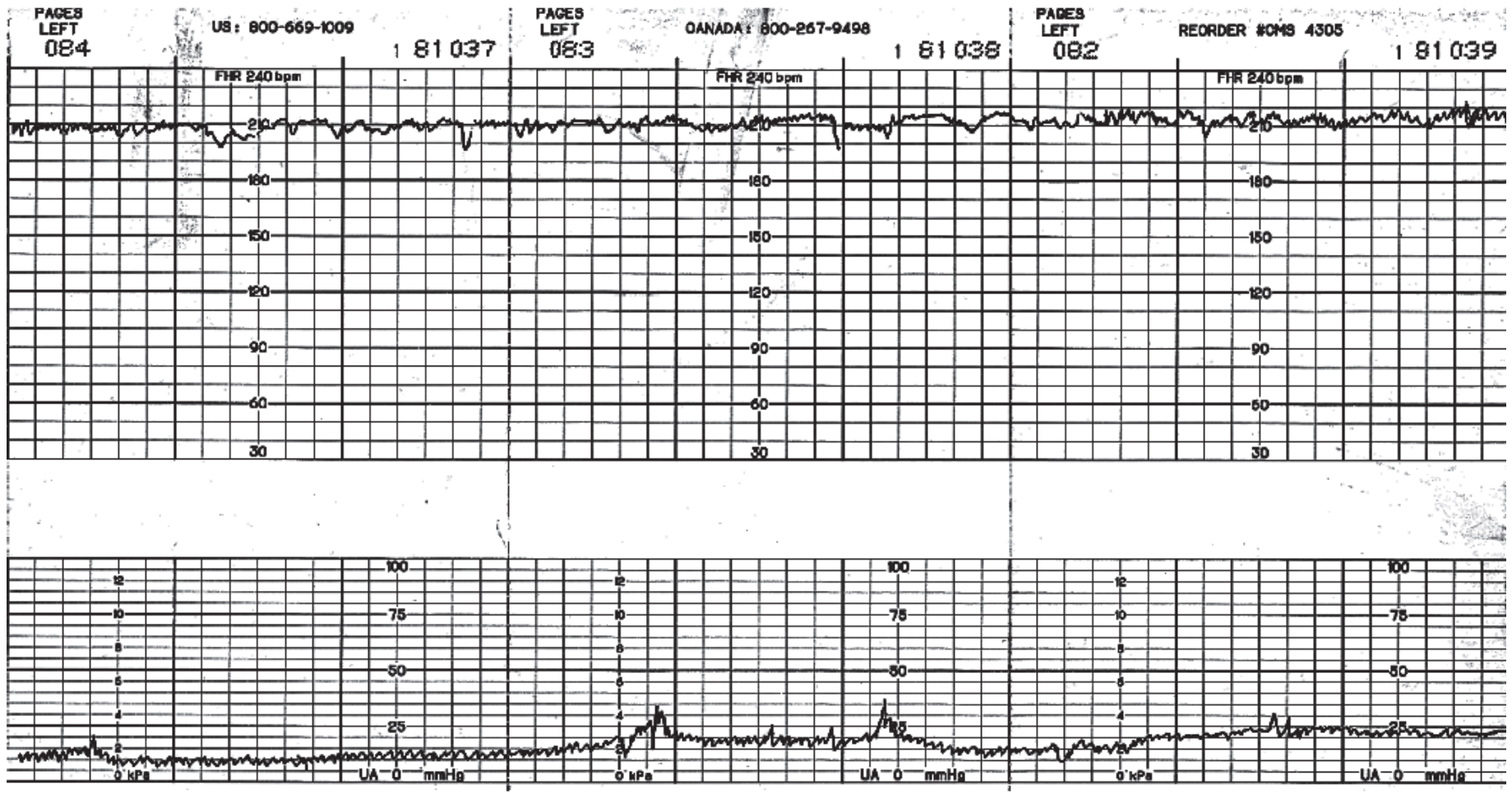
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 7



CASE 7
Answers

TRACING INTERPRETATION

Baseline 205 – 220 beats per minute
Variability Moderate
Decelerations None
Accelerations None

Is this tracing reactive? No

Contractions
 Frequency Palpation required
 Duration Palpation required
 Resting Tone Palpation required
 Intensity Palpation required

Reassuring components

- Average variability

Non-reassuring components

- Tachycardia
- Unable to determine uterine activity with external monitor

Overall interpretation of the tracing: Non-reassuring

INTERVENTIONS

- Listen with fetoscope
- Assess maternal temperature
- Initiate IV fluid bolus
- Notify provider
- Palpate fundus and readjust tocotransducer

RATIONALE

In this situation, a woman presents in possible labor. Although it is impossible to determine much information about uterine activity, the fetal clinical picture provides cause for concern. The baseline FHR is tachycardic. Tachycardia is defined as baseline heart rate above 160 beats per minute or more than 30 beats per minute increase over the normal baseline for 10 minutes or more. There are a variety of reasons that tachycardia can occur, including fetal hypoxia, maternal fever, fetal anemia and administration of drugs, both legal and illegal. This tracing is not definitive.

Tachycardia is not necessarily a sign of fetal hypoxia unless it is associated with repetitive late decelerations. Late decelerations cannot be assessed on this tracing. Therefore, other assessments (such as maternal temperature and review of drugs administered) should be performed in order to determine the possible etiology of this fetal tachycardia.

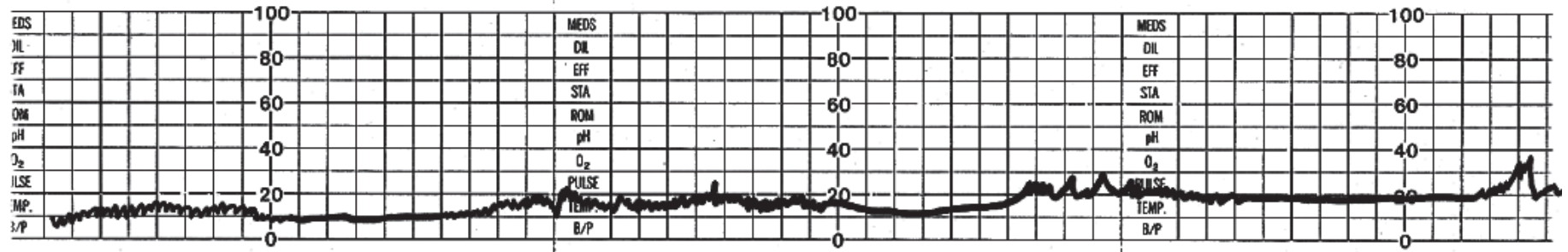
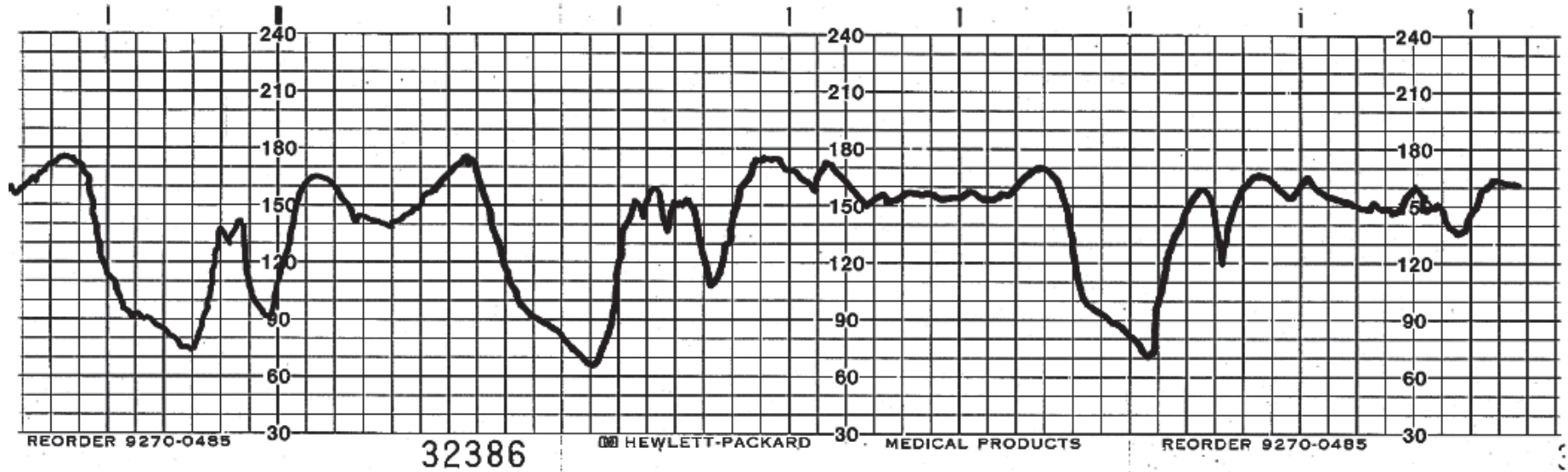
Short periods of supraventricular tachycardia (SVT), as defined by fetal heart rate of 200 beats per minute and above, may be innocuous. However, longer periods have been associated with high cardiac output failure, nonimmune hydrops fetalis, ascites, hydramnios and fetal death.

OUTCOME

In this case, the maternal temperature was 38.4° C (101.0° F) and the woman was diagnosed as having chorioamnionitis and treated with ampicillin and gentamycin. Note that intraamniotic infection can occur, albeit rarely, with intact membranes. Oxytocin induction was begun and eight hours later, she delivered a 6 pound, 15 ounce (3150 gm) male infant with Apgar scores of 8/9.

For more information about fetal tachycardia, read Tucker (2000) pages 83-87.

Case 8



CASE 8 (BASIC)
Worksheet

PATIENT DATA

Gravidity/Parity G1P0
Gestational Age 42 weeks

Prenatal Care According to standard
Prenatal History Unremarkable

Reason for Monitoring Induction for post dates
Type of Monitoring FSE, tocotransducer
Intrapartum History Induction for 17 hours

Status of Membranes SROM
Color Particulate meconium
Length of Time Ruptured 14 hours

Position/Presentation Vertex

Pelvic Examination
Dilatation 8 cm
Effacement 100%
Station +1

Labor Status

Intrapartum Medications Nubain® (nalbuphine hydrochloride) 0 mg SQ 2 hours previously

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
Duration _____
Resting Tone _____
Intensity _____

What are the reassuring components?

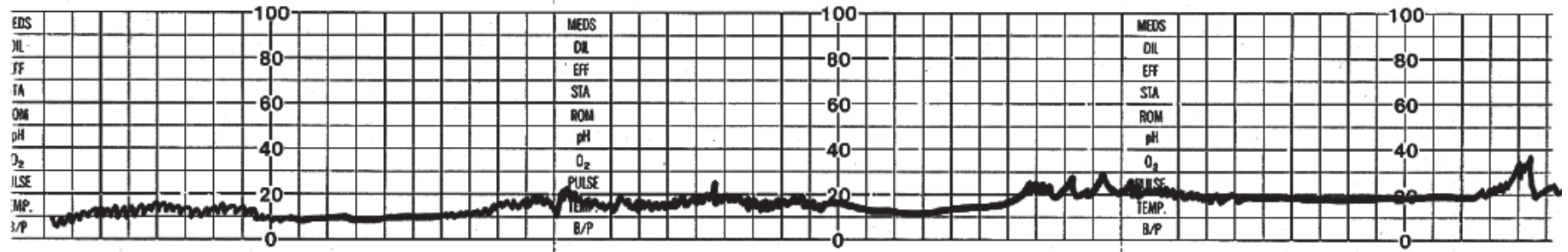
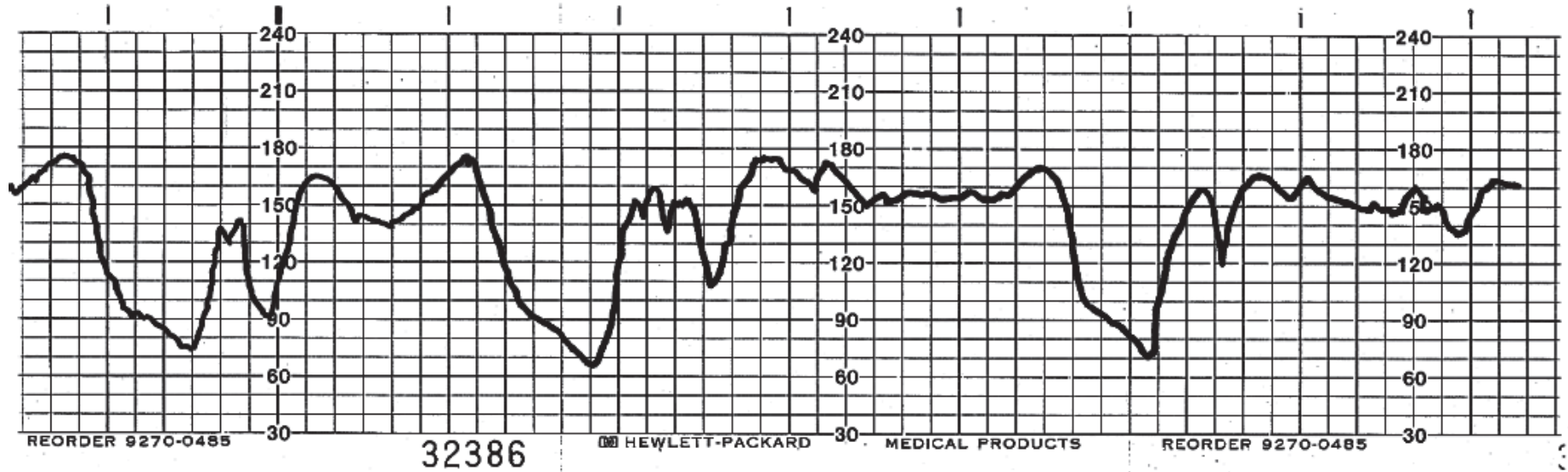
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 8



TRACING INTERPRETATION

Baseline	Unable to determine
Variability	Absent
Decelerations	Variable, atypical
Accelerations	None
Is this tracing reactive?	No
Contractions	
Frequency	Appears to be every 2 – 3 minutes
Duration	Difficult to determine
Resting Tone	Palpation required
Intensity	Palpation required
Reassuring components	
• None	
Non-reassuring components	
• Absent variability	
• Variable decelerations are repetitive and drop to 65 to 75 bpm	
• Atypical nature of variables (biphasic, prolonged duration)	
Overall interpretation of the tracing:	Non-reassuring

INTERVENTIONS

- Discontinue oxytocin
- Vaginal exam
- Provide oxygen
- Initiate IV fluid bolus
- Notify provider
- Prepare for cesarean section
- Determine frequency and duration of uterine contractions through adjustment of tocotransducer, palpation or IUPC insertion
- Consider terbutaline if any delay in delivery is anticipated (wait for physician, OR crew, etc.)
- Consider amnioinfusion to lavage meconium

RATIONALE

For most of history, the postterm pregnancy was recognized as problematic only by the pregnant woman herself who often was tired and anxious to see her child. Health care providers began generally to appreciate potential health risks during the last quarter of the century or so. It is now well accepted that pregnancies at or beyond 42 weeks gestational age are associated with increased perinatal morbidity and mortality rates. Almost 15% of women in the United States have an induction of labor, often to avoid postdates, as in this case. This woman was admitted at exactly 42 weeks gestational age. Upon admission her cervix was 1 – 2 cm, 80% effaced and –1 station. Oxytocin was begun and three hours later she was 2 – 3 cm. Her membranes ruptured spontaneously at the time of the examination and particulate meconium was present. A FSE was placed and the oxytocin continued. Now, 14 hours later she is dilated to 8 cm, completely effaced and at a +1 station. An attempt was made to insert an IUPC but it was unsuccessful, thus, the uterine tracing is external.

The tracing is a serious one, without any reassuring components. Variability is lacking, the decelerations, albeit variables, are profound and atypical in nature. By this time, the woman had been receiving oxytocin for 17 hours. The obstetrician was present and after the nurse and physician viewed this tracing, a cesarean section birth occurred.

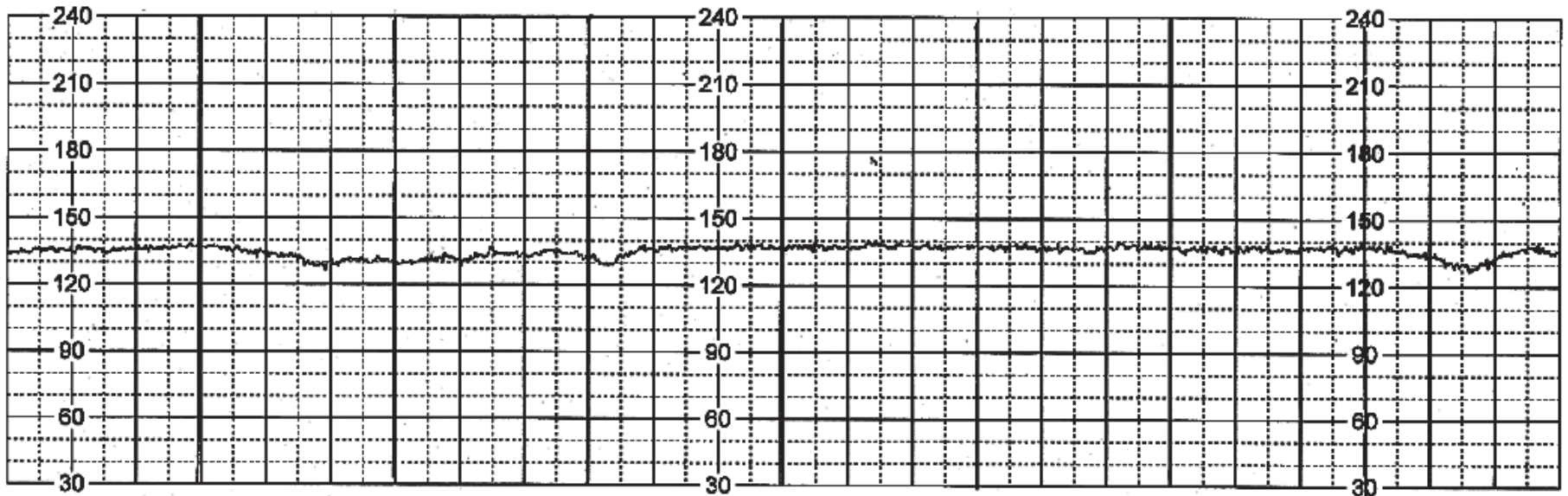
OUTCOME

The infant boy was 9 pounds, 1 ounce (4105 gm) with Apgar scores 3/5/8 with directed resuscitation. He was admitted to the special care nursery where due to continued respiratory difficulty (confirmed by X-ray and blood gases) a diagnosis of meconium aspiration was made. Neonatal care was aggressive and rapid, however, after a week of assisted ventilation, the baby succumbed to overwhelming sepsis.

In addition to the stress experienced in association with the loss of a child, the woman developed both postpartum endometritis and wound dehiscence. Both of these complications responded well to antimicrobial therapy. Endometritis is, unfortunately, relatively common with any cesarean section birth and wound dehiscence is a risk for an woman after any abdominal surgery.

The question in this situation is whether or not earlier intervention could have changed the outcome. Meconium aspiration may occur in utero and is more likely when the meconium is particulate in character. Aspiration in utero is associated with severe variable decelerations. Thus, the answer to the question remains unknown, however, most non-reassuring fetal heart rate patterns develop over time with a loss of variability indicating a significant negative change.

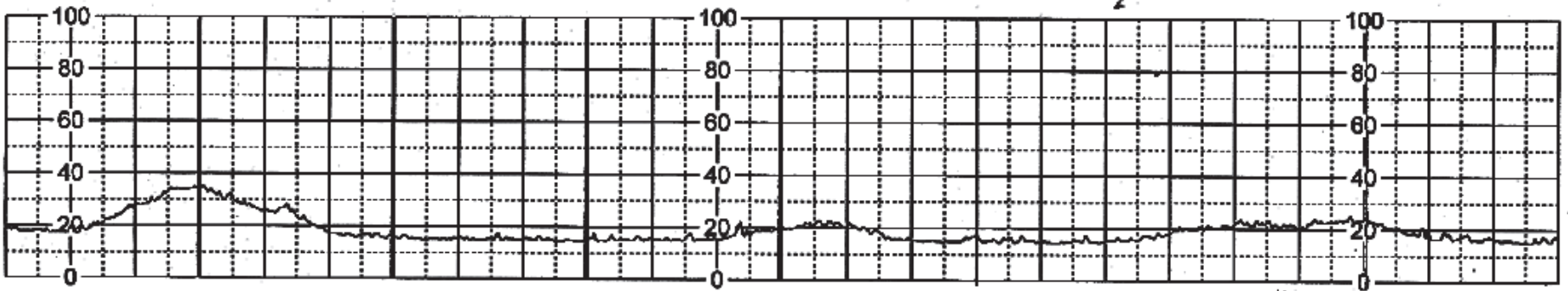
Case 9



* 11:31:20 AM 12/11/97 3 cm/min

* 11:34:40 AM

* 11:38:00 AM



CASE 9 (INTERMEDIATE)

Worksheet

PATIENT DATA

ASSESSMENT AND INTERPRETATION

Gravidity/Parity G1P0
 Gestational Age 40 weeks by uncertain LMP, bedside ultrasound on day of delivery

Prenatal Care No prenatal care
 Prenatal History Woman has had IDDM for 22 years. Has not been under a physician's care for several years.

Reason for Monitoring Increased risk for uteroplacental insufficiency and congenital anomalies due to preexisting diabetes.

Type of Monitoring Ultrasound, tocotransducer
 Intrapartum History Spontaneous onset of labor two hours before admission

Status of Membranes Intact
 Color NA
 Length of Time Ruptured NA

Position/Presentation Vertex/OA

Pelvic Examination
 Dilatation 3-4 cm
 Effacement 90%
 Station - 1

Labor Status

Intrapartum Medications Insulin during labor

DESCRIBE THE FOLLOWING:
 Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

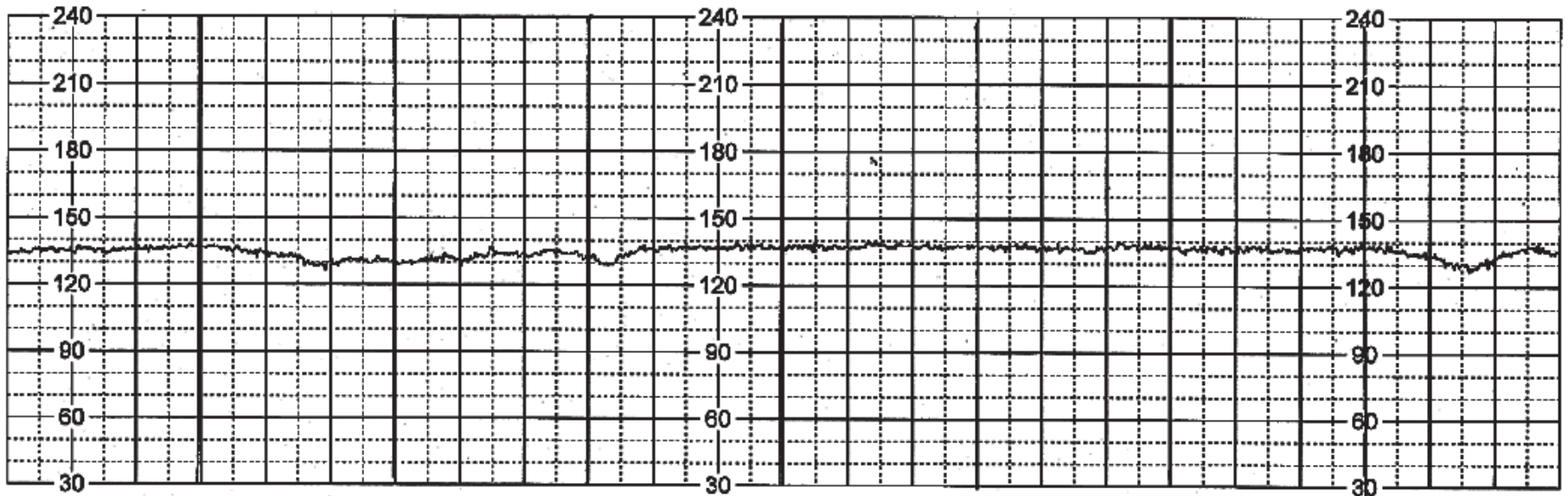
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

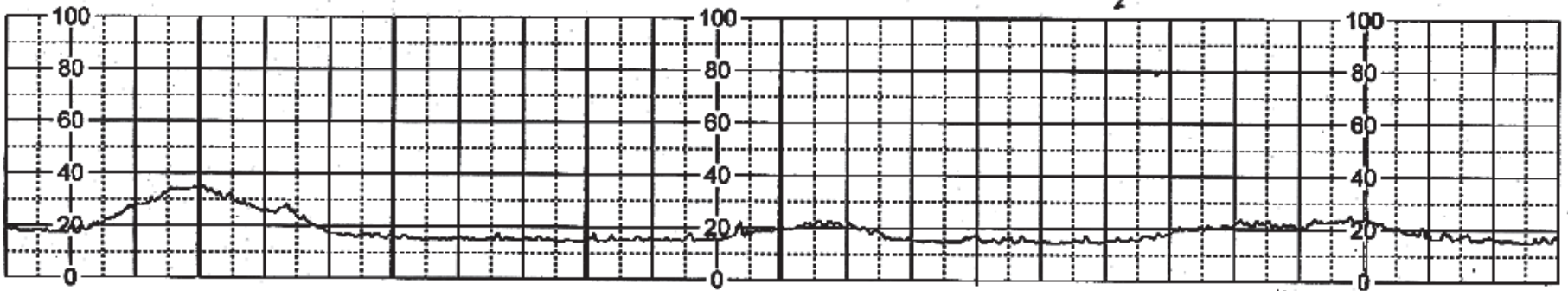
Case 9



* 11:31:20 AM 12/11/97 3 cm/min

* 11:34:40 AM

* 11:38:00 AM



CASE 9
Answers

TRACING INTERPRETATION

Baseline	135 – 140 beats per minute
Variability	Minimal (with external)
Decelerations	Lates
Accelerations	None

Is this tracing reactive? No

Contractions	
Frequency	Every 2-3 minutes
Duration	50 – 70 seconds
Resting Tone	Palpation required
Intensity	Palpation required

Reassuring components

- Normal baseline
- Rhythmic uterine activity

Non-reassuring components

- Minimal variability with external monitoring
- Late decelerations
- No accelerations

Overall interpretation of the tracing: Non-reassuring

INTERVENTIONS

- Change maternal position
- Initiate IV fluid bolus
- Provide oxygen
- Notify provider
- Recommend ultrasound evaluation to rule out anomalies
- Anticipate cesarean section

RATIONALE

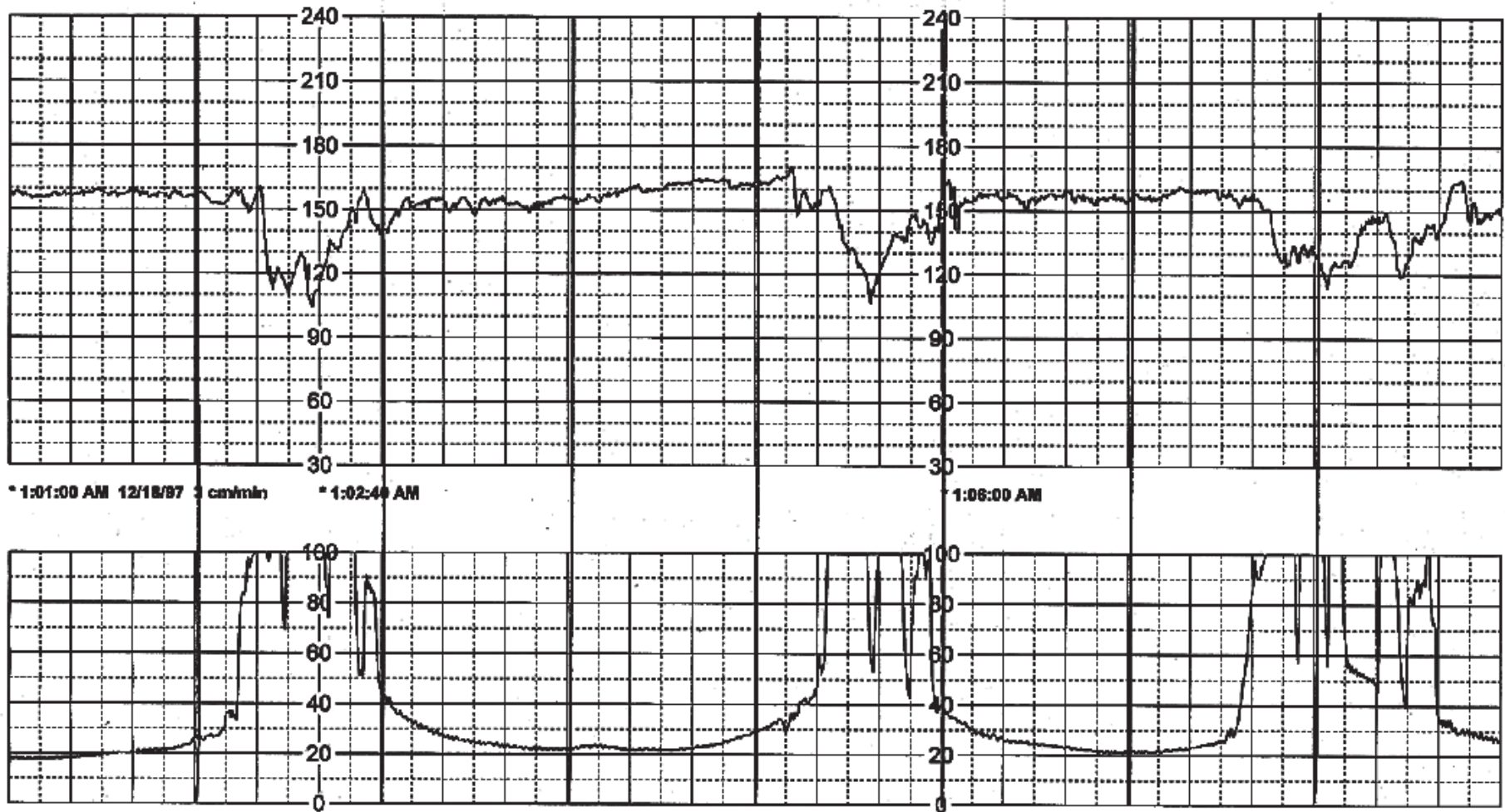
Women who experience uncontrolled diabetes during pregnancy are at risk for a variety of complications, including pregnancy-induced hypertension, uteroplacental insufficiency, congenital anomalies, and stillbirths. Some individuals who are diabetic are not necessarily vigilant about their care. In this case, the woman is 26 years old and she has been a diabetic since she was 4 years old. During adolescence, she began to rebel against the disease and did not seek regular care for several years. She now found herself with an unplanned pregnancy and without social support. She did not obtain prenatal care and took her insulin intermittently. Although she stated that she “tried to eat good”, she was not familiar with an ADA diet and had not followed any particular plan. Since insulin is not limited by prescription for diabetics, she simply bought regular insulin, syringes and needles as she desired.

This woman was admitted in early labor to the hospital at term. Among the tests drawn at that time was a Hemoglobin A₁C which was found to be 14.6%. Normal Hgb A₁C levels during pregnancy range from 4.2% to 6.4%. Thus, it was clear that the diabetes was not well controlled. On this tracing, late decelerations were noted, perhaps due to uteroplacental compromise secondary to diabetes. Furthermore, the minimal variability could be suggestive of congenital anomalies since such conditions involving the central nervous system or cardiovascular system can decrease variability. For more information on these types of changes, read Tucker (2000), pages 75 – 83.

OUTCOME

Due to this nonreassuring pattern, an operative birth was discussed with the woman. She refused a cesarean section, so she was continuously monitored and labor proceeded normally. Late decelerations were apparent throughout the labor and variability remained minimal. Six hours after the tracing, she delivered a 6 pound, 3 ounce (2810 grams) male infant with Apgar scores of 1/6/7. The baby had major congenital malformations, including caudal regression, cardiomegaly, pulmonary hypertension, limb and vertebral abnormalities. After a prolonged stay in the pediatric hospital, the baby was discharged home. Within the first year of life, the infant was hospitalized six times, culminating with a community pneumonia which was the immediate cause of his death at 14 months of age.

Case 10



CASE 10 (INTERMEDIATE)

Worksheet

PATIENT DATA

ASSESSMENT AND INTERPRETATION

Gravidity/Parity G1P0
 Gestational Age 38 weeks

Prenatal Care According to standard
 Prenatal History Gestational diabetes managed by diet; hydramnios

Reason for Monitoring Gestational diabetes, dysfunctional labor

Type of Monitoring Ultrasound, tocotransducer
 Intrapartum History Amniotomy induction 13 hours prior to time of monitor tracing

Status of Membranes Ruptured
 Color Clear
 Length of Time Ruptured 13 hours

Position/Presentation Vertex, suspected OP

Pelvic Examination
 Dilatation Complete
 Effacement 100%
 Station - 2

Labor Status Active, in the second stage

Intrapartum Medications Continuous epidural

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

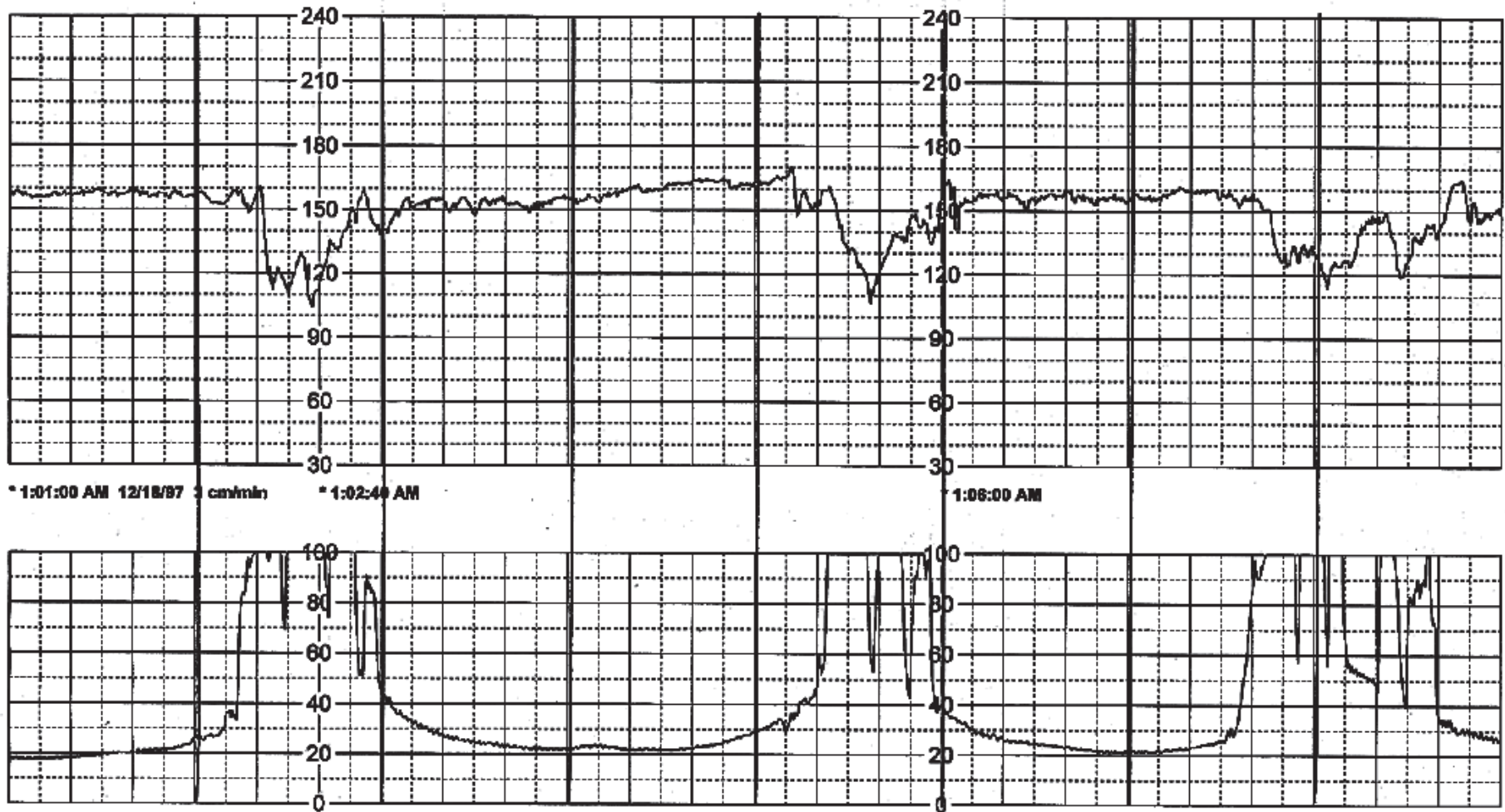
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 10



TRACING INTERPRETATION

Baseline	155 – 160 beats per minute
Variability	Minimal
Decelerations	Variable decelerations
Accelerations	None

Is this tracing reactive? No

Contractions	
Frequency	Every 2 ½ - 3 minutes
Duration	90 – 100 seconds
Resting Tone	Palpation required
Intensity	Palpation required

Reassuring components

- Variables return to baseline
- Depth of variable decelerations less than 60 bpm
- Rhythmic uterine activity

Non-reassuring components

- Minimal variability
- No accelerations
- Variable decelerations with each contraction

Overall interpretation of the tracing: Non-reassuring

INTERVENTIONS

- Vaginal exam
- Change maternal position
- Initiate IV fluid bolus
- Provide oxygen
- Notify provider
- Continue to monitor/watch

RATIONALE

Hydramnios often is associated with dysfunctional labor. Uterine activity can be impaired by the distention secondary to excessive fluid and/or the fluid is an obstacle to the fetus assuming a presentation/position conducive to labor. In this situation, the membranes have been ruptured for 13 hours. It would be hoped that the fetus would now be in an advantageous position and contractions effective.

However, in this case, the fetus is unengaged and most likely in the common malposition of occiput posterior. Although not incompatible with vaginal delivery, labor with a fetus in an occiput posterior position is often longer than with a fetus in an OA position and it should be of major concern that the fetal head is not yet engaged.

In this tracing, variable decelerations are apparent, however, they are somewhat atypical in shape. For additional reading on variable decelerations, read Tucker pages 109-117.

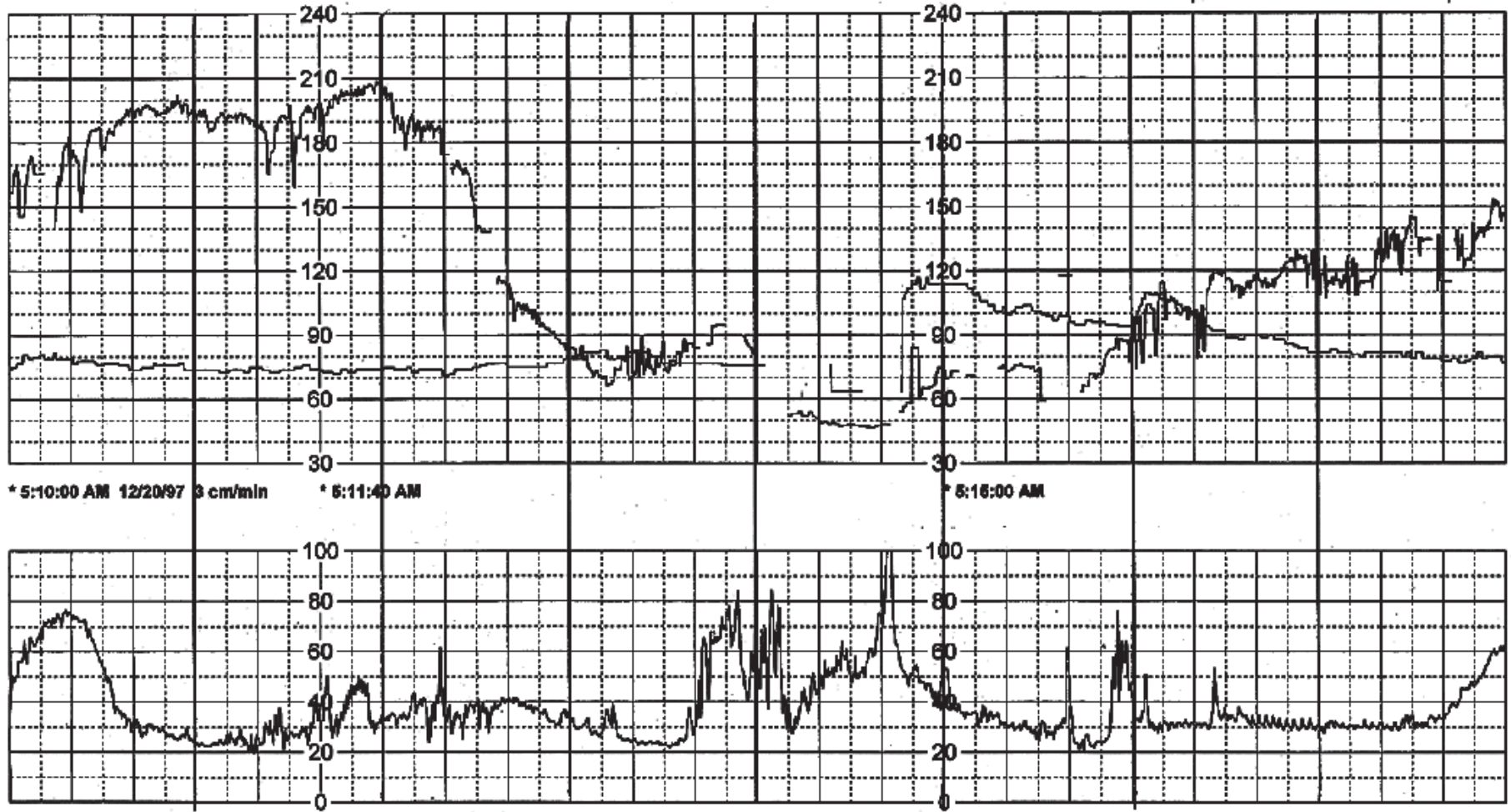
At the time of the monitoring, this woman has a continuous epidural and no inherent urge to push. In order to facilitate delivery, the nurse had been coaching the woman to push vigorously by instructing her to close her glottis and (Valsalva) push, or hold her breath with pushing. This directed pushing technique is not one of AWHONN's recommendations for 2nd stage management.

In order to better facilitate pushing efforts, the epidural anesthetic/analgesic was decreased after this tracing. The woman began to spontaneously push and open glottis (non-Valsalva) pushing was encouraged.

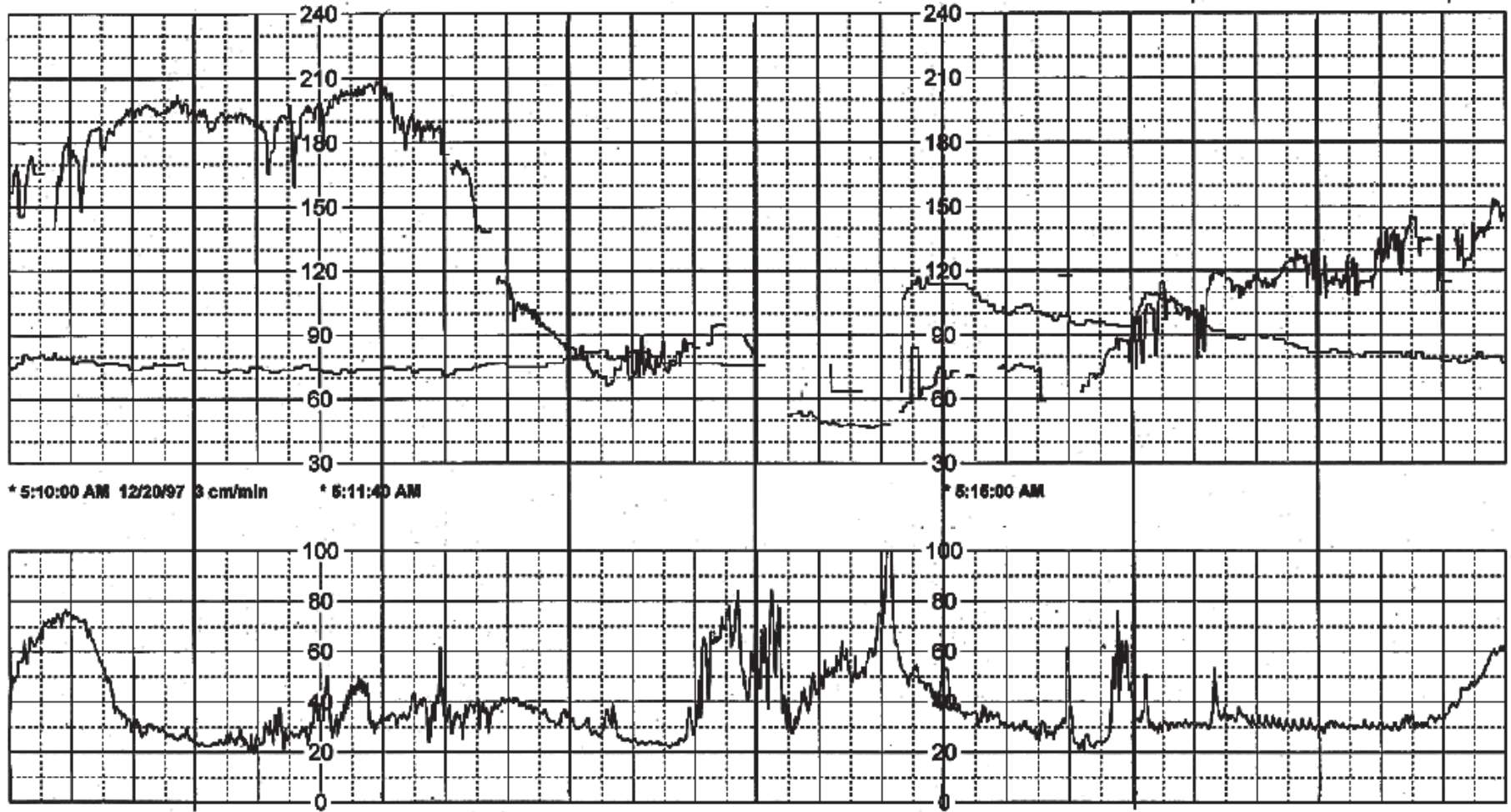
OUTCOME

In spite of maternal and uterine effort, no progress was found after three hours of second stage and a primary cesarean section was performed. A male infant weighing 7 pounds, 12 ounces (3515 gm) was born with Apgar scores of 5 and 8. The cord gases were consistent with respiratory acidosis that often is associated with variable decelerations, although no obvious cord occlusion was found at the time of birth.

Case 11



Case 11



TRACING INTERPRETATION

Baseline	Unable to determine
Variability	Unable to determine
Decelerations	Prolonged
Accelerations	Unable to determine
Is this tracing reactive?	Unable to determine
Contractions	
Frequency	Every 1 ½ -3 ½
Duration	greater than 110 seconds
Resting Tone	Palpation required (potential hypertonus)
Intensity	Palpation required
Reassuring components	
• None	
Non-reassuring components	
• Potential tachycardia	
• Prolonged deceleration	
Overall interpretation of the tracing:	Non-reassuring

INTERVENTIONS

- Vaginal exam
- Change maternal position
- Initiate IV fluid bolus
- Provide oxygen
- Notify provider
- Continue to monitor/watch
- Consider Brethine® (Terbutaline) if FHR does not reestablish normal baseline

RATIONALE

Oligohydramnios is a relatively uncommon complication of pregnancy. Often it is a subtle change, with the first clinical sign simply being a fetus whose position and outline is deceptively easy to palpate. In this case, oligohydramnios was not even suspected until the woman had her regular prenatal visit at 39 weeks and the size seemed small for dates with an easily palpable baby. It was confirmed by sonogram two days later. Arrangements were made for induction of labor and the following Monday, at which time she was at 40 weeks gestational age, induction was scheduled. Four hours prior to induction, she spontaneously began labor.

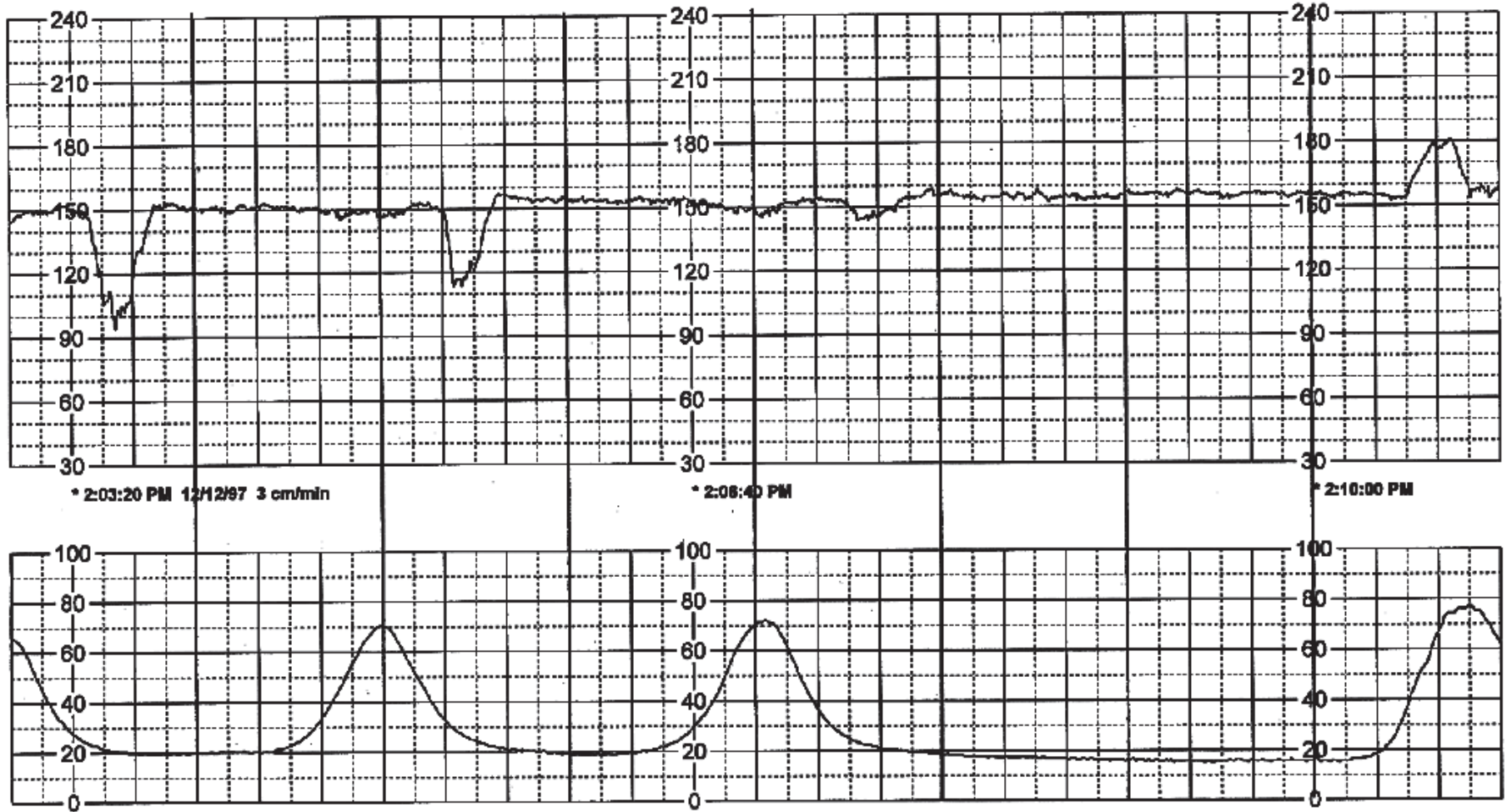
The tracing in question was obtained when the woman was in active labor. This tracing is problematic for several reasons. Tachycardia may be present, but due to the unclear baseline, it is difficult to ascertain. The deceleration is profound, making it difficult to determine its etiology although it could be related to uterine hypertonia. Regardless of origin, the prolongation of the deceleration necessitates prompt intervention. Palpation of the uterus can assess the presence or absence of hypertonicity. With a profound deceleration, it is also wise to perform a vaginal examination to assess if a cord can be palpated or if rapid fetal descent has occurred.

Sometimes such decelerations can be corrected by amnioinfusion. This procedure allows more fluid to reposition the fetus, potentially relieving pressure on the cord. This intervention could be a particularly valuable one in this case due to the oligohydramnios.

OUTCOME

Twenty-two minutes after the tracing was obtained, the woman delivered a 7 pound 9 ounce (3460 gm) female infant with Apgar scores of 9/9. The baby did well in the hospital and demonstrated no signs of neonatal sepsis.

Case 12



CASE 12 (INTERMEDIATE)
Worksheet

PATIENT DATA

Gravity/Parity G3P1
 Gestational Age 38 weeks by uncertain criteria

 Prenatal Care None
 Prenatal History Unremarkable according to woman

 Reason for Monitoring Unknown history
 Type of Monitoring Ultrasound, IUPC
 Intrapartum History Spontaneous onset of labor 90 minutes prior to monitor tracing

 Status of Membranes Intact
 Color NA
 Length of Time Ruptured NA

 Position/Presentation Vertex/OA

 Pelvic Examination
 Dilatation 4 cm
 Effacement 90%
 Station - 2
 Labor Status Early active labor

 Intrapartum Medications None

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

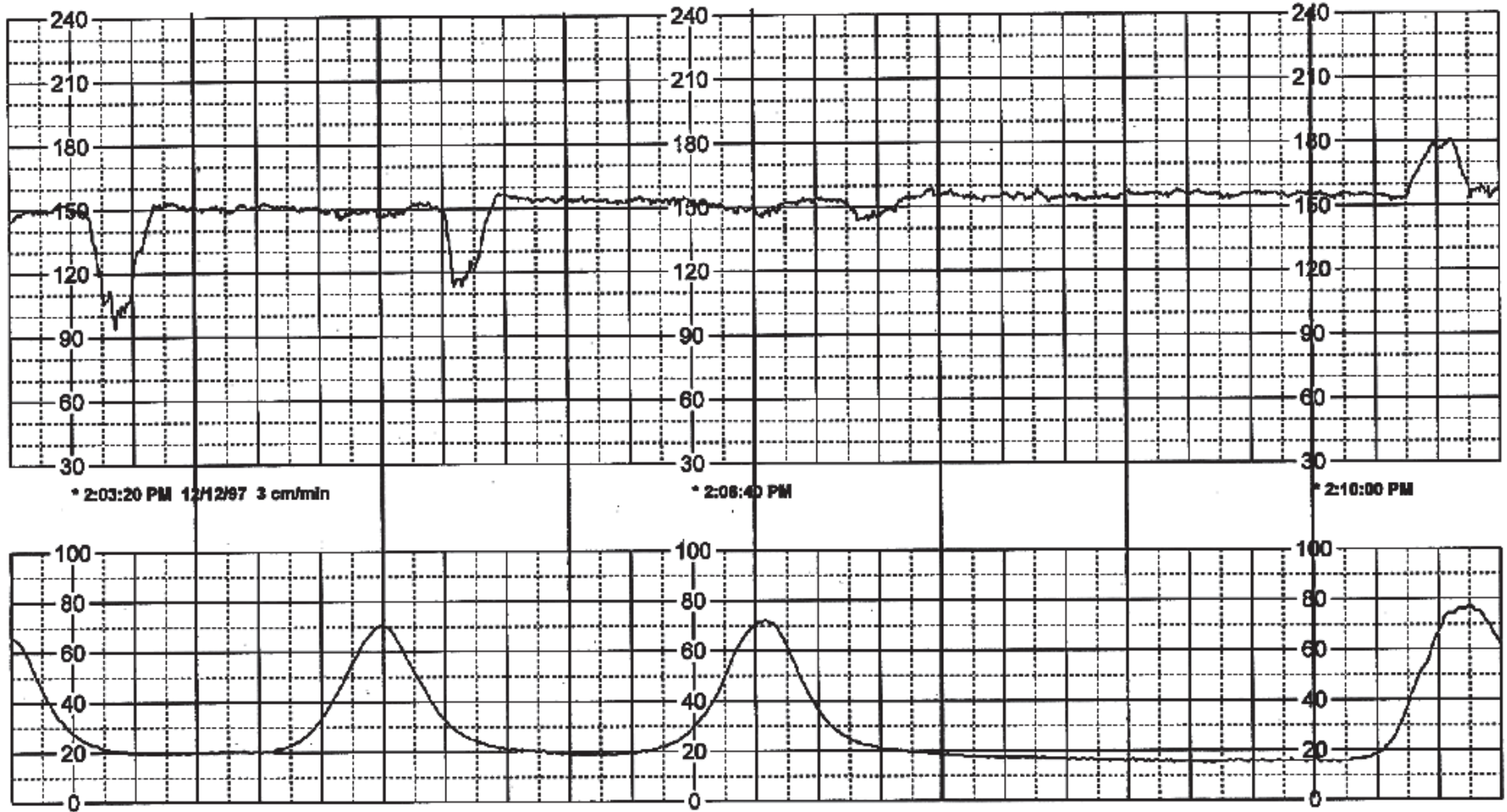
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 12



TRACING INTERPRETATION

Baseline 150 – 155 beats per minute
Variability Minimal
Decelerations Variable
Accelerations Yes (one)

Is this tracing reactive? No

Contractions
 Frequency Every 2 –3 ½ minutes
 Duration 60-70 seconds
 Resting Tone 15-20 mm Hg
 Intensity 70-75 mm Hg

Reassuring components

- Normal baseline
- Acceleration of 25 bpm above baseline for 20 seconds
- Abrupt onset and return of variable decelerations

Non-reassuring components

- Variability only minimal
- Uterine activity not very rhythmic

Overall interpretation of the tracing: Reassuring

INTERVENTIONS

- Change maternal position
- Closely observe rhythmicity of uterine contractions
- Closely observe variability

RATIONALE

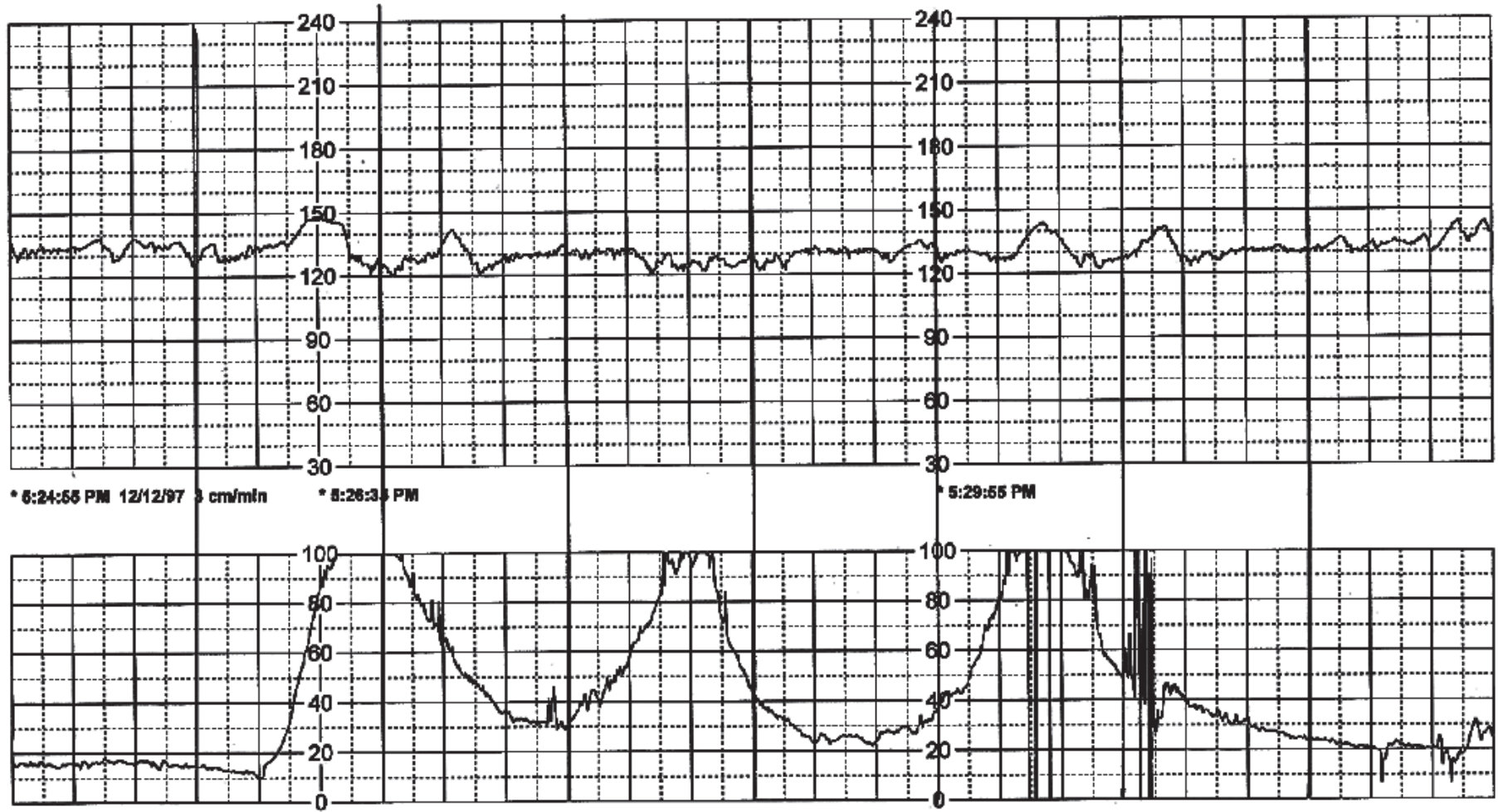
Prenatal care allows the maternal fetal dyad to be continually assessed. It allows some conditions like anemia to be diagnosed and treated early, prior to delivery. Although prenatal care is heavily publicized in the media, there is a small but significant number of women who do not obtain any care, or only obtain care in the last few weeks of pregnancy. For some, the obstacle to prenatal care may be an issue of economics, for others accessibility. Others may have a false sense of security since previous pregnancies have been uncomplicated. In this case, the woman had experienced an uncomplicated previous pregnancy and birth. She came to the hospital in labor at term (at approximately 38 gestational weeks by an uncertain last menstrual period).

Variable decelerations are apparent on this tracing. One acceleration proximate to the last contraction can be seen. The variability is minimal and perhaps could be better assessed with a fetal spiral electrode as labor progresses. The erratic spacing between contractions suggests that a rhythmic, regular frequency may be lacking, perhaps due to a dysfunctional pattern or even secondary to the use of pharmaceutical agents. In any case, it should be closely monitored to ascertain if augmentation will be required.

OUTCOME

After repositioning, the decelerations occurred only occasionally. Ninety minutes after this tracing was obtained, she delivered a female infant weighing 6 pounds, 13 ounces (3105 gm). There was a tight nuchal cord once around the neck necessitating clamping and cutting before birth of the body. Apgar scores were 6 and 9 and mother and daughter did well.

Case 13



CASE 13 (BASIC)
Worksheet

PATIENT DATA

Gravidity/Parity G5P0
 Gestational Age 39 weeks

Prenatal Care According to standard
 Prenatal History 4 previous spontaneous abortions,
 all in first trimester; Intrauterine
 growth restriction identified
 yesterday at regular prenatal visit

Reason for Monitoring IUGR
 Type of Monitoring FSE and tocotransducer
 Intrapartum History Induction of labor begun with
 oxytocin 6 hours before

Status of Membranes Spontaneous rupture
 Color Clear
 Length of Time Ruptured 1 hour

Position/Presentation Vertex/OA

Pelvic Examination
 Dilatation 8 cm
 Effacement 100%
 Station 0

Labor Status Active

Intrapartum Medications Oxytocin at 12 mU/min,
 Continuous epidural

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

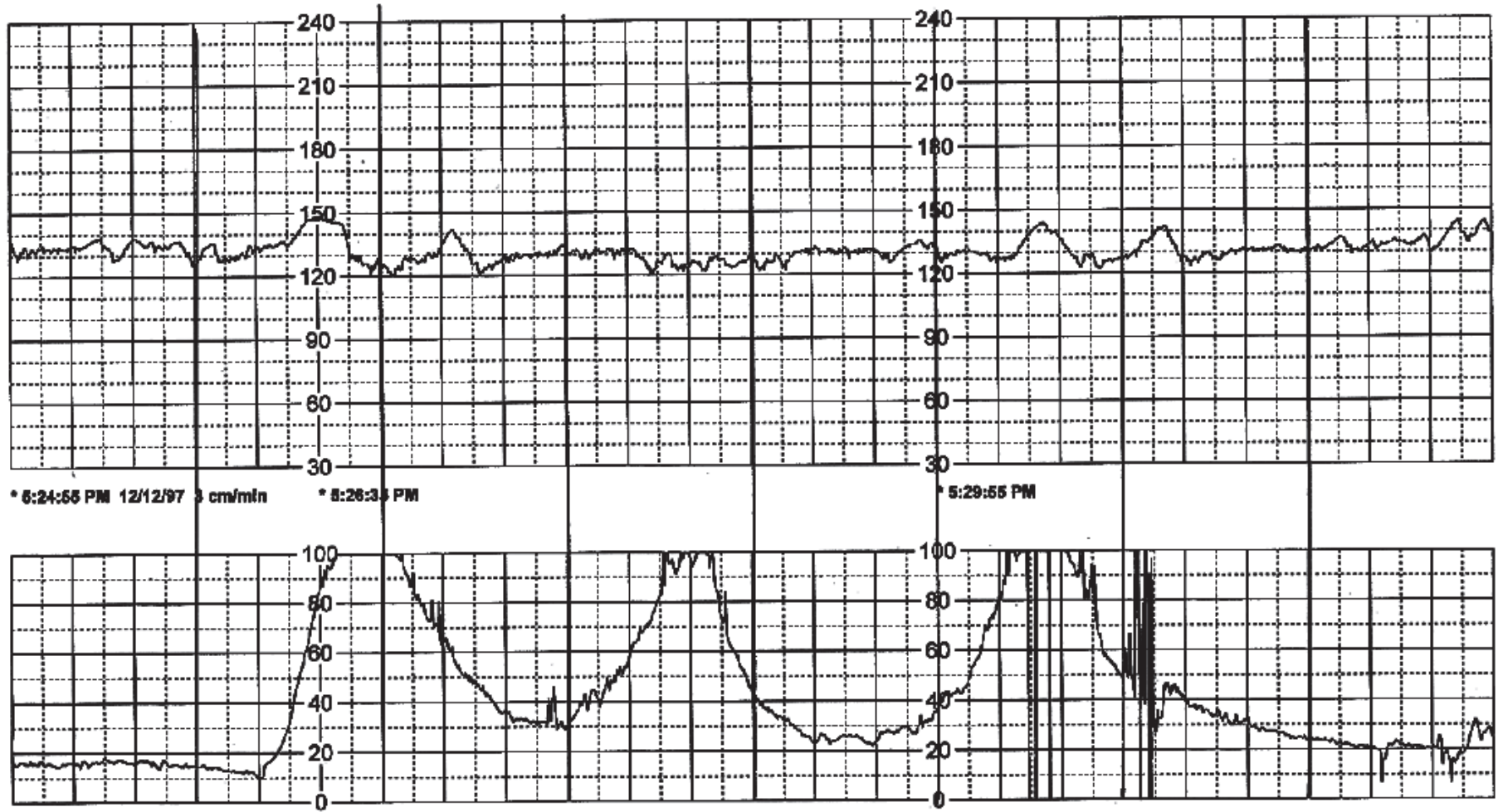
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 13



TRACING INTERPRETATION

Baseline	125 – 135 beats per minute
Variability	Moderate
Decelerations	None
Accelerations	Yes
Is this tracing reactive?	Yes
Contractions	
Frequency	Every 1 ½ minutes
Duration	Hypertonic, approximately 80-110 seconds
Resting Tone	Palpation required, suspect that uterus does not relax between contractions
Intensity	Palpation required
Reassuring components	
• Moderate variability	
• Accelerations	
• Reactivity	
• Baseline is normal	
Non-reassuring components	
• Uterine hypertonus	
Overall interpretation of the tracing:	Reassuring

INTERVENTIIONS

- Decrease oxytocin and titrate to obtain rhythmic pattern of contractions every 2 – 3 minutes
- Palpate uterus to determine resting tone

RATIONALE

Oxytocin is one of the most commonly used drugs in intrapartum, often for augmentation or induction of labor. The agent is relatively safe when used cautiously. It is an antidiuretic only in large amounts and the association with neonatal hyperbilirubinemia is likely to be relatively weak. The most profound complication is that of uterine hyperstimulation. Uterine hyperstimulation directly increases the risk of uterine rupture and even fetal death. This tracing is suggestive of hyperstimulation and hypertonus.

This tracing indicated difficulty, but does not provide a clear diagnosis. The nurse needs to assess the uterus because of the suggestion of hyperstimulation. Manual palpation can be of benefit. Oxytocin administration must be decreased if hypertonia is present. Oxytocin has a relatively short half life and endogenously occurs in a pulsatile fashion. Titrating the administration is needed to obtain a good pattern without the potential fetal and maternal adverse effects associated with hyperstimulation.

OUTCOME

In this situation, oxytocin was decreased and the contractions not only continued, but also became more rhythmic. Within two hours, a 4 pound, 14 ounce (2185 gm) male infant with Apgar scores of 9/9 was born via the aid of a vacuum extractor.

CASE 14 (BASIC)
Worksheet

PATIENT DATA

Gravidity/Parity G5P3
Gestational Age 41 weeks

Prenatal Care According to standard
Prenatal History Oligohydramnios confirmed by
sonogram yesterday at regular
prenatal visit

Reason for Monitoring Oligohydramnios, plan to initiate
induction of labor

Type of Monitoring Ultrasound, tocotransducer
Intrapartum History Induction of labor with oxytocin
ready to be started

Status of Membranes Intact
Color NA
Length of Time Ruptured NA

Position/Presentation Vertex/probably LOA

Pelvic Examination
Dilatation 2 cm
Effacement 50%
Station - 2

Labor Status Not in labor, ready to initiate
induction

Intrapartum Medications None

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
Duration _____
Resting Tone _____
Intensity _____

What are the reassuring components?

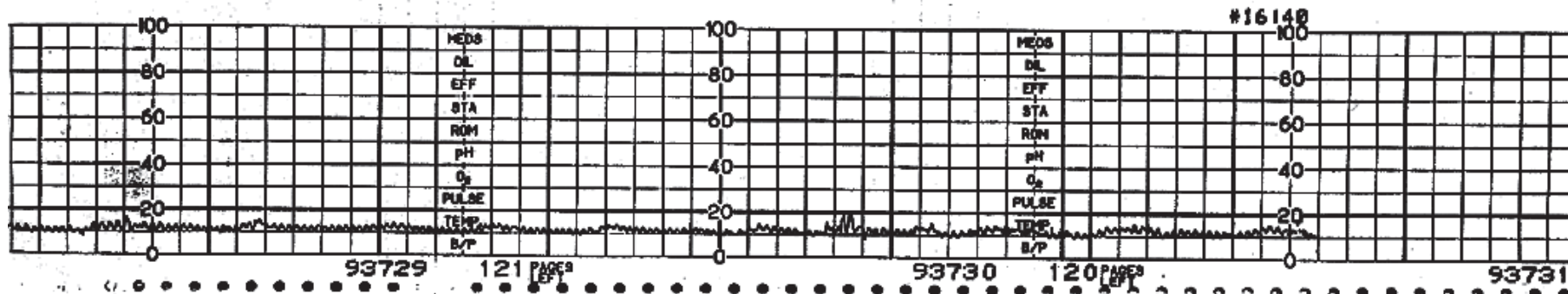
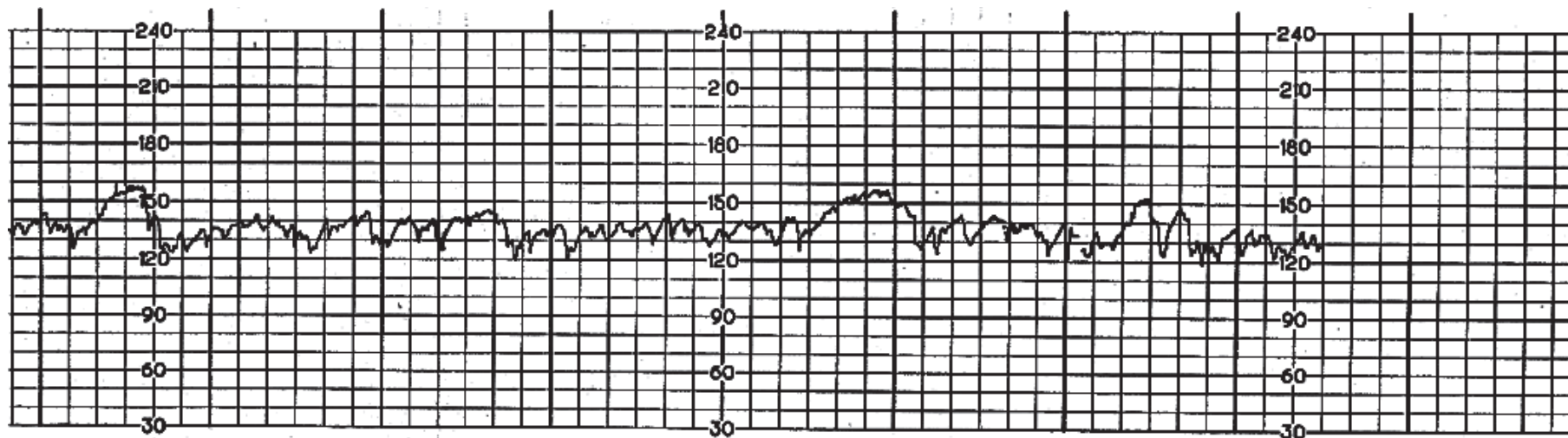
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 14



TRACING INTERPRETATION

Baseline 130 – 140 beats per minute
Variability Moderate
Decelerations None
Accelerations Yes

Is this tracing reactive? Yes

Contractions None
 Frequency NA
 Duration NA
 Resting Tone NA
 Intensity NA

Reassuring components

- Moderate variability
- Reactivity
- Normal baseline

Non-reassuring components

- None

Overall interpretation of the tracing: Reassuring

INTERVENTIONS

- Begin induction

RATIONALE

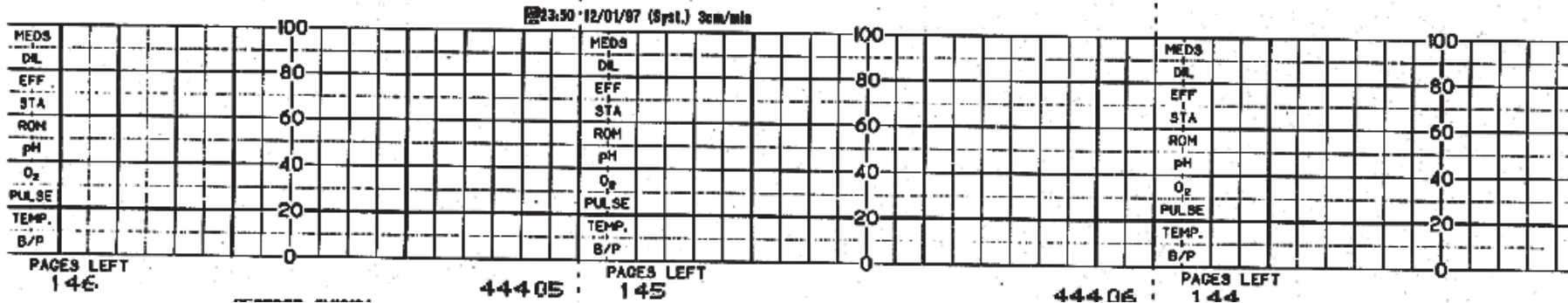
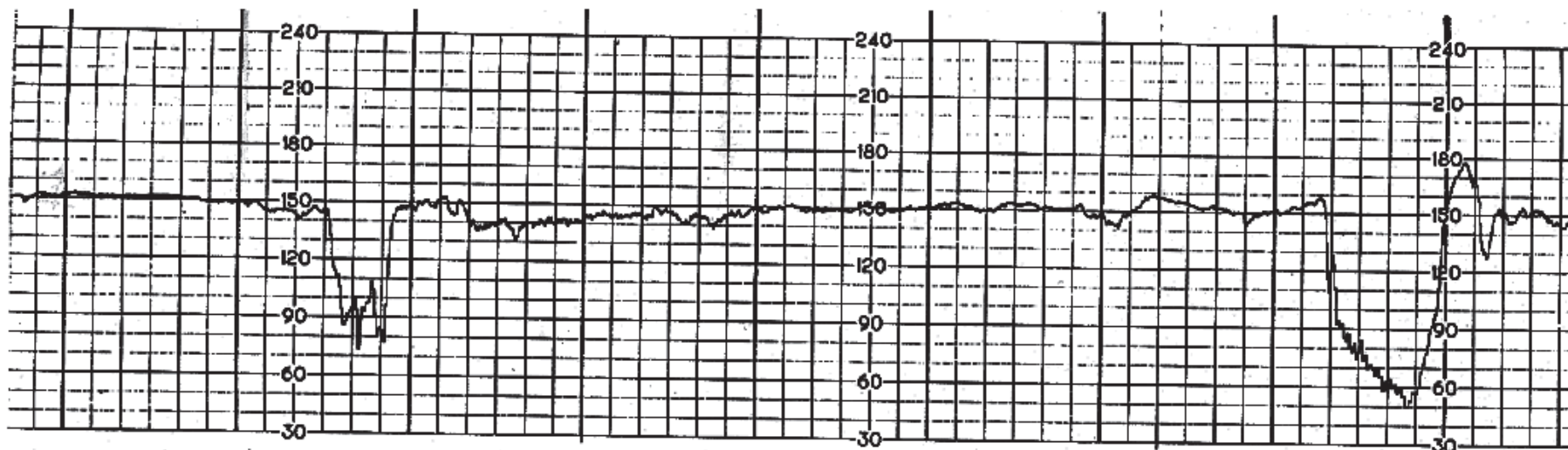
Although postdates is a term usually reserved for pregnancies at 42 weeks or beyond, it is now common in many parts of the United States to induce labor after 41 gestational weeks in an effort to reduce the risks associated with a post term infant. In this situation, not only was pregnancy after 41 weeks, but a complication associated with postdates, oligohydramnios, had been diagnosed. Thus, there was greater urgency for the induction.

This tracing was obtained as induction of labor was being initiated. In spite of concerns regarding this pregnancy, the professional should be reassured at least by the variability, stable baseline and lack of decelerations on this tracing. This was a reactive NST. Nonstress testing is discussed at length in Tucker (2000) on pages 188 – 193.

OUTCOME

Two hours after the oxytocin induction was begun, membranes ruptured spontaneously and the cervix was found to be dilated at 6 cm. One hour later the woman spontaneously delivered a 5 pound, 9 ounce (2580 gm) male infant with Apgar scores of 8 and 9. The size of the infant suggested some possible growth restriction, but the baby did well and was discharged with his mother at 48 hours post delivery.

Case 15



PATIENT DATA

ASSESSMENT AND INTERPRETATION

Gravidity/Parity G6P5
 Gestational Age 40 weeks

Prenatal Care According to standard
 Prenatal History Woman was 47 years old with unplanned pregnancy. All previous pregnancies were vaginal births without complications. Last infant born 11 years before.

Reason for Monitoring Advanced maternal age; dysfunctional labor.

Type of Monitoring FSE. Tocotransducer was removed during this tracing since abdomen was being prepared for surgery

Intrapartum History Spontaneous labor began 10 hours ago, unchanged pelvic findings for last three hours

Status of Membranes Amniotomy
 Color Clear
 Length of Time Ruptured 8 hours

Position/Presentation Vertex, OT

Pelvic Examination
 Dilatation 6 cm
 Effacement 100%
 Station - 2

Labor Status Active, arrest of progress

Intrapartum Medications Continuous epidural

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

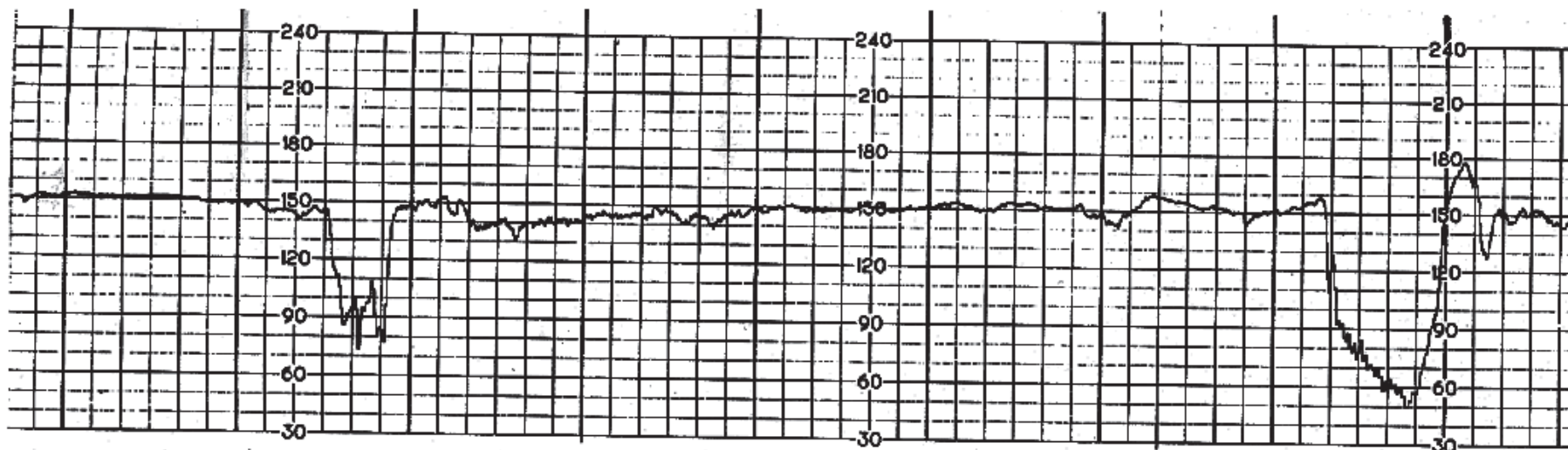
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 15



23:30 12/01/87 (Syst.) 3cm/min

MEDS
DL
EFF
STA
ROM
pH
O₂
PULSE
TEMP.
B/P

100
80
60
40
20
0

MEDS
DL
EFF
STA
ROM
pH
O₂
PULSE
TEMP.
B/P

100
80
60
40
20
0

MEDS
DL
EFF
STA
ROM
pH
O₂
PULSE
TEMP.
B/P

100
80
60
40
20
0

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146

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145

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144

CASE 15 (ADVANCED)

Answers

TRACING INTERPRETATION

Baseline 150 – 155 beats per minute
Variability Minimal
Decelerations Variable
Accelerations No

Is this tracing reactive? No

Contractions
 Frequency Palpation required
 Duration Palpation required
 Resting Tone Palpation required
 Intensity Palpation required

Reassuring components

- Stable baseline
- First variable demonstrated an abrupt return to baseline

Non-reassuring components

- Second variable decelerated to 50 bpm and lasted longer

Overall interpretation of the tracing: Non-reassuring

INTERVENTIONS

- Change maternal position
- Initiate IV fluid bolus
- Provide oxygen
- Notify provider
- Continue to closely monitor

RATIONALE

It has been suggested that the only age group less likely to use contraception than adolescents are women over the age of 40. Some mature women think that decreased fecundity associated with age translates to infertility. Other mature women find themselves with birth control choices limited by development of conditions such as hypertension or life styles not conducive to use of oral contraceptives or IUDs. As demonstrated with this case, women in their 40s can and do get pregnant. This 47 year old woman found herself pregnant with her sixth child. At the time of the tracing, she had been in labor for 10 hours. All previous deliveries had been vaginal and none lasted more than 8 hours in total. Failure to progress was diagnosed since her cervix was unchanged for three hours in spite of regular, rhythmic contractions of good quality.

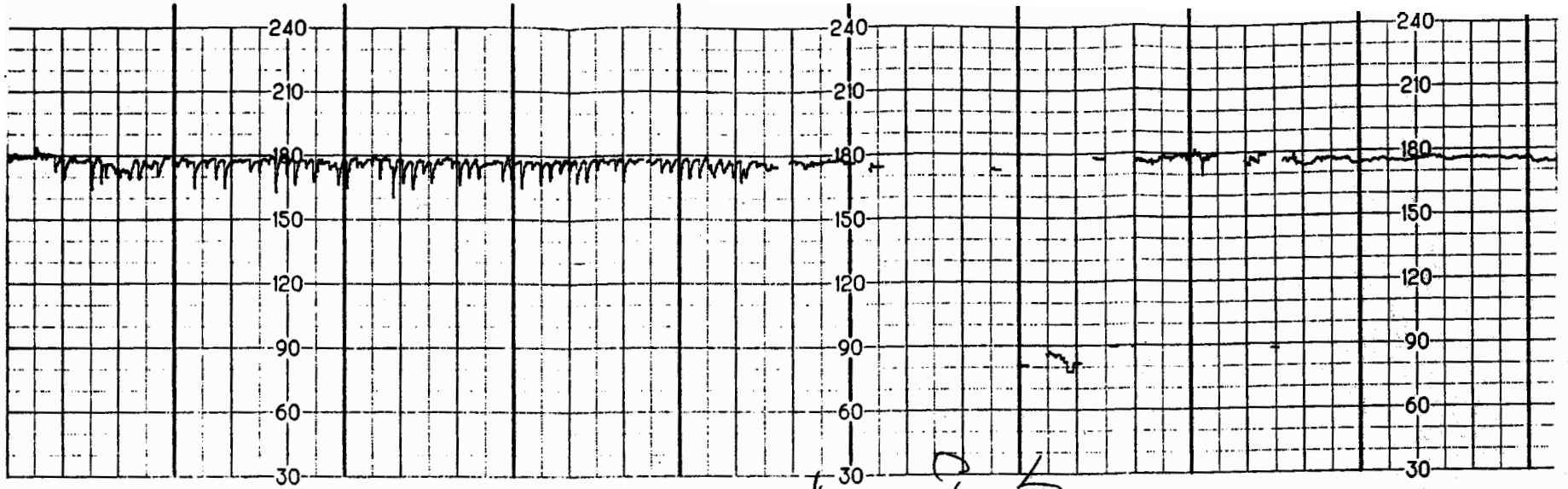
It is difficult to determine a cause of failure to progress, especially when uterine hypotonia is ruled out. Fetal position, size, maternal soft tissue and even maternal psyche may play a role. In this case the decision for an operative birth was made and the woman was taken to the operating room. As is common, the spiral electrode continued to monitor the fetus, the tocotransducer was removed in order to allow abdominal access.

Upon assessment of the tracing, decelerations were apparent. The second deceleration was accompanied by an acceleration. Note that this acceleration is not a classic overshoot. Overshoots usually are an increase of 20 beats per minute and last 20 seconds or more (Tucker, p 115, AWHONN). However, the nurse should continue to assess the tracing carefully and be able to recognize overshoots should they exist. Overshoots usually follow severe variable deceleration (s) and often indicate significant hypoxic stress. Repositioning is an important action for the nurse to take, especially if the woman is supine on the operating room table. Some providers might also perform a pelvic examination to rule out cord or impending delivery. Amnioinfusion could be considered in similar cases if the variability were better and labor progressing normally.

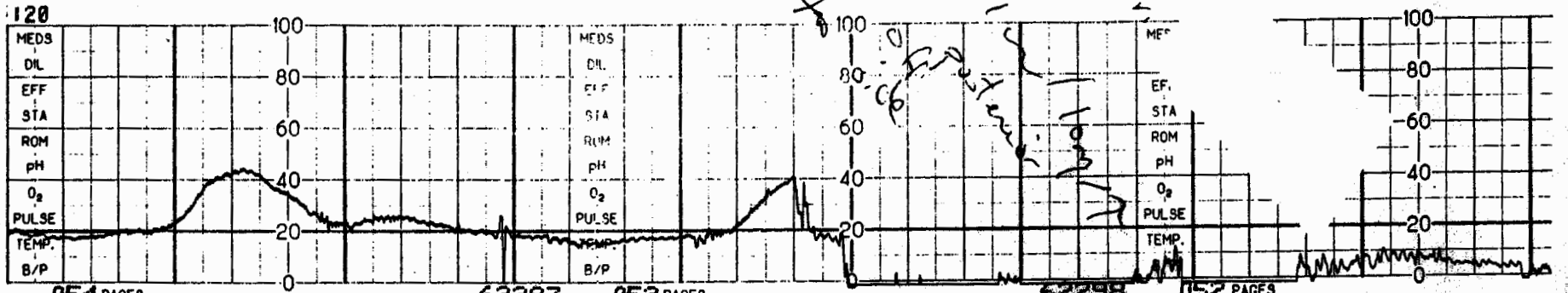
OUTCOME

The cesarean birth was delayed while the fetus continued to be monitored. In this situation, treatment with repositioning, fluid bolus and oxygen were performed. The fetus stabilized prior to the cesarean section and within twenty minutes a female baby weighing 7 pounds 11 ounces (3500 gm) with Apgar scores of 8/9 was born.

Case 16



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CASE 16 (INTERMEDIATE)
Worksheet

PATIENT DATA

Gravidity/Parity G1P0

Gestational Age 37 weeks

Prenatal Care According to standard
Prenatal History Unremarkable

Reason for Monitoring Breech presentation, presents for external version

Type of Monitoring Ultrasound, tocotransducer
Intrapartum History Not in labor

Status of Membranes Intact
Color N/A
Length of Time Ruptured N/A

Position/Presentation Frank breech changed to vertex

Pelvic Examination
Dilatation 1 cm
Effacement Thick
Station Ballotable

Labor Status Not in labor, irritable uterine pattern

Intrapartum Medications Brethine® (terbutaline)
0.250 mg 30 minutes prior to version

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
Frequency _____
Duration _____
Resting Tone _____
Intensity _____

What are the reassuring components?

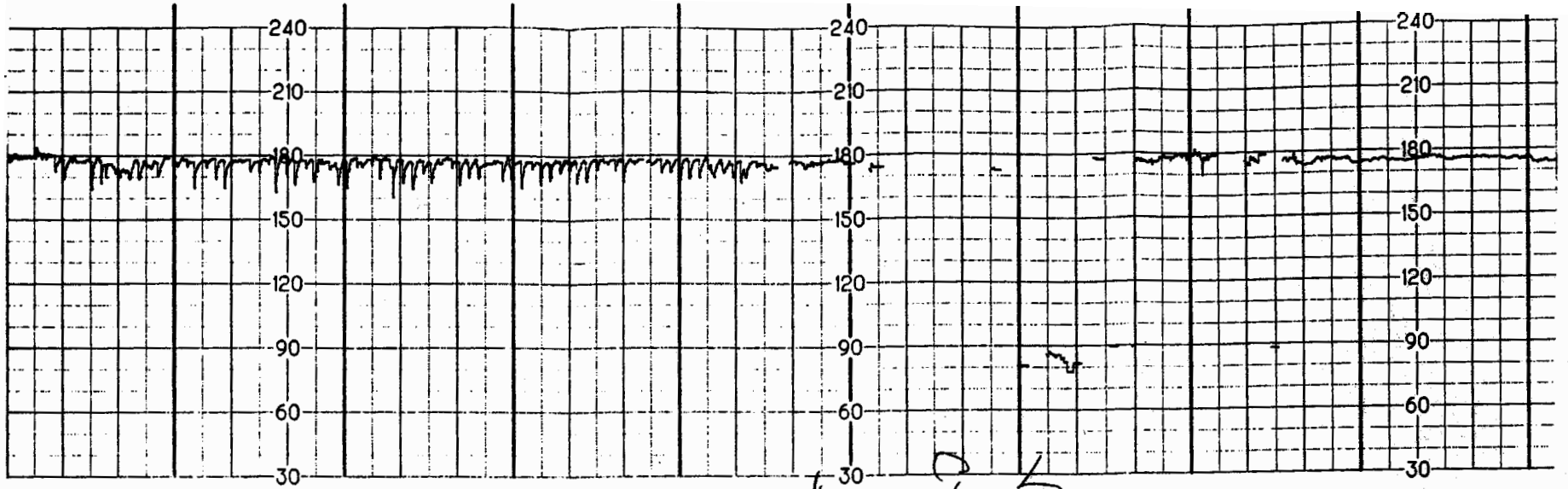
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

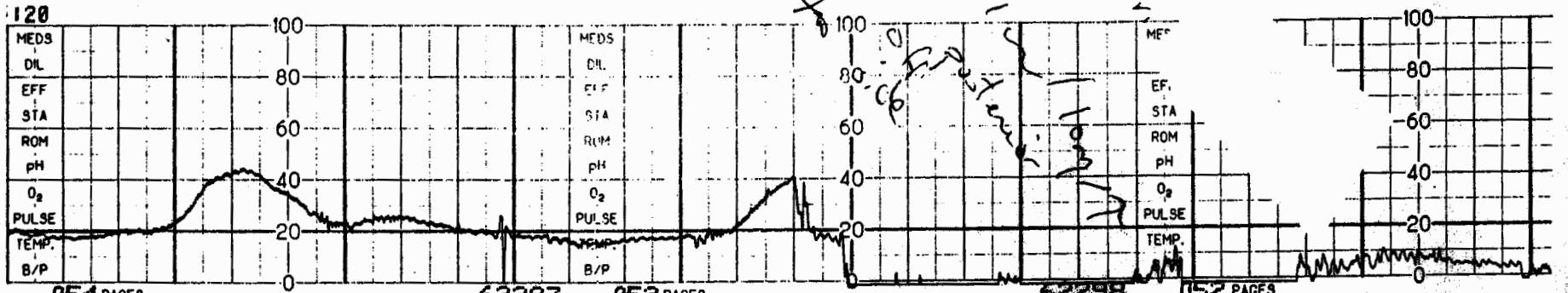
What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 16



Handwritten notes:
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TRACING INTERPRETATION

Baseline	170-180 beats per minute, suspect dysrhythmia (would confirm by continuing tracing)
Variability	Moderate to minimal
Decelerations	Unable to determine
Accelerations	None
Is this tracing reactive?	No
Contractions	
Frequency	Irritable
Duration	30 – 50 seconds
Resting Tone	Palpation required
Intensity	Palpation required
Reassuring components	
• None	
Non-reassuring components	
• Fetal tachycardia	
• Absent variability	
Overall interpretation of the tracing:	Non-reassuring

INTERVENTIONS

- Change maternal position
- Observe for vaginal bleeding and signs/symptoms of uterine rupture and/or placental abruption
- Initiate IV fluid bolus
- Administer oxygen
- Notify provider
- Consider readministration of tocolytic

RATIONALE

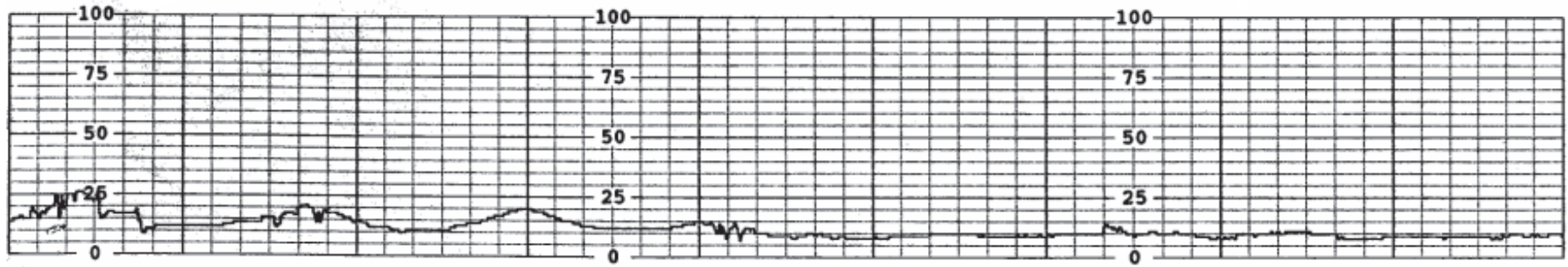
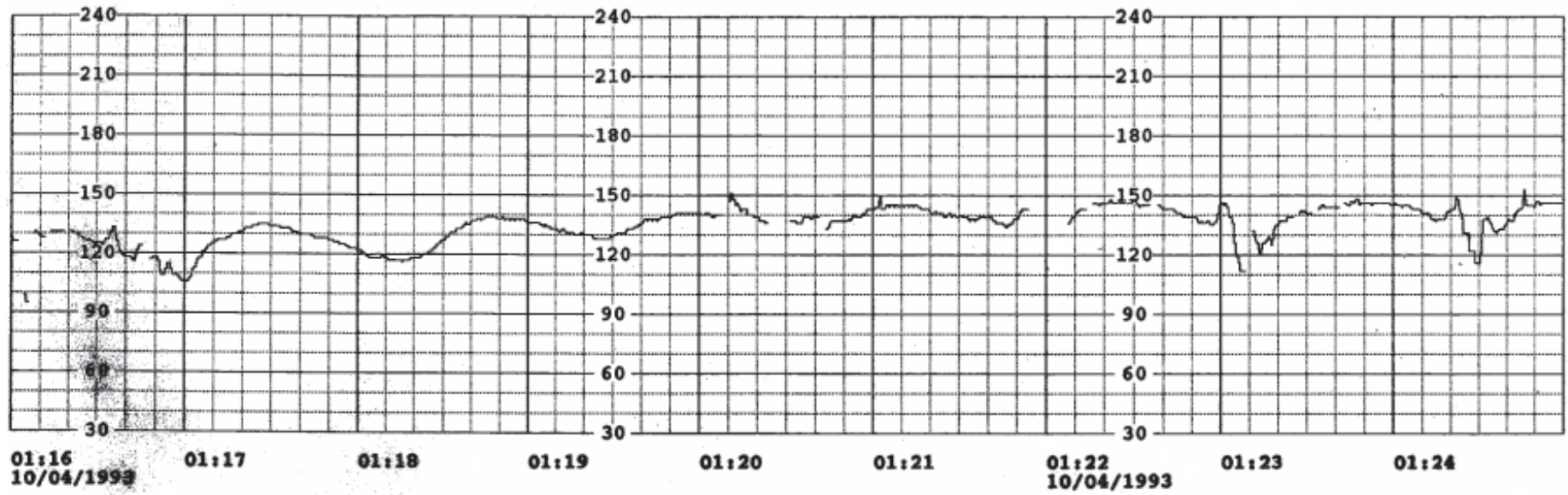
Today it is unusual for a primigravida with a breech presentation to have a vaginal birth. However, external, or cephalic versions can move the fetus into a vertex presentation in order to make a vaginal birth more likely. When done too early, the fetus is more likely to again assume a breech presentation. Therefore, it is common to attempt the version at 36-37 gestational weeks or more. Uterine quiescence usually is obtained by use of a tocolytic prophylactically, such as the beta adrenergic agent, terbutaline. Although terbutaline has been associated with an increase in fetal heart rate baseline, it is unlikely that it is responsible for a tachycardia of this degree nor a dysrhythmia. Ultrasonic evaluation of location of placenta, adequacy of fluid volume etc. helps the clinician move the fetus in the path of least resistance.

However, external versions are not without risk. Uterine rupture and placental abruption can occur. In this case, the fetal monitoring tracing suggests a problem and a uteroplacental injury must be considered due to the version. Although the tracing may reflect a temporary hypoxic episode, the nurse should continue carefully to watch the tracing as the indicated interventions are implemented. Additional doses of tocolytics may be withheld until it is ascertained if delivery should be promoted, rather than quelled. The woman and her family should be supported and anxiety decreased as much as feasible since if an abruption is present, maternal tachycardia will only increase the bleeding.

OUTCOME

Shortly after this tracing, late decelerations became apparent and there was no resolution in tachycardia or dysrhythmia. A female infant weighing 6 pounds, 5 ounces (2860 grams) was born with apgars 7/9 by a Cesarean Section. The placenta was found to have a 40% abruption. It may be of interest that one week later, the woman's twin sister presented at 37 weeks with a frank breech. Due to low amniotic fluid volume (AFI), a version was not attempted and a Cesarean Section was performed.

Case 17



CASE 17 (INTERMEDIATE)
Worksheet

PATIENT DATA

Gravidity/Parity G6P2
 Gestational Age 32 weeks

Prenatal Care First prenatal visit at 26 weeks, 3 visits to date

Prenatal History Presents 6 hours after she "ran into a door"; now stating she has cramping, decreased fetal movement, but no vaginal bleeding

Reason for Monitoring Rule out preterm labor
 Type of Monitoring Ultrasound, tocotransducer
 Intrapartum History Cramping for 4 hours

Status of Membranes Intact
 Color N/A
 Length of Time Ruptured N/A

Position/Presentation Vertex

Pelvic Examination
 Dilatation 1 cm
 Effacement 50%
 Station -3

Labor Status Irritable pattern, rule out preterm labor

Intrapartum Medications None

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

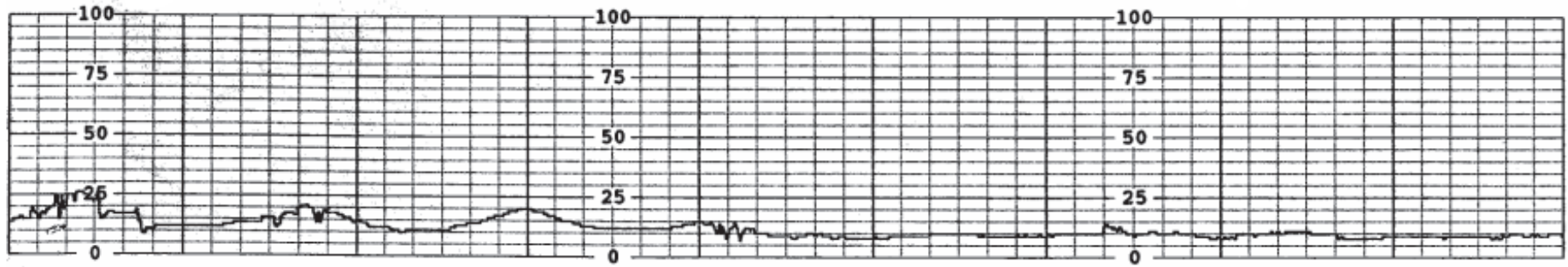
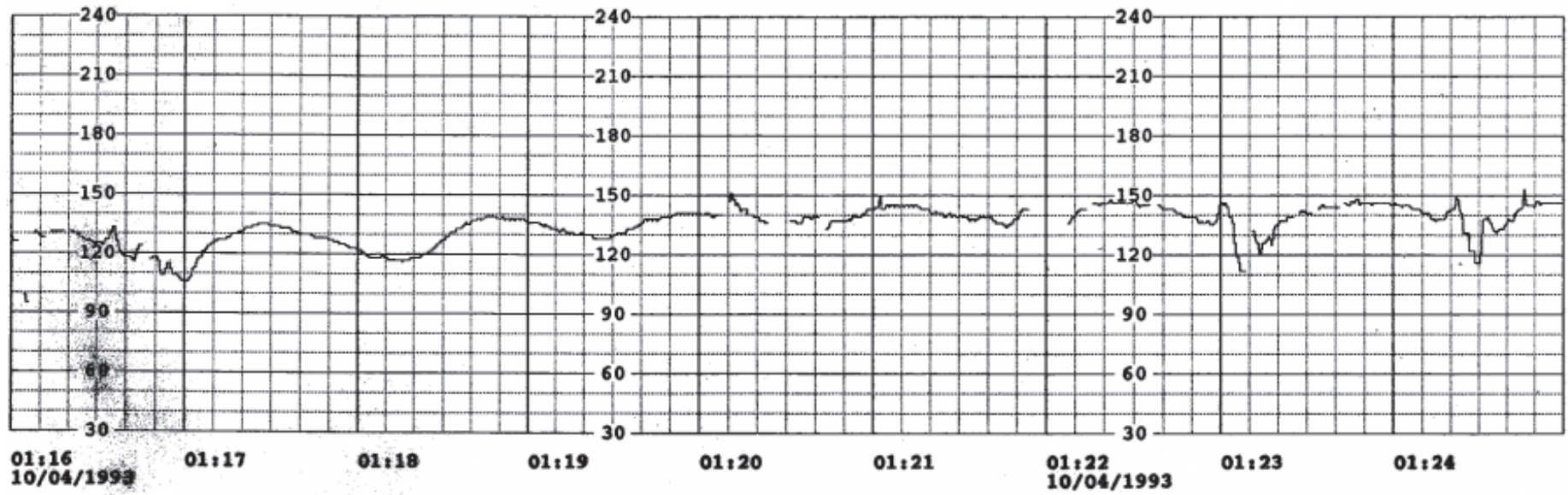
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 17



CASE 17
Answers

TRACING INTERPRETATION

Baseline	Appears to be 140-145, but difficult to determine due to frequent decelerations
Variability	Minimal to absent
Decelerations	Late
Accelerations	None
Is this tracing reactive?	No
Contractions	
Frequency	Irritable
Duration	Unable to determine
Resting Tone	Palpation required
Intensity	Palpation required
Reassuring components	
• None	
Non-reassuring components	
• Minimal to absent variability	
• Repetitive late decelerations	
• Documentation in nurse's notes that woman is "very uncomfortable and unable to relax in between contractions."	
Overall interpretation of the tracing:	Non-reassuring

INTERVENTIONS

- Change maternal position
- Initiate IV fluid bolus
- Administer oxygen
- Notify provider
- Prepare for possible cesarean
- Evaluate for signs of domestic violence

RATIONALE

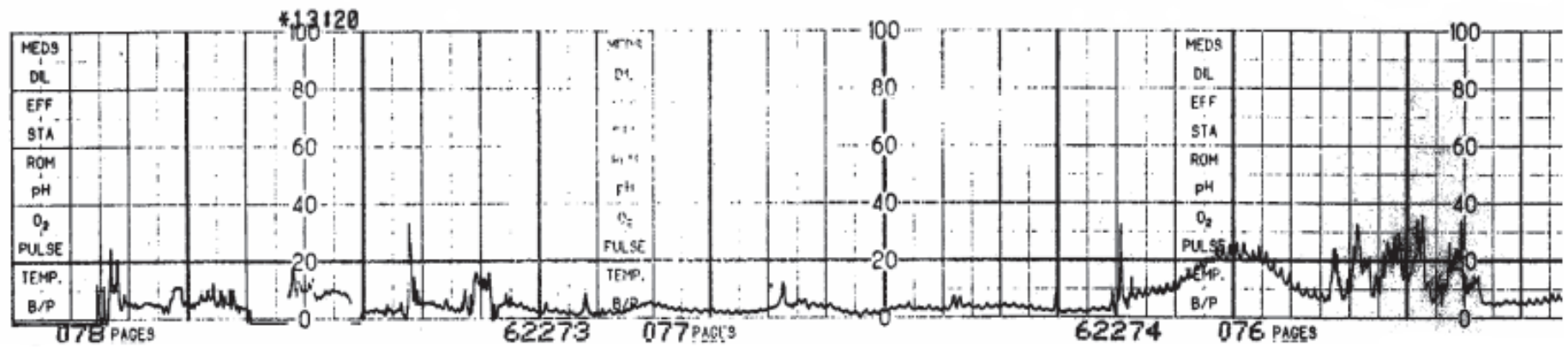
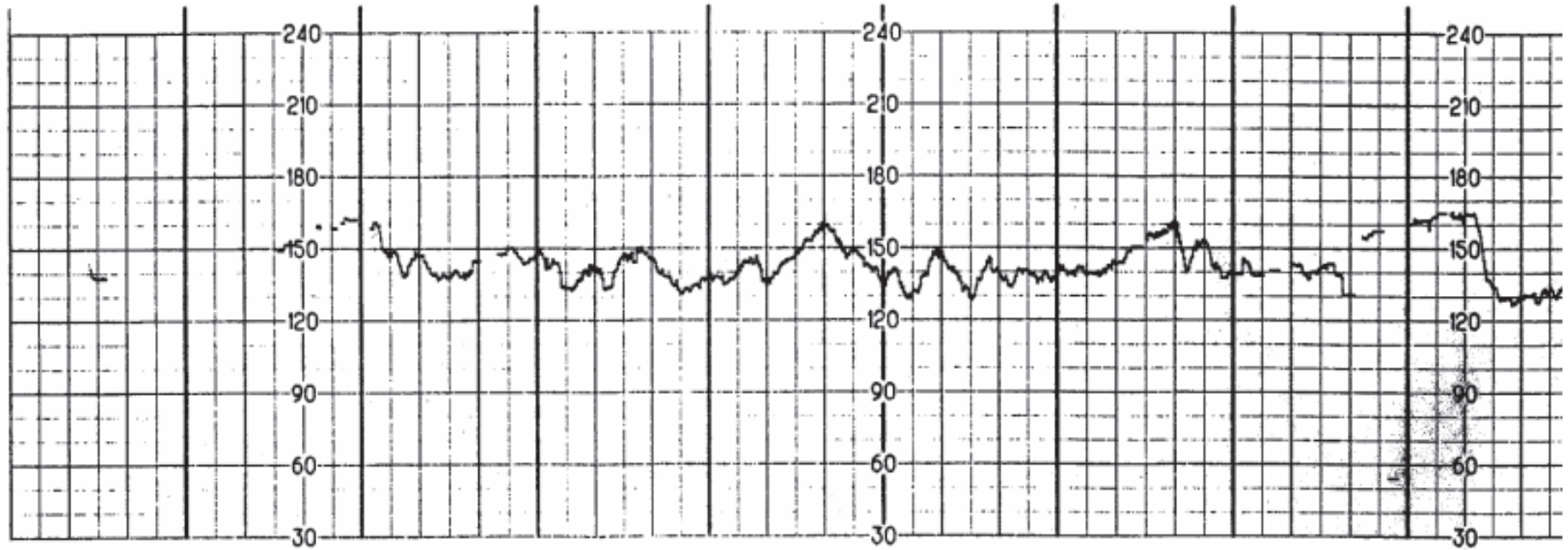
Domestic violence has been estimated to occur in almost 15% of all pregnant women, regardless of age, nationality or socioeconomic status. In some cases of domestic violence, a woman may experience battering specifically on her pregnant abdomen, increasing the risk of fetal injury and placental abruption. In this case, social service already had been requested to see the woman because of a high index of suspicion for abuse since the history of "running into a door" seemed vague and inconsistent with the physical findings.

The nurse caring for this woman was inexperienced and did not recognize the ominous nature of the fetal/uterine pattern or give appropriate credence to the assessment that the woman was "very uncomfortable and unable to relax in between contractions." Assessment of the abdomen at that point might have revealed a board like abdomen that can occur with abruptions. Fortunately, another nurse, observing the tracing via a central monitor, initiated the sequence of interventions.

OUTCOME

Thirty-eight minutes after this tracing, a male fetus weighing 7 pounds, 3 ounces (3250 grams) was delivered by Cesarean Section. In spite of aggressive resuscitative efforts, the baby had apgars 0/0/0. An almost complete placental abruption was noted. The woman's recovery was complicated by a hematocrit of 24% in comparison to the 38% when admitted to labor and delivery unit. She had profound fatigue and an unexpected episode of syncope that resolved after receiving two units of whole blood.

Case 18



CASE 18 (BASIC)
Worksheet

PATIENT DATA

Gravidity/Parity G1P0
Gestational Age 41 weeks (2 days before 42 weeks)

Prenatal Care According to standard
Prenatal History Unremarkable

Reason for Monitoring NST for postdates
Type of Monitoring Ultrasound, tocotransducer
Intrapartum History Not in labor

Status of Membranes Intact
Color N/A
Length of Time Ruptured N/A

Position/Presentation Vertex

Pelvic Examination
Dilatation 4 cm
Effacement 50%
Station -1
Labor Status Irregular uterine contractions

Intrapartum Medications None

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
Duration _____
Resting Tone _____
Intensity _____

What are the reassuring components?

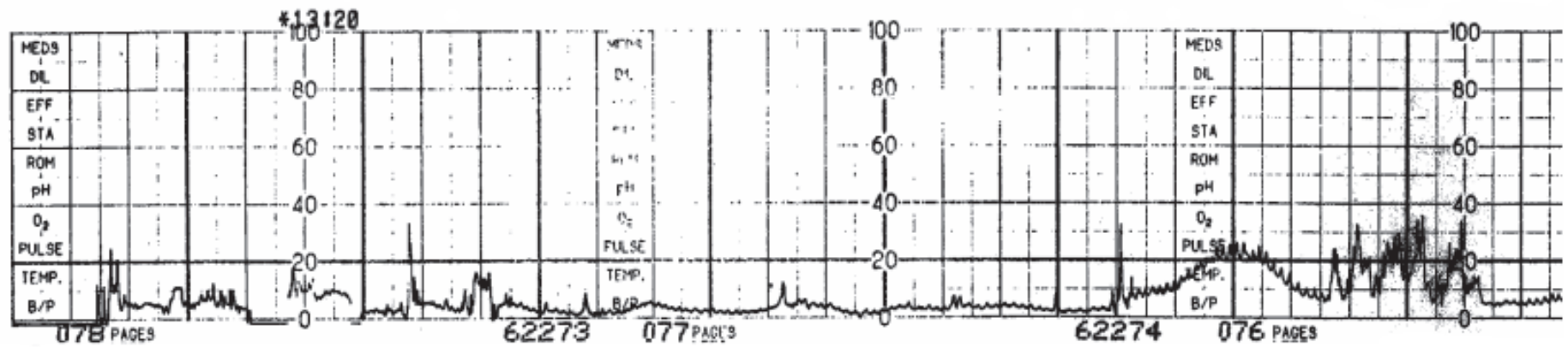
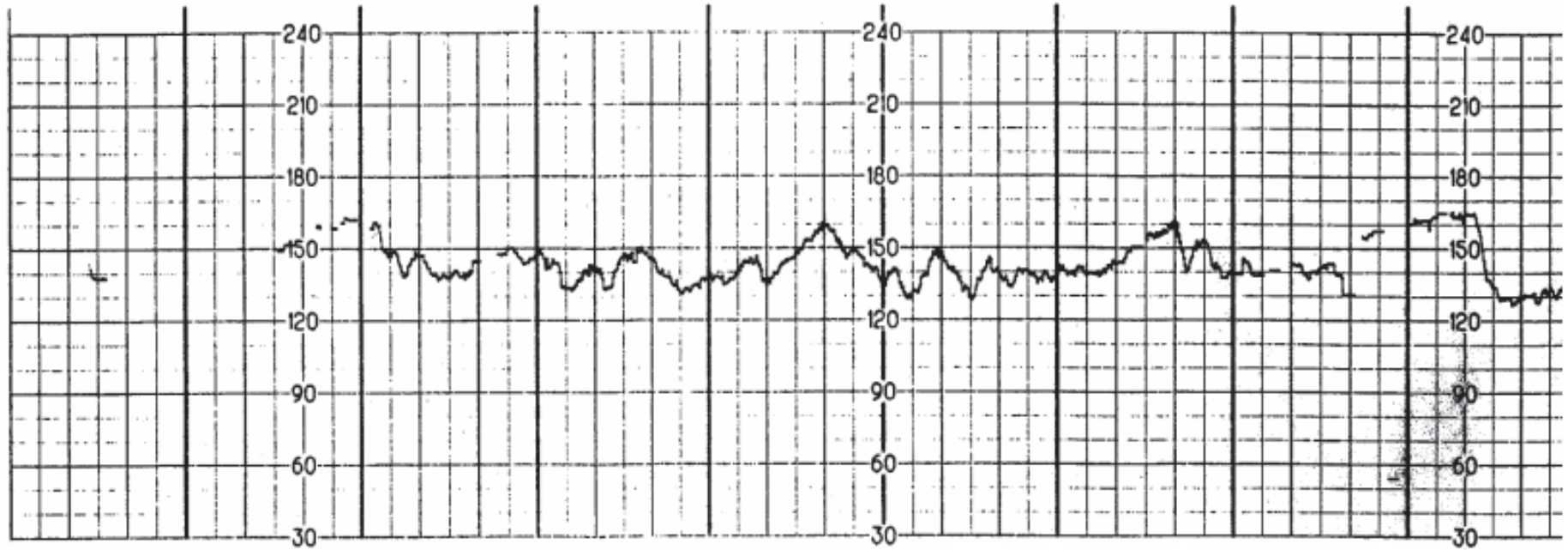
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 18



CASE 18
Answers

TRACING INTERPRETATION

Baseline	135 – 150 beats per minute
Variability	Moderate
Decelerations	None
Accelerations	Yes
Is this tracing reactive?	Yes
Contractions	
Frequency	Irregular
Duration	Unable to determine
Resting Tone	Palpation required
Intensity	Palpation required
Reassuring components	
• Normal baseline rate	
• Reactivity	
• Moderate variability	
Non-reassuring components	
• None	
Overall interpretation of the tracing:	Reassuring

INTERVENTIONS

- Readjust tocotransducer for improved evaluation of uterine activity
- Evaluate for possible induction

RATIONALE

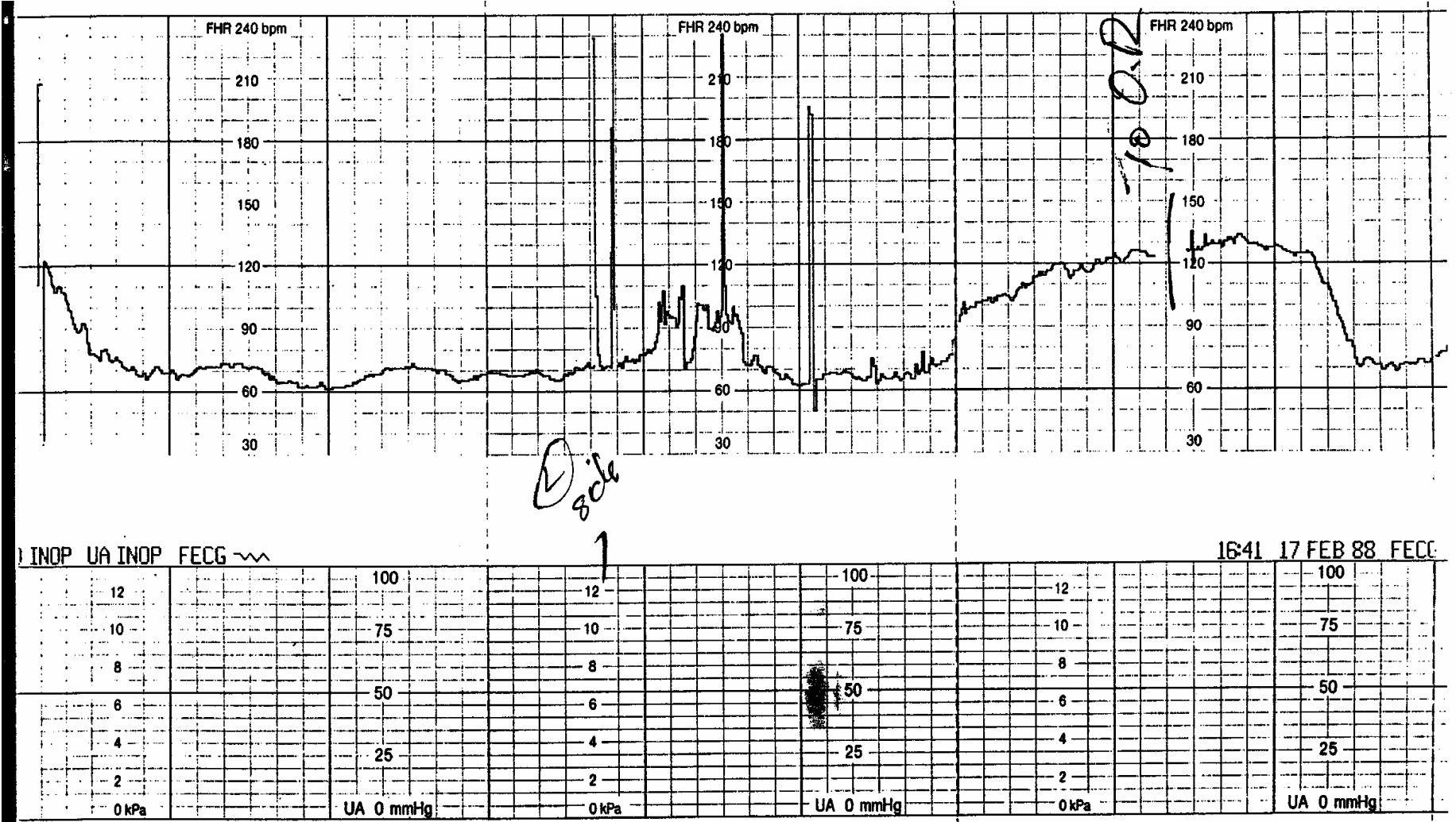
By definition, term pregnancy is between 38 and 42 gestational weeks and post dates is 42 weeks or thereafter. However, some clinicians seek to avoid the risk of post dates by considering closer fetal surveillance for women after 41 gestational weeks, and induction of labor at the 42 week point. In this situation, the woman was 2 days less than the magic 42 weeks. The tracing obtained was part of a fetal surveillance, namely NST. The monitor strip demonstrated reactivity and reassured the woman and clinician alike.

When considering induction, a Bishop score can be used. Bishop scores assess cervical dilation, consistency, effacement, location as well as pelvic station of the presenting part. When scores are above 6, most inductions of labor are successful. In addition to the dilatation, effacement, and station as noted above, the woman's cervix was soft and in midposition. Therefore, she had a Bishop score of 7. Since the cervix appeared favorable for induction, and the NST suggested fetal well being, the woman was discharged from the unit with an appointment for an induction the following morning.

OUTCOME

The following day the woman was admitted for an oxytocin induction. Her labor was uncomplicated and she gave birth to a female infant weighing 8 pounds, 8 ounces (3825 grams) with apgars 8/9 14 hours after the induction was begun.

Case 19



CASE 19 (INTERMEDIATE)
Worksheet

PATIENT DATA

Gravidity/Parity G2P1
 Gestational Age 40 weeks

Prenatal Care According to standard
 Prenatal History Unremarkable for this pregnancy, prior cesarean section birth for failure to progress; desires VBAC

Reason for Monitoring VBAC

Type of Monitoring FSE, tocotransducer
 Intrapartum History Spontaneous labor shortly after spontaneous rupture of membranes. Presented to hospital in early labor with cervical dilation of 2 centimeters, 100% effacement and -1 station. Within 1 hour, was completely dilated.

Status of Membranes SROM
 Color Light meconium
 Length of Time Ruptured 2 hours

Position/Presentation Vertex

Pelvic Examination
 Dilatation 10 cm
 Effacement 100%
 Station -1

Labor Status Active labor, second stage

Intrapartum Medications None

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

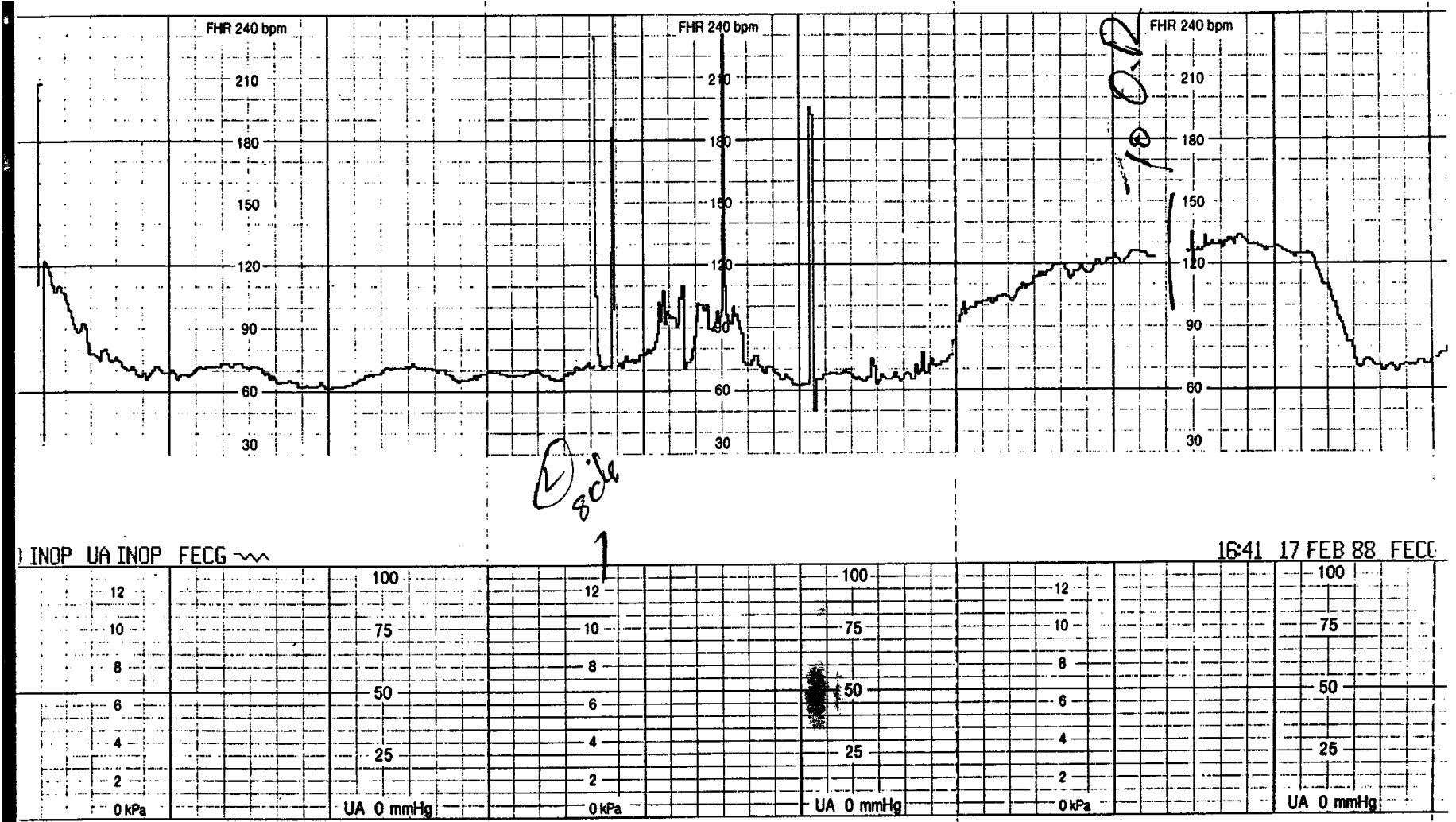
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 19



CASE 19
Answers

TRACING INTERPRETATION

Baseline	Unable to determine prior to prolonged deceleration
Variability	Unable to determine since less than one minute at baseline
Decelerations	Prolonged
Accelerations	None
Is this tracing reactive?	No
Contractions	
Frequency	Unable to determine, tocotransducer removed in preparation for transport to operating room; palpation required
Duration	Palpation required
Resting Tone	Palpation required
Intensity	Palpation required
Reassuring components	
• None	
Non-reassuring components	
• Prolonged deceleration	
Overall interpretation of the tracing:	Non-reassuring

INTERVENTIONS

- Change maternal position
- Initiate IV fluid bolus
- Administer oxygen
- Notify provider
- Prepare for cesarean
- Monitor blood pressure
- Perform vaginal exam

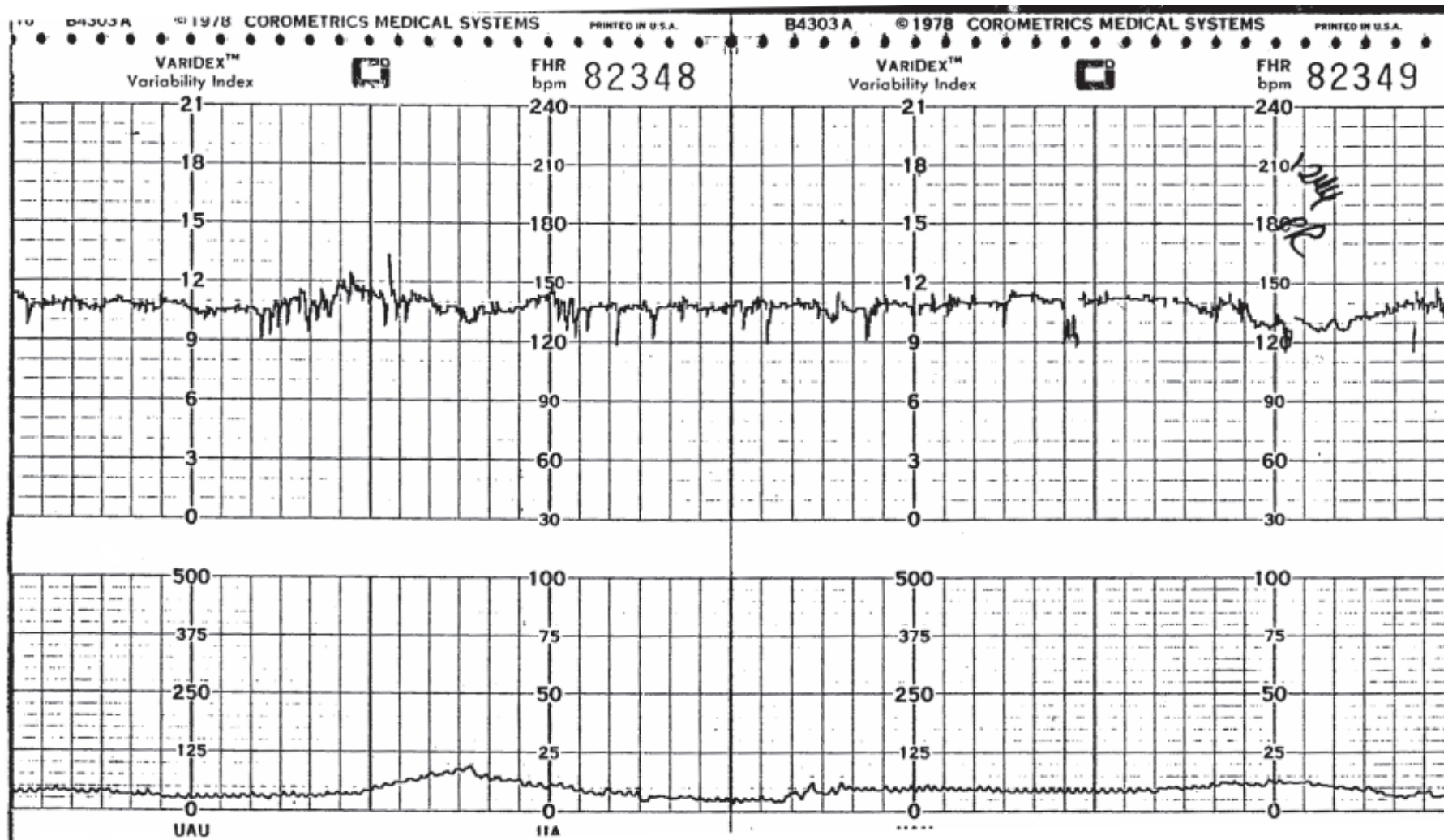
RATIONALE

The vast majority of women who attempt a VBAC (Vaginal Birth after Cesarean) are successful. However, these women should be carefully and continuously assessed during labor. Uterine ruptures are rare, but can be catastrophic. The profound and prolonged nature of the deceleration prompted the nurse and the health care team to respond promptly and prepare for an operative birth.

OUTCOME

Although the cervix was fully dilated, the fetal head remained at –1 station. The woman had no urge to push, and a brief attempt without change of station, convinced the providers that delivery by cesarean would be more rapid than either directed pushing or vacuum/forceps. A male infant, 7 pounds 1 oz (3200 grams) was born with appgars 5/7/9. At the time of delivery, it was noted that there was a rupture of the lower uterine segment.

Case 20



CASE 20 (INTERMEDIATE)
Worksheet

PATIENT DATA

Gravity/Parity G3P2
 Gestational Age 32 weeks

 Prenatal Care According to standard
 Prenatal History No history of previous preterm birth. Unremarkable current pregnancy

 Reason for Monitoring Preterm labor
 Type of Monitoring Ultrasound, tocotransducer
 Intrapartum History 36 hours prior to tracing, woman began to experience uterine contractions and vaginal spotting

 Status of Membranes Intact
 Color N/A
 Length of Time Ruptured N/A

 Position/Presentation Vertex

 Pelvic Examination
 Dilatation 2 cm
 Effacement 50%
 Station Ballotable
 Labor Status Preterm labor—stable

 Intrapartum Medications Brethine® (Terbutaline) 0.250 mg SQ X 2

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

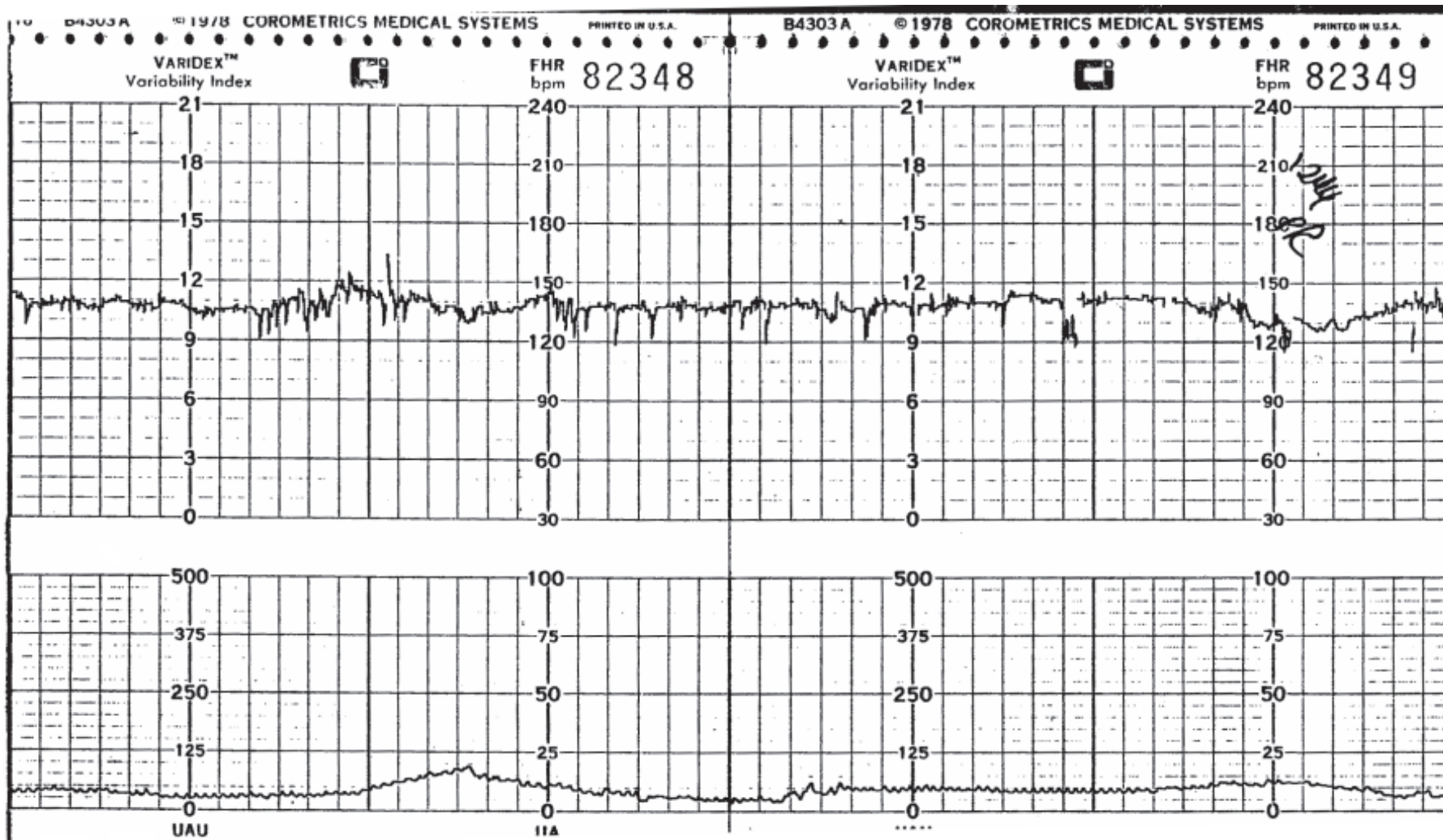
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 20



TRACING INTERPRETATION

Baseline 138-142 beats per minute
Variability Minimal
Decelerations Questionable early
Accelerations One

Is this tracing reactive? No

Contractions
 Frequency Irregular
 Duration 60 seconds
 Resting Tone Palpation required
 Intensity Palpation required

Reassuring components
• Normal baseline rate

Non-reassuring components
• Abnormal configuration of fetal heart rate tracing

Overall interpretation of the tracing: Non- reassuring

INTERVENTIONS

- Compare maternal and fetal heart rates
- Perform bedside ultrasound for fetal cardiac activity

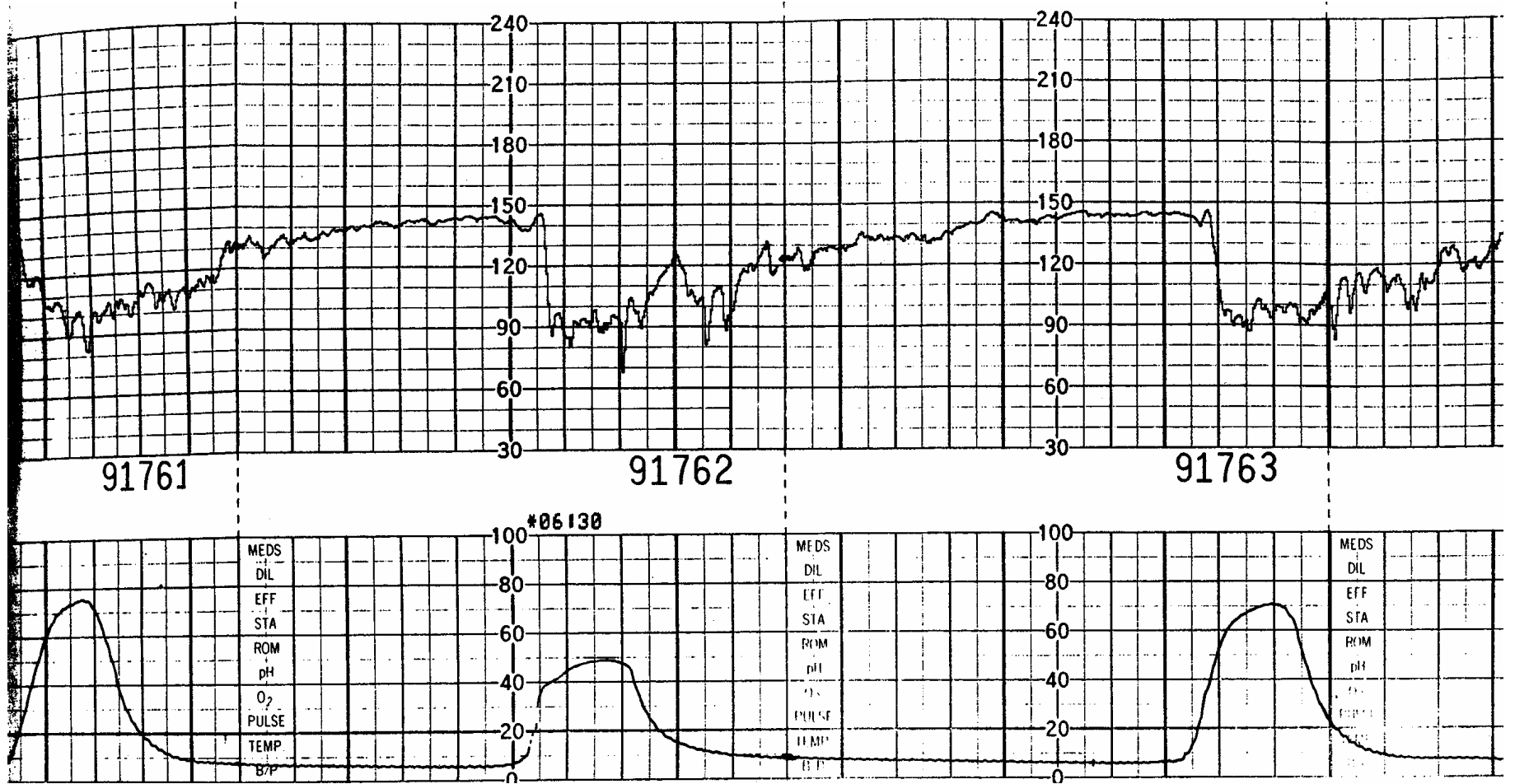
RATIONALE

It must be remembered that EFM is based upon use of machinery, which is not always perfect. In situations where the configuration of a tracing appears abnormal, one of the first actions of the nurse is to confirm that the tracing is valid. Medications (e.g. beta adrenergics) or conditions such as infections can result in maternal tachycardia. In this case, the rapid maternal rate was recorded by the machine as a normal baseline for a fetus.

OUTCOME

Maternal pulse was found to be in the range of 130 beats per minute. An ultrasound failed to demonstrate any fetal cardiac activity. Beta adrenergic drugs were discontinued, and labor was induced. A 3 pound, 3 ounce (1400 gram) male infant was born and noted to be grossly normal. No reason for the antepartal death was ever determined.

Case 21 Part 1



CASE 21 PART 1 (INTERMEDIATE)
Worksheet

PATIENT DATA

Gravidity/Parity G2P1
 Gestational Age 41 weeks (3 days before 42 weeks)
 Prenatal Care According to standard
 Prenatal History Unremarkable
 Reason for Monitoring Hospital policy
 Type of Monitoring FSE, IUPC
 Intrapartum History Induction of labor with oxytocin initiated 3 hours prior to tracing
 Status of Membranes AROM
 Color Thick, particulate meconium
 Length of Time Ruptured 1 hour
 Position/Presentation Vertex
 Pelvic Examination
 Dilatation 4 cm
 Effacement 100%
 Station -1
 Labor Status Active labor
 Intrapartum Medications Oxytocin 8 mU; Nubain® (nalbuphine hydrochloride) 10 mg 90 minutes prior to tracing

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

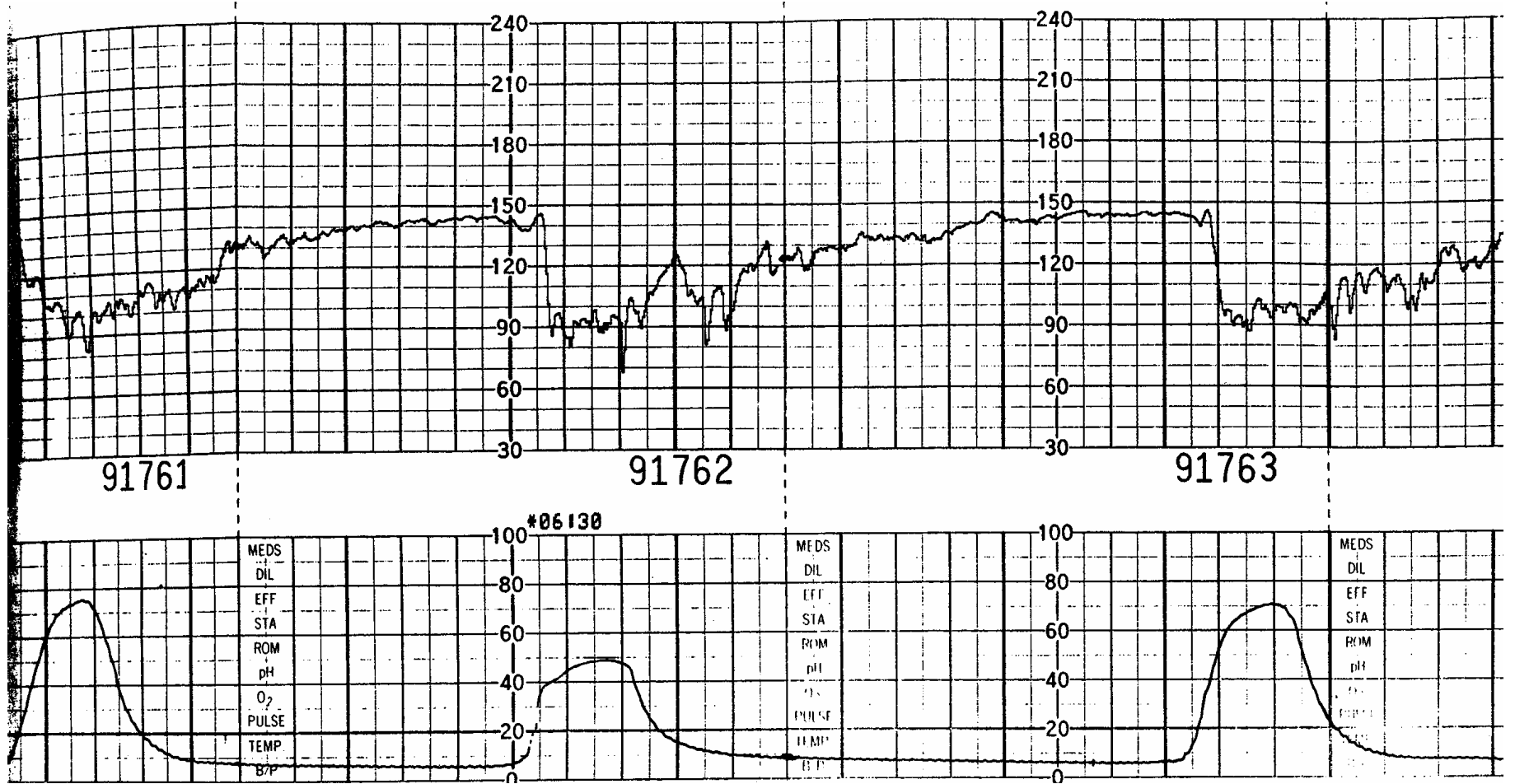
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 21 Part 1



CASE 21 Part 1
Answers

TRACING INTERPRETATION

Baseline 140 – 145 beats per minute
Variability Minimal
Decelerations Variable with prolonged return to baseline
Accelerations None

Is this tracing reactive? No

Contractions
 Frequency every 3-4 minutes
 Duration 60-70 seconds
 Resting Tone 5-8 mm Hg
 Intensity 50-75 mm Hg

Reassuring components

- Normal baseline rate
- Moderate intensity of uterine contractions

Non-reassuring components

- Minimal variability
- Inadequate frequency of uterine contractions
- Atypical variable decelerations with prolonged period before return to baseline

Overall interpretation of the tracing: Non-reassuring

INTERVENTIONS

- Change maternal position
- Initiate IV fluid bolus
- Administer oxygen
- Notify provider
- Decrease rate of oxytocin
- Consider amnioinfusion
- Perform vaginal exam

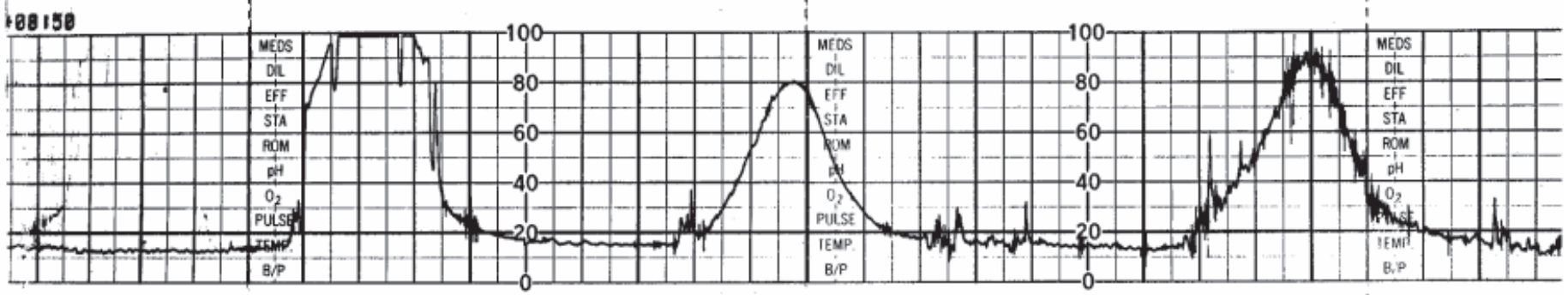
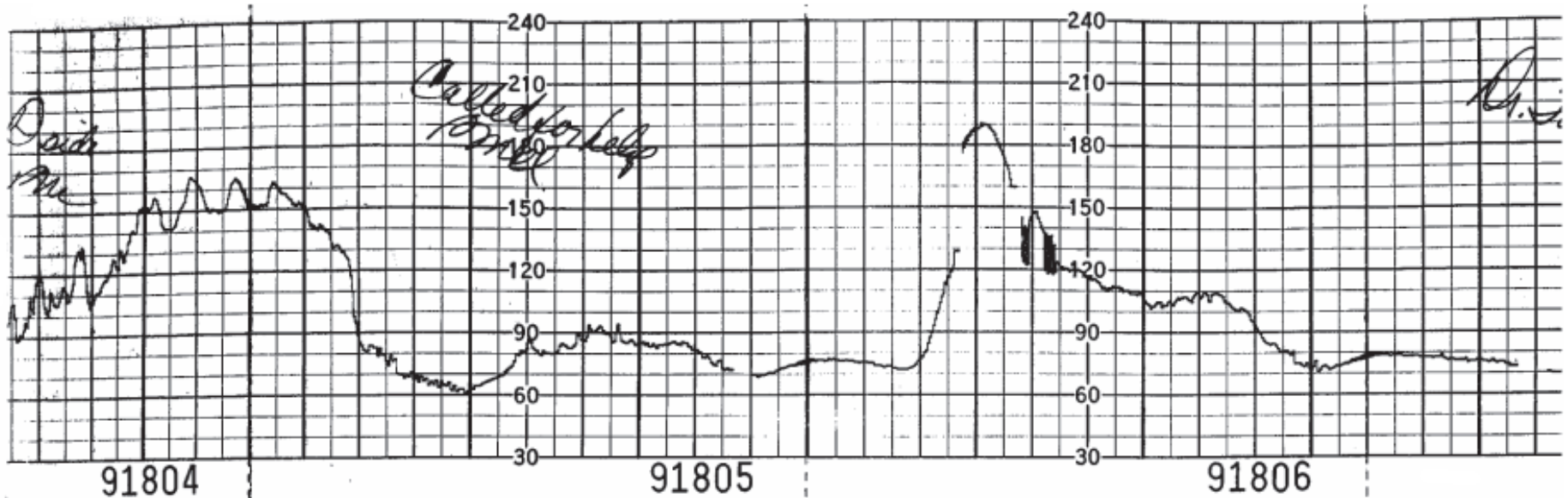
RATIONALE

When prolonged variable decelerations occur, there are several actions that may facilitate intrauterine resuscitation, such as repositioning a woman in order to decrease cord compression. An amnioinfusion may be of help. In this situation, the fetus has already provided a clue to a less than optimal intrauterine environment by passing meconium. Thick meconium staining may be a marker of oligohydramnios and an amnioinfusion may provide additional cushioning around the cord to decrease the severity of the variable decelerations as well as decrease the oligohydramnios. In the presence of variable deceleration, fetal gasping may increase the risk of meconium aspiration syndrome. In some sites, amnioinfusion is performed to dilute meconium in an attempt to reduce the risk of meconium aspiration syndrome.

OUTCOME

See Part 2

Case 21 Part 2



CASE 21 PART 2 (INTERMEDIATE)

2 HOURS LATER

Worksheet

PATIENT DATA

Gravidity/Parity	G2P1
Gestational Age	41 weeks (3 days before 42 weeks)
Prenatal Care	According to standard
Prenatal History	Unremarkable
Reason for Monitoring	Hospital policy
Type of Monitoring	FSE, IUPC
Intrapartum History	Oxytocin induction of labor initiated 5 hours prior to tracing
Status of Membranes	AROM
Color	Thick, particulate meconium
Length of Time Ruptured	1 hour
Position/Presentation	Vertex
Pelvic Examination	
Dilatation	8cm
Effacement	90%
Station	0
Labor Status	Active labor
Intrapartum Medications	Oxytocin 8 mU; Nubain® (nalbuphine hydrochloride) 10 mg 3 ½ hours prior to tracing Continuous epidural for last 90 minutes

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
Duration _____
Resting Tone _____
Intensity _____

What are the reassuring components?

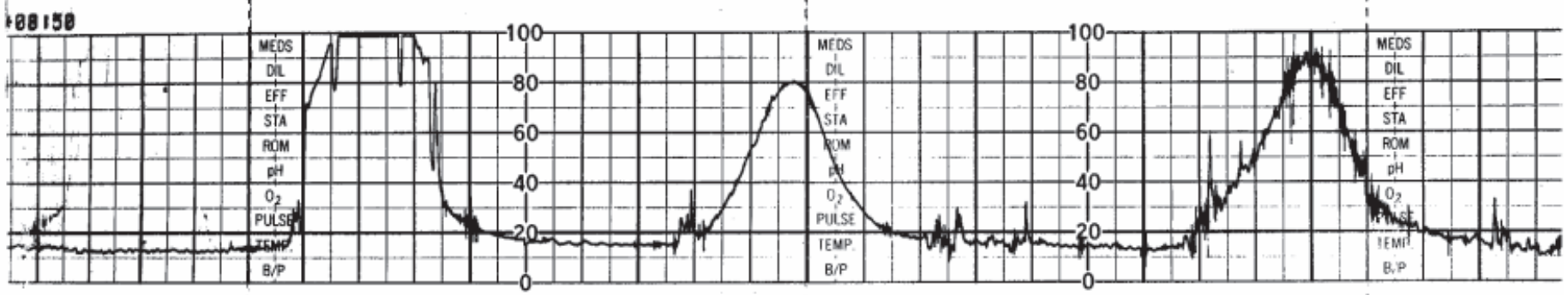
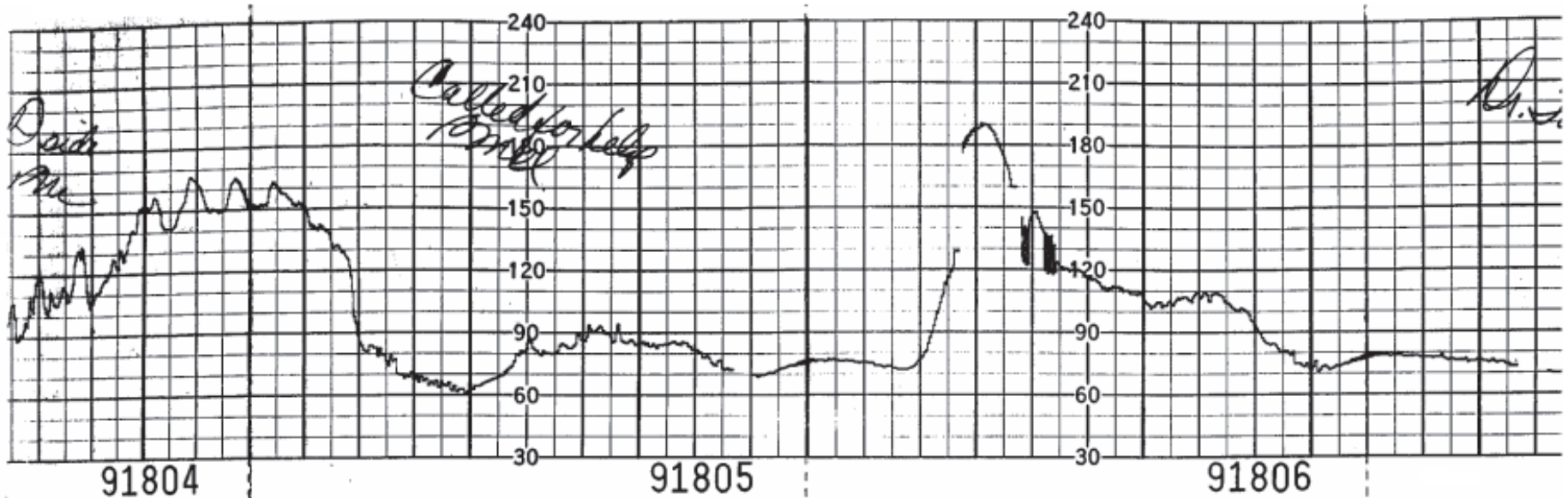
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 21 Part 2



CASE 21 Part 2

Answers

TRACING INTERPRETATION

Baseline Unable to be determined
Variability Unable to determine
Decelerations Prolonged
Accelerations None

Is this tracing reactive? No

Contractions
 Frequency Every 2 ½ minutes
 Duration 60-70 seconds
 Resting Tone 15 mm Hg
 Intensity 80-100 mm Hg

Reassuring components

- None

Non-reassuring components

- Prolonged decelerations
- Unable to establish baseline

Overall interpretation of the tracing: Non-reassuring

INTERVENTIONS

- Discontinue pitocin
- Perform vaginal exam
- Prepare for cesarean

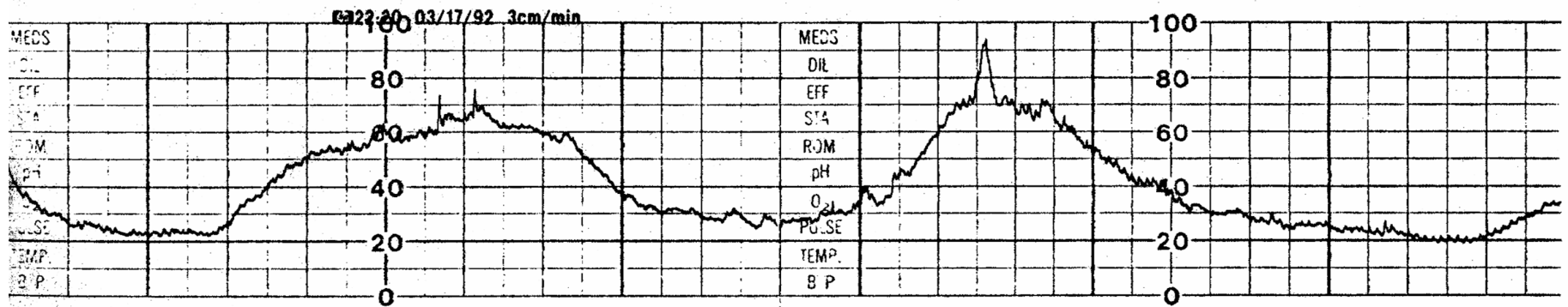
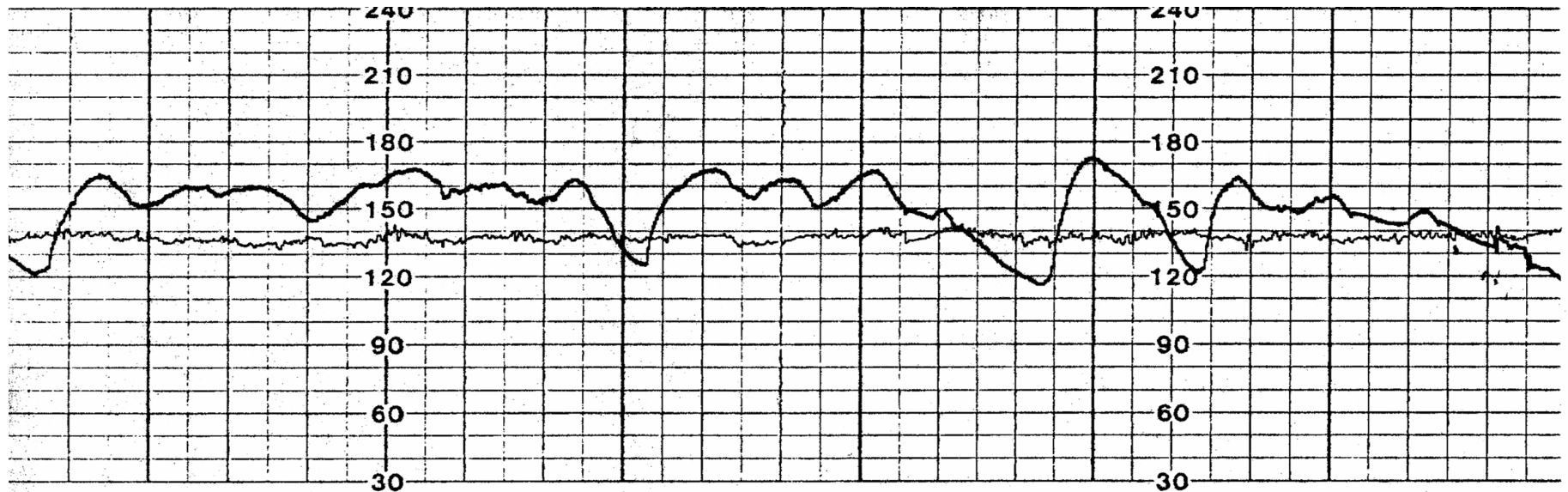
RATIONALE

After two hours, the tracing has become more severe, suggesting that the fetal reserve is exhausted. The fetal heart does not return to baseline. A vaginal exam fails to reveal cord prolapse. Birth is the best plan at this point and since she is not fully dilated, cesarean is the chosen option.

OUTCOME

At the time of delivery, the neonate was flaccid, with apgars 2/2/6 and respiratory acidosis as confirmed by cord blood gases. Difficulty with resuscitation was determined to be associated with fetal meconium aspiration probably during the variable decelerations. After a week in neonatal intensive care unit, the male infant, with a birthweight of 7 lbs., 14 ounces (3575 grams) was discharged home with his mother.

Case 22 Part 1



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CASE 22 PART 1 (ADVANCED)

Worksheet

PATIENT DATA

ASSESSMENT AND INTERPRETATION

Gravity/Parity G3P1
 Gestational Age 31 weeks

 Prenatal Care According to standard
 Prenatal History Spontaneous twins

 Reason for Monitoring Preterm labor, Preterm PROM,
 Twins
 Type of Monitoring Twin A (dark line) FSE;
 Twin B (light line) Ultrasound;
 tocotransducer

 Intrapartum History PROM 5 days previously
 Uterine tenderness occurred today
 Maternal temperature 37.4°C
 (99.3°F)
 Oxytocin induction begun 3 hours
 prior to tracing

 Status of Membranes Preterm PROM
 Color Clear
 Length of Time Ruptured 5 days

 Position/Presentation Vertex, vertex

 Pelvic Examination
 Dilatation 6 cm
 Effacement 100%
 Station 0
 Labor Status Active

 Intrapartum Medications Continuous epidural
 Oxytocin at 12 mU/min

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions

Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

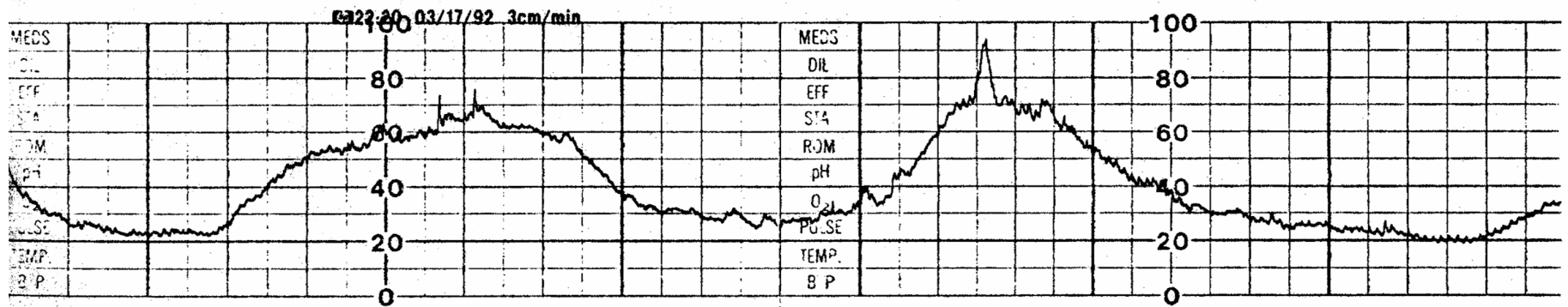
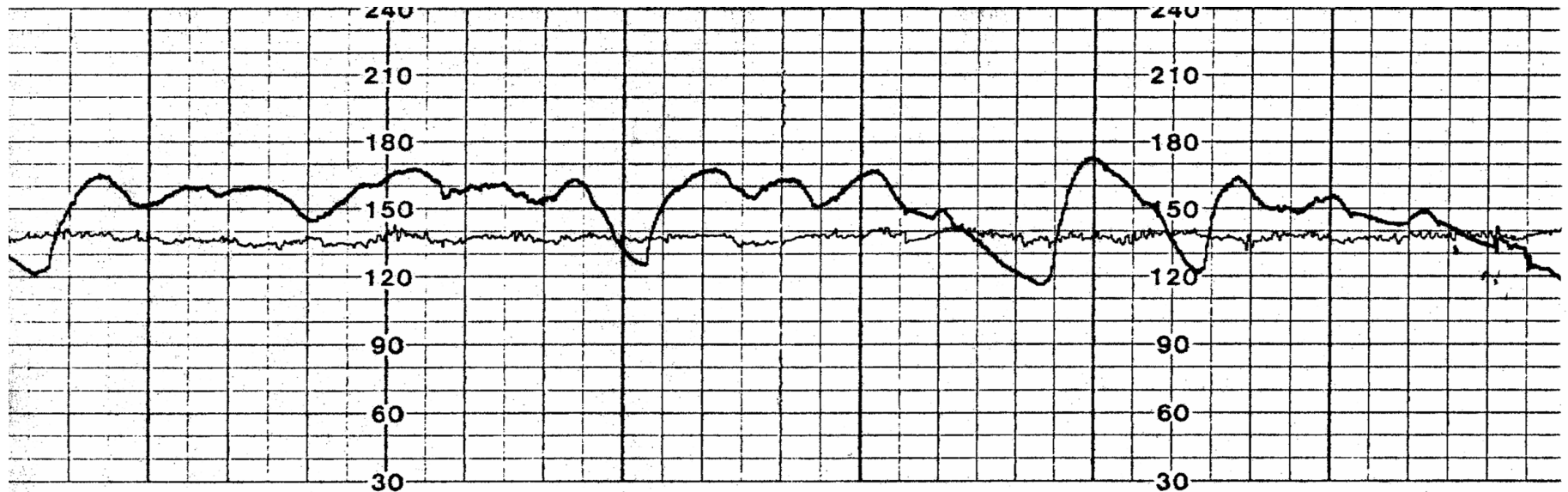
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 22 Part 1



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CASE 22 Part 1

Answers

TRACING INTERPRETATION

INTERVENTIONS

Baseline	Twin A Unable to determine Twin B 135-140 beats per minute
Variability	Twin A: Unable to determine Twin B: Minimal
Decelerations	Twin A: Unable to determine type Twin B: None
Accelerations	Twin A: Unable to determine Twin B: None
Is this tracing reactive?	No for both
Contractions	
Frequency	Every 2 ½ minutes
Duration	110 seconds
Resting Tone	Palpation required
Intensity	Palpation required
Reassuring components	
• Twin A:	None
• Twin B:	Stable baseline
Non-reassuring components	
• Uterine hyperstimulation	
• Twin A:	Unable to determine baseline, unable to determine variability, atypical deceleration
• Twin B:	Minimal variability
Overall interpretation of the tracing:	Non-reassuring

- Continue to monitor maternal temperature
- Administer antibiotics as ordered by provider
- Discontinue oxytocin
- Administer terbutaline
- Reposition
- IV fluid bolus
- Oxygen
- Notify provider

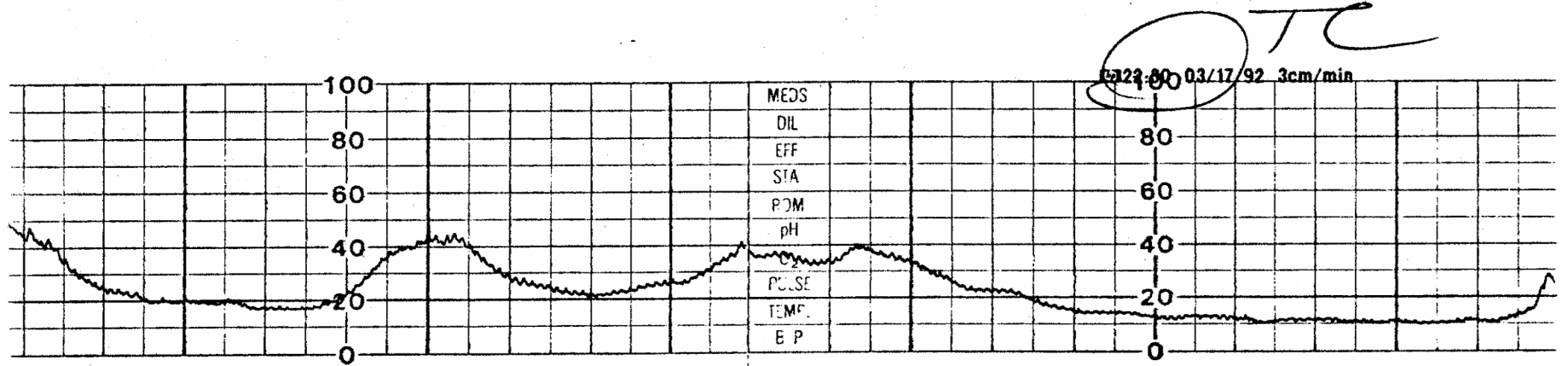
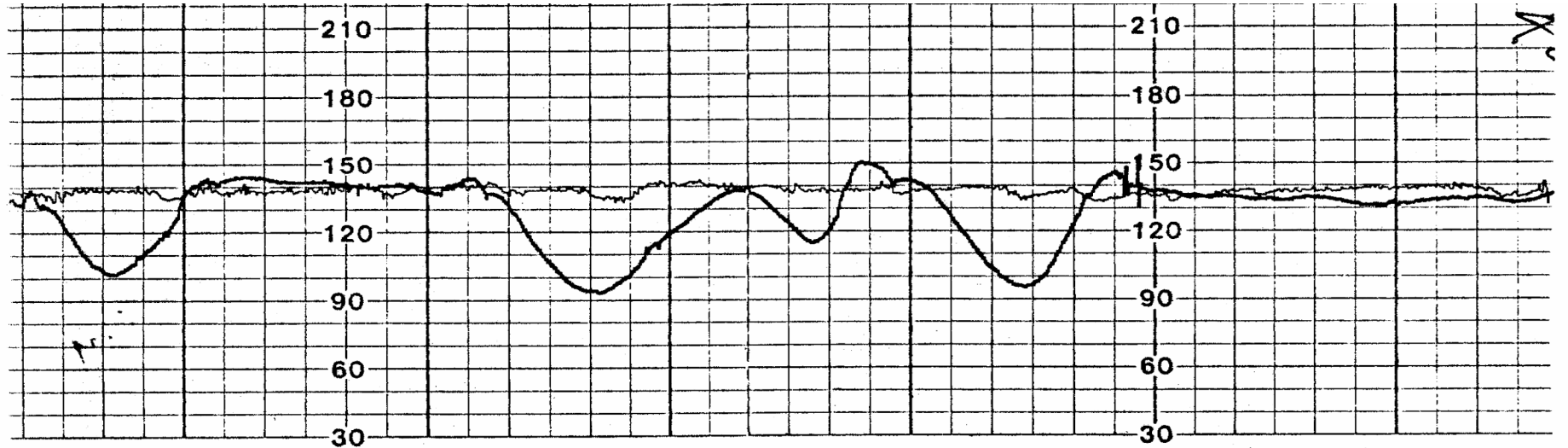
RATIONALE

Hyperstimulation is a relatively common complication of oxytocin induction of labor. Decrease in the rate or temporary discontinuation often can facilitate intrauterine resuscitation and resolution of abnormal tracing patterns.

OUTCOME

See Part 2

Case 22 Part 2



- MEDS
- DIL
- EFF
- STA
- PDM
- pH
- PC₂
- PULSE
- TEMP.
- E P

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CASE 22 PART 2 (INTERMEDIATE)
2 HOURS LATER
Worksheet

PATIENT DATA

Gravidity/Parity G3P1
 Gestational Age 31 weeks

Prenatal Care According to standard
 Prenatal History Spontaneous twins

Reason for Monitoring Preterm labor, Preterm PROM,
 Twins

Type of Monitoring Twin A (dark line) FSE
 Twin B (light line) Ultrasound,
 tocotransducer

Intrapartum History PROM 5 days previously
 Uterine tenderness occurred today
 Maternal temperature remains
 37.4°C (99.3°F)

Status of Membranes Preterm PROM
 Color Clear
 Length of Time Ruptured 5 days

Position/Presentation Vertex/vertex

Pelvic Examination (unchanged)
 Dilatation 6 cm
 Effacement 100%
 Station 0

Labor Status

Intrapartum Medications Continuous epidural

ASSESSMENT AND INTERPRETATION

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

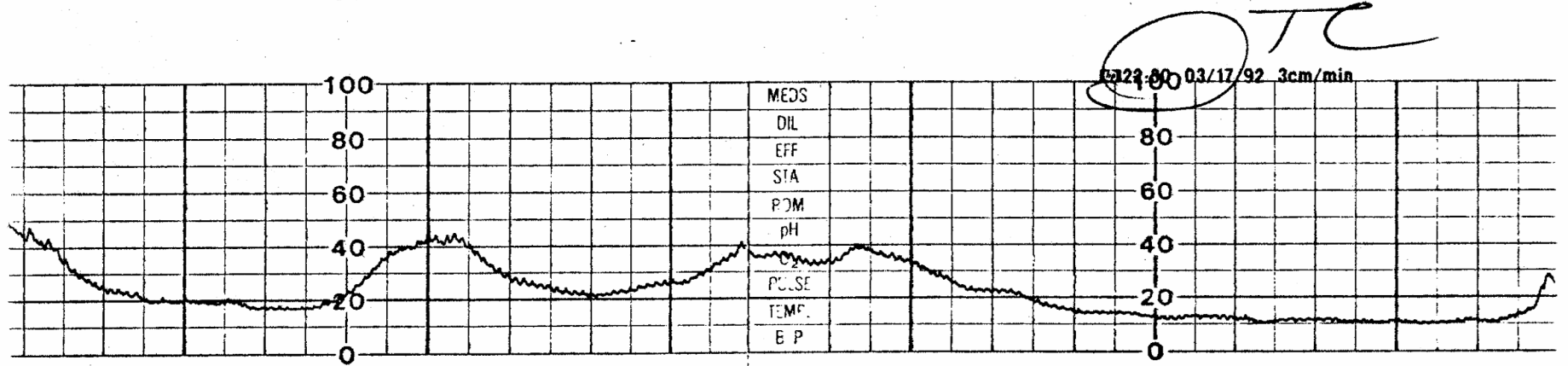
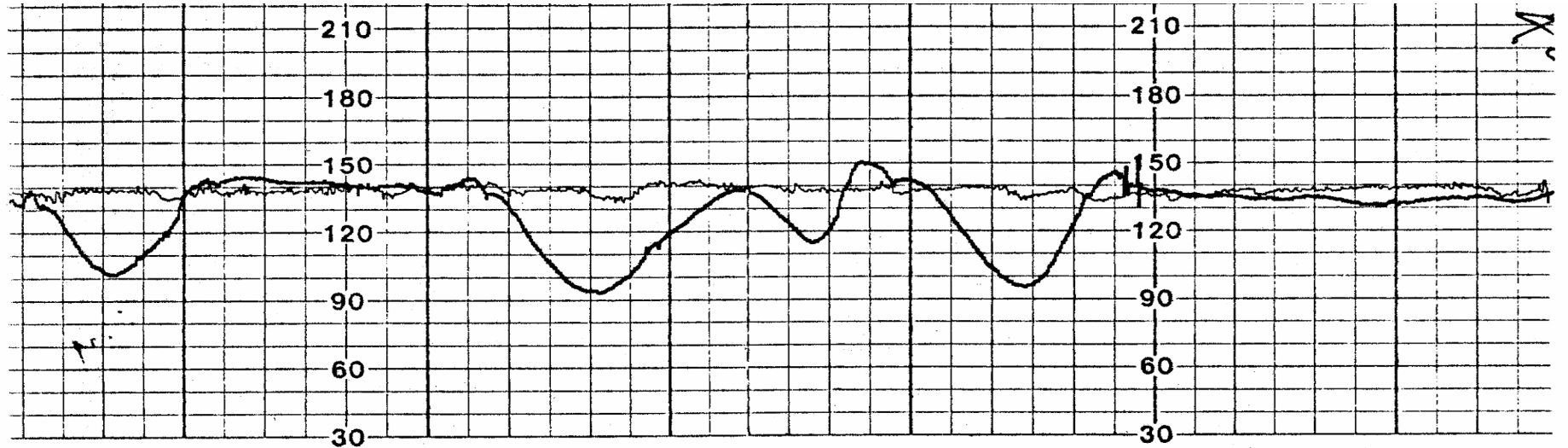
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 22 Part 2



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CASE 22 Part 2

Answers

TRACING INTERPRETATION

Baseline	Twin A Probably 130-135 (would confirm by continuing tracing) Twin B 135-140 beats per minute
Variability	Twin A Unable to determine variability, probably absent Twin B Minimal
Decelerations	Twin A Variables Twin B None
Accelerations	None
Is this tracing reactive?	No
Contractions	
Frequency	Every 1 ½ - 3 ½ minutes
Duration	60 – 120 seconds
Resting Tone	Palpation required
Intensity	Palpation required
Reassuring components	
• Twin A – Baseline probably within normal range	
• Twin B – Stable baseline, no decelerations	
Non-reassuring components	
• Twin A	Probably absent variability, variable decelerations
• Uterine hyperstimulation	
• Both twins are nonreactive	
Overall interpretation of the tracing:	Non-reassuring

INTERVENTIONS

- Change maternal position
- Continue IV fluid bolus
- Continue oxygen
- Notify provider
- Discontinue oxytocin
- Continue previous interventions and assessments while preparing for an immediate operative delivery

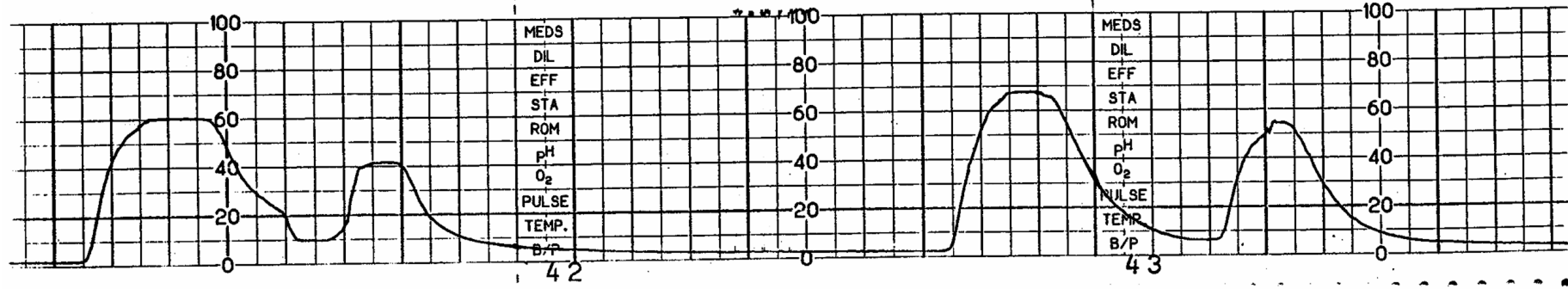
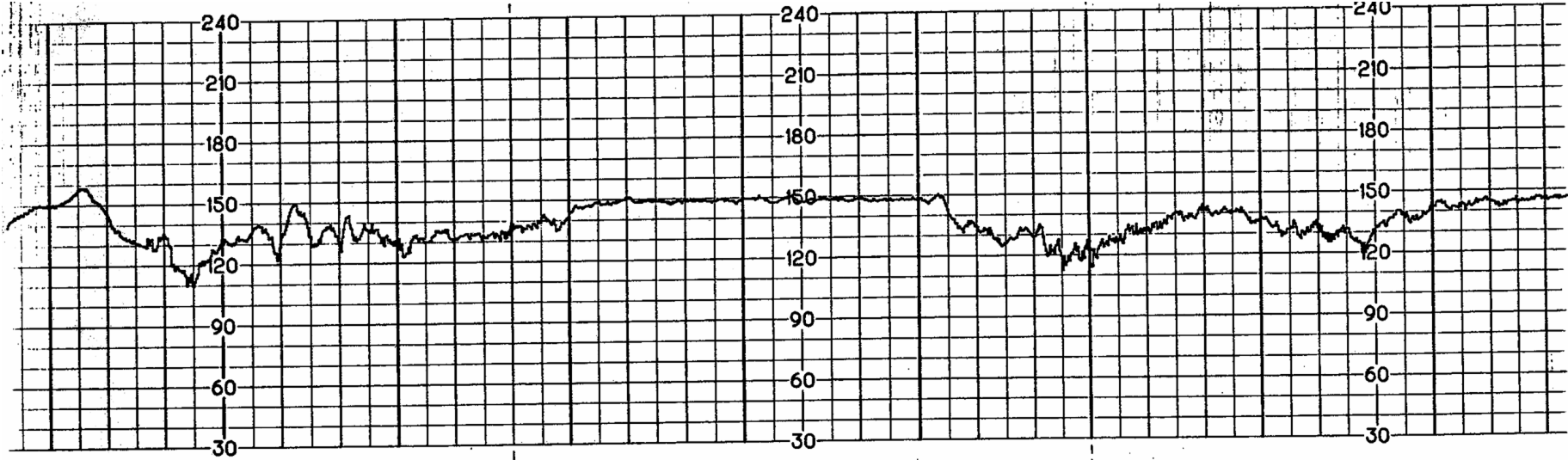
RATIONALE

In this situation, changes in titration of oxytocin failed to relieve the hyperstimulation. At this point, the time for birth appeared remote and status for both fetuses seem to be deteriorating. Although its difficult to determine the baseline and variability of Twin A, this pattern appears ominous. Although the decelerations of Twin A are classified by NIH as variables, the possibility of utero placental insufficiency (late decelerations) should also be considered. Thus, an operative birth was planned.

OUTCOME

Before the cesarean could be performed, the woman began to involuntarily push and was found to be completely dilated. Both infants were born vaginally, with 15 minutes between the birth of Twin A and that of Twin B. Apgars for Twin A were 1/1/0 and resuscitation was unsuccessful. Twin A weighed 2 lbs. 2 ounces (950 grams) and the autopsy revealed a normal male fetus. Twin B had apgars of 6/6/7. Twin B weighed 2 ½ pounds (1150 grams) and was discharged home after 6 weeks in the hospital.

Case 23



CASE 23 (INTERMEDIATE)

Worksheet

PATIENT DATA

ASSESSMENT AND INTERPRETATION

Gravidity/Parity G1P0
 Gestational Age 39 weeks

Prenatal Care According to standard
 Prenatal History Unremarkable

Reason for Monitoring Hospital policy
 Type of Monitoring FSE, IUPC
 Intrapartum History PROM followed by oxytocin induction 12 hours later. Maternal temperature 36.8°C (98.2°F) Oxytocin induction begun 6 hours prior to tracing

Status of Membranes PROM
 Color Clear
 Length of Time Ruptured 18 hours

Position/Presentation Vertex, suspected OP

Pelvic Examination
 Dilatation 3 cm
 Effacement 100%
 Station - 1/0

Labor Status Induction of labor

Intrapartum Medications Oxytocin 6 mU
 Continuous epidural

DESCRIBE THE FOLLOWING:

Baseline _____ Variability _____
 Decelerations _____ Accelerations _____

Is this tracing reactive? _____

Contractions
 Frequency _____
 Duration _____
 Resting Tone _____
 Intensity _____

What are the reassuring components?

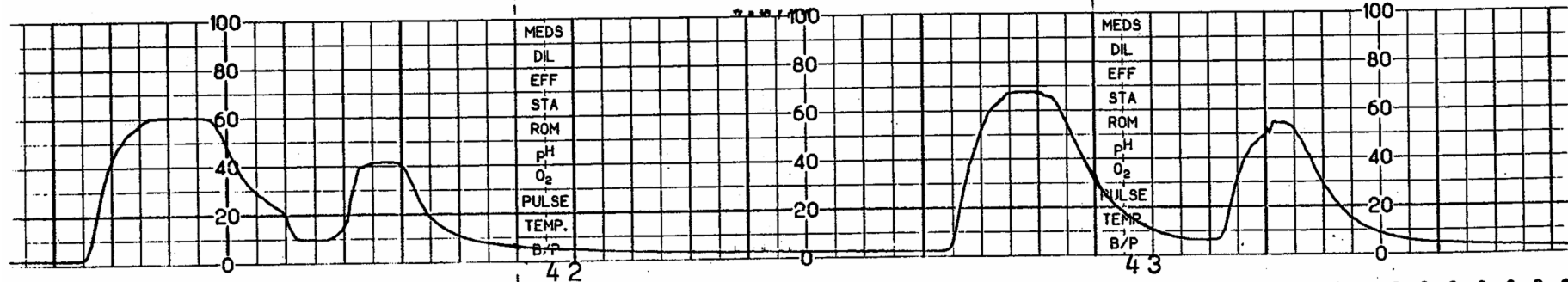
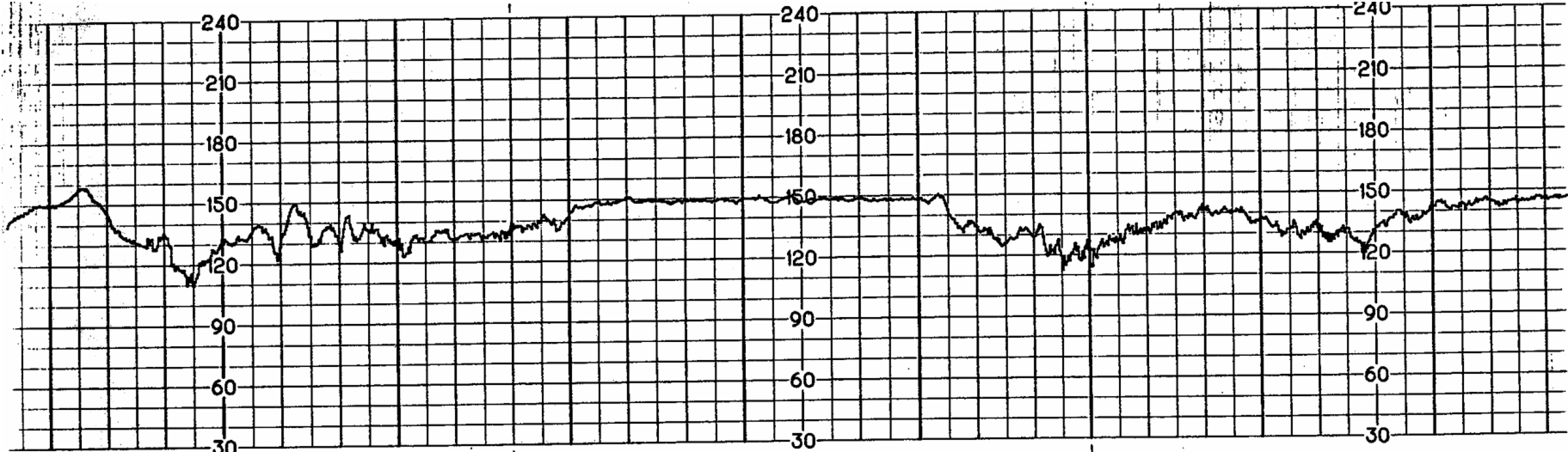
What are the non-reassuring components?

This tracing is Reassuring Non-reassuring

What are the indicated interventions?

What is the rationale for the indicated interventions?

Case 23



TRACING INTERPRETATION

Baseline	148-150 beats per minute
Variability	Minimal
Decelerations	Late
Accelerations	None

Is this tracing reactive? No

Contractions

Frequency	Every 1 ½ - 5 minutes
Duration	40 - 80 seconds
Resting Tone	2-5 mm Hg
Intensity	40-70 mm Hg

Reassuring components

- Normal baseline

Non-reassuring components

- Late decelerations
- Absent variability
- Difficulty in establishing labor pattern

Overall interpretation of the tracing: Non-reassuring

INTERVENTIONS

- Change maternal position
- Initiate IV fluid bolus
- Administer oxygen
- Notify provider
- Discontinue oxytocin, restart and titrate carefully if fetal heart rate pattern improves
- Monitor maternal temperature carefully
- Administer antibiotics as ordered

RATIONALE

This case illustrates how the nurse often is challenged to appropriately titrate oxytocin. The amount of oxytocin should be administered carefully in order to enable labor to progress while attempting to diminish the late decelerations. Simultaneously the nurse must also monitor the woman since she is at risk for chorioamnionitis. Although maternal fever may be an early indication of the condition, one of the common complications of the infection may be uterine hypotonia or poor labor patterns. Therefore, this woman may already be demonstrating infection.

OUTCOME

Although a rhythmic labor pattern was never able to be achieved, the Montevideo units registered with uterine contractions were consistently above 200 mg Hg. After 4 hours of strong contractions, a pelvic examination was unchanged and the baseline began to increase. A decision was made to perform a primary low transverse cesarean section and a 6 pound, 6 ounce (2950 gram) male infant with apgars 7/8 was born.

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EFM Appendixes



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Appendix A

Nonstress Test

The nonstress test is a noninvasive procedure used to assess for fetal well-being. There are numerous indications for a nonstress test that include both maternal and fetal high risk conditions. During the monitoring session, fetal activity can be noted by the woman using the event marker. According to Gabbe, 1996, page 340, since almost all accelerations are accompanied by fetal movement, fetal movement does not have to be documented in order to call the test reactive. It is helpful to record movements, however, because when they are present, it is reassuring.

The test is interpreted as follows:

Reactive (normal): Two or more FHR accelerations peaking at least 15 bpm above the baseline lasting at least 15 seconds from baseline to baseline within a 20 minute period.

Nonreactive: Absence of accelerations that meet the criteria for reactivity listed above during the testing period. An unsatisfactory test occurs when the fetus is sleeping, there is a malfunction in the equipment, or the quality of the tracing is not adequate for interpretation.

Since a nonreactive or inconclusive test can occur during fetal sleep, it is acceptable to continue monitoring the fetus for an additional 20 minutes or to stimulate the fetus by vibroacoustic stimulation (see section on vibroacoustic stimulation). ACOG (1994) defines a nonreactive tracing as one without sufficient fetal heart rate accelerations over a 40 minute period.

There is no scientific evidence to support the practice of administering juice/fluids to facilitate a reactive NST.

Variable decelerations may indicate oligohydramnios. The presence of variable decelerations should be reported to the healthcare provider even if the NST is reactive. Any other nonreassuring fetal heart rate patterns should be reported.

Gestational age of the fetus must be considered; before 32 weeks gestation, accelerations are defined as having an acme ≥ 10 bpm above the baseline and a duration of ≥ 10 seconds (NICHD, 1997).

Appendix B

Contraction Stress Test (CST)

The contraction stress test evaluates the fetal response to the stress of contractions. Fetuses with an inadequate oxygen reserve will demonstrate late decelerations. Contractions can be initiated through nipple-stimulation or oxytocin (oxytocin challenge test or OCT). An adequate CST requires at least 3 contractions in 10 minutes with moderate quality contractions lasting 40-60 seconds.

Interpretation

ACOG's (1994) criteria are as follows:

- Negative:** No late decelerations
- Positive:** Late decelerations following 50% or more of contractions even if the contraction frequency is less than 3 in 10 minutes
- Suspicious: (Equivocal)** Intermittent late or significant variable decelerations
- Unsatisfactory:** Fewer than 3 contractions in 10 minutes or a poor-quality tracing

Gabbe (1996) and Tucker (2000) also describe hyperstimulation:

Hyperstimulation: Uterine contractions closer than every 2 minutes or lasting greater than 90 seconds; or five contractions in 10 minutes if no late decelerations are seen, the test is interpreted as negative (Gabbe, 1996, p. 336)

If a late deceleration is observed during or after excessive uterine activity, the test is not interpretable and is classified as hyperstimulation because the stress is considered enough to exceed even normal uteroplacental reserve (Tucker, 2000, p. 199)

For more specific information regarding the specific steps of performing a CST, refer to Gabbe, 1996, pp. 335-338 and Tucker, 2000, pp. 196-200.

Appendix C

Biophysical Profile

This method of fetal surveillance relies on an evaluation of five biophysical parameters to identify the compromised fetus. The premise is that observation of multiple variables increases the accuracy of identification of the fetus at risk.

Components

The five components utilized to evaluate the fetus include fetal heart rate acceleration, fetal breathing movements, fetal body movements, fetal tone and amniotic fluid volume. All data is collected through the use of real time ultrasound except for fetal heart reactivity that is assessed by the nonstress test.

Scoring

For each parameter, a score of 0 (nonreassuring) or a score of 2 (reassuring) is assigned. The combined scores range from 0 to 10. A combined score of 8 or 10 is considered normal. A combined score of 6 is equivocal and requires retesting within 24 hours. A combined score of 0, 2 or 4 indicates fetal compromise and delivery of the fetus should be considered. A deviation from this scoring system exists if oligohydramnios is present (0 points for amniotic fluid volume). This represents a long-term chronic condition and, in most cases, delivery is initiated even in the presence of "normal" scores in the other evaluation parameters.

The criteria that establishes a reassuring finding for each of the biophysical profile parameters according to Tucker, 2000, p. 166 are as follows:

Nonstress test	Two or more episodes of FHR acceleration \geq 15 bpm \geq seconds
Fetal breathing movements (FBM)	At least one episode of fetal breathing movement of at least 30 seconds duration in a 20 minute observation
Fetal movements	At least three discrete body/limb movements in 20 minutes (episodes of active continuous movement considered as a single movement)
Fetal tone	At least one episode of active extension with return to flexion of fetal limb(s) or trunk; opening and closing of hand considered normal tone
Amniotic fluid volume	Sum total of measurements in cm from each quadrant is 5.1 to 24 cm (low normal is 5.1 to 9.9 cm)

Appendix D

Fetal Activity Determination (Fetal Movement Counting)

Counting fetal movements is based upon scientific evidence that a marked decrease in fetal movement may occur prior to fetal death. Gabbe (1996) suggests that all pregnant women, regardless of risk status, should monitor fetal activity starting at 28 weeks (p.335).

There are several methods used to assess and record daily fetal movement (kick counts); no one method has been identified as being better than another.

The Guidelines for Perinatal Care (1997, pp.85-86) and ACOG (1994) recommend that the woman lie on her side and count until she perceives 10 distinct movements. The perception of 10 movements in a period of 2 hours is considered reassuring.

For further information about fetal activity determination refer to:

Gabbe, 1996, pp. 333-335

Olds, 1996, pp. 376-377

Tucker, 2000, pp. 172-173

Appendix E

Intermittent Auscultation

Intermittent auscultation can be performed with a fetoscope or a Doppler ultrasound. Fetal position should be determined. The fetal heart sounds are best heard in the lower quadrants of the maternal abdomen when the fetus is vertex. In breech presentation, the fetal heart sounds are at or above the umbilicus (Reeder, 1997, p.1100).

The fetal heart rate should be evaluated during and for 30 seconds after a contraction to assess for decelerations or accelerations. The rate, rhythm and presence of or absence of any decelerations or accelerations should be noted. The baseline rate should be identified by counting the FHR between contractions for at least 30 to 60 seconds. The mother's pulse should be evaluated to differentiate it from the fetus.

For more specific details regarding this method of fetal heart monitoring refer to Feinstein, Sprague, and Trepanier (2000), Fetal Heart Rate Auscultation, Washington, DC: AWHONN.

Appendix F

Frequency of Assessment and Documentation

The frequency of assessment and documentation is the same, regardless of which method is used to assess the fetal heart rate. The fetal heart rate should be assessed upon admission. In addition, Feinstein, Sprague, and Trepanier (2000) Fetal Heart Rate Auscultation (AWHONN) lists the following recommendations for frequency and documentation:

Low-Risk Patients

First Stage of Labor:

- q 1 hour in latent phase
- q 30 min in active phase

Second Stage of Labor

- q 15 min

High Risk Patients

First Stage of Labor:

- q 30 min in latent phase
- q 15 min in active phase

Second Stage of Labor

- q 5 min

The same recommendations for active phase and second stage (both low-risk and high-risk patients) are found in the Guidelines for Perinatal Care (1997) and in ACOG's Technical Bulletin, #207, July 1995 on Fetal Heart Rate Patterns.

The Fetal Heart Rate Auscultation (AWHONN) also recommends assessment and documentation of fetal heart rate for the following labor events:

Assess FHR prior to:

- initiation of labor-enhancing procedures (e.g., amniotomy)
- periods of ambulation
- administration of medications
- administration or initiation of analgesia/anesthesia
- transfer or discharge of patients

Assess FHR following:

- rupture of membranes
- recognition of abnormal uterine activity patterns, such as increased basal tone or tachysystole
- evaluation of oxytocin (maintenance, increase, or decrease of dosage)
- vaginal examination
- periods of ambulation
- evaluation of analgesia and/or anesthesia (maintenance, increase, or decrease of dosage)

Appendix G

Treatment of Oxytocin - Induced Uterine Hyperstimulation

	AWHONN (1993)	ACOG (1999)
Definition of Hyperstimulation	Contractions < 2 minutes apart or greater than 90 seconds in duration may be associated with an elevated resting tone and possibly a non-reassuring FHR	Uterine contractions lasting 2 minutes or more or a contraction frequency of 5 or more in 10 minutes with the fetus not tolerating this pattern (late decelerations, bradycardia)
Oxytocin (Pitocin)	Discontinue oxytocin infusion	Decrease or discontinue the oxytocin infusion
Positioning	Position the woman in a left lateral semi-recumbent position	Turn the woman on her side
Oxygen	Administer oxygen	Administer oxygen
IV Fluids	No recommendation	Infuse additional IV fluid
Notify Provider	Notify the health-care provider	No recommendation
Restarting Oxytocin	A lower dose than the previous dose is often instituted	No recommendation If hyperstimulation persists, use of terbutaline or other tocolytics may be considered

EFM Questions



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1. Scalp stimulation is best used to help:

1. assess for metabolic acidosis
2. decrease head compression
3. improve fetal oxygenation

2. Resting tone and intensity of uterine contractions cannot be assessed by:

1. external tocodynamometer
2. internal pressure catheter
3. manual palpation

3. A smooth appearing acceleration that lasts greater than 30 seconds and immediately follows a variable deceleration that goes down to 60 beats per minute and lasts 75 seconds is defined as a(n)

1. lambda pattern
2. overshoot
3. primary acceleration

4. In a preterminal pattern, FHR variability is most likely:

1. absent
2. highly variable
3. profound

5. List four interventions when a non-reassuring FHR pattern is discovered:

1. _____
2. _____
3. _____
4. _____

6. Variability with fluctuations of 10-12 beats per minute around the baseline FHR is defined as

1. minimal
2. moderate
3. marked

7. What percent of the time do decelerations minimally have to occur with contractions in a 20 minute period in order to be defined as recurrent?

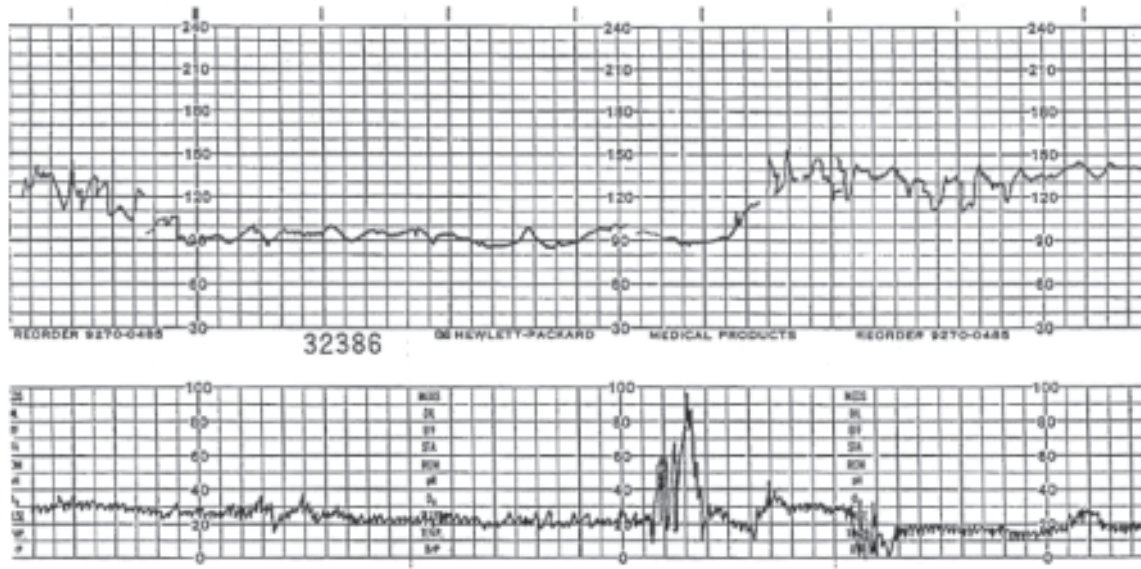
1. 25%
2. 50%
3. 75%

8. According to the National Institute of Health (NIH) a normal tracing has the following characteristics: (fill in the blank)

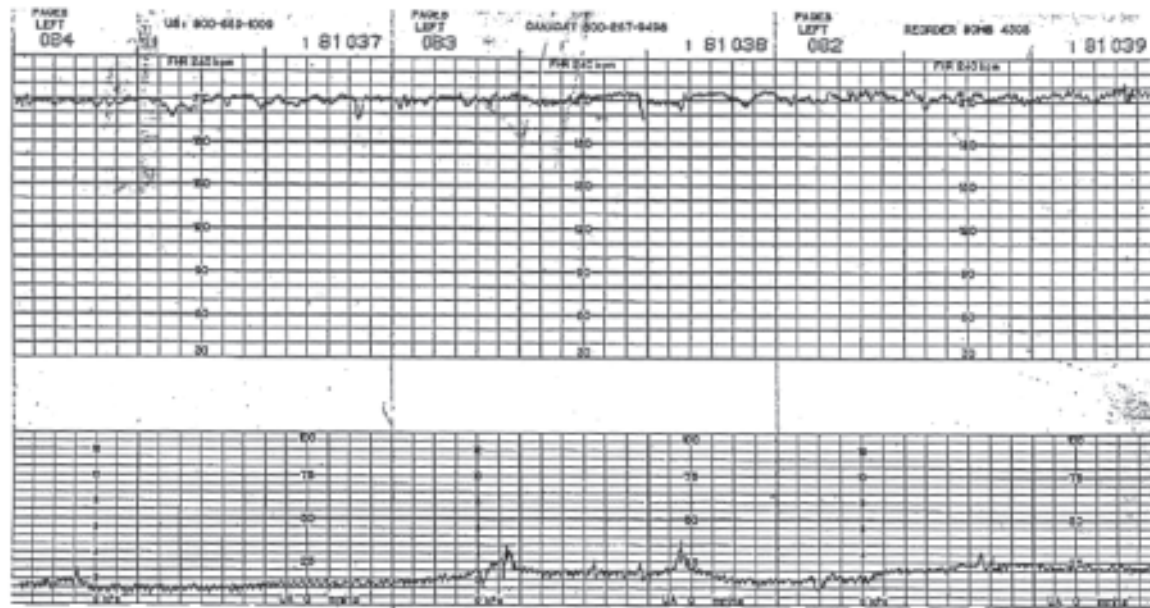
1. _____
2. _____
3. _____
4. _____

9. According to AWHONN, a high risk woman in second stage should have FHR documented every:

1. contraction
2. 5 minutes
3. 15 minutes

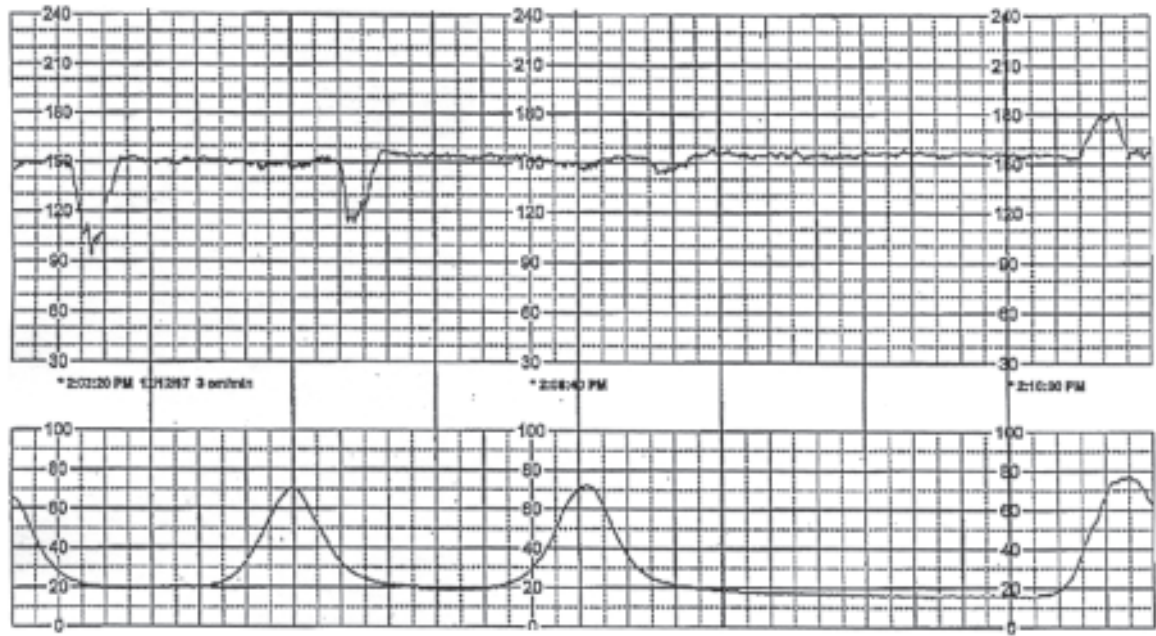


10. This tracing was obtained from a woman in active labor with a term fetus. The best nursing action is to:
1. continue the electronic tracing
 2. prepare for a cesarean section birth
 3. reassure the parents of normalcy of tracing



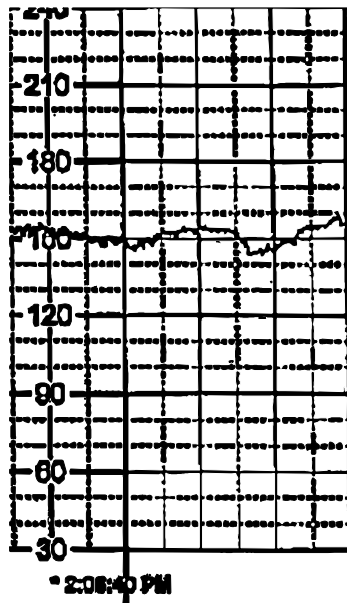
11. The most likely pregnancy event associated with this tracing is:

1. chorioamnionitis
2. fetal prematurity
3. maternal epidural anesthesia



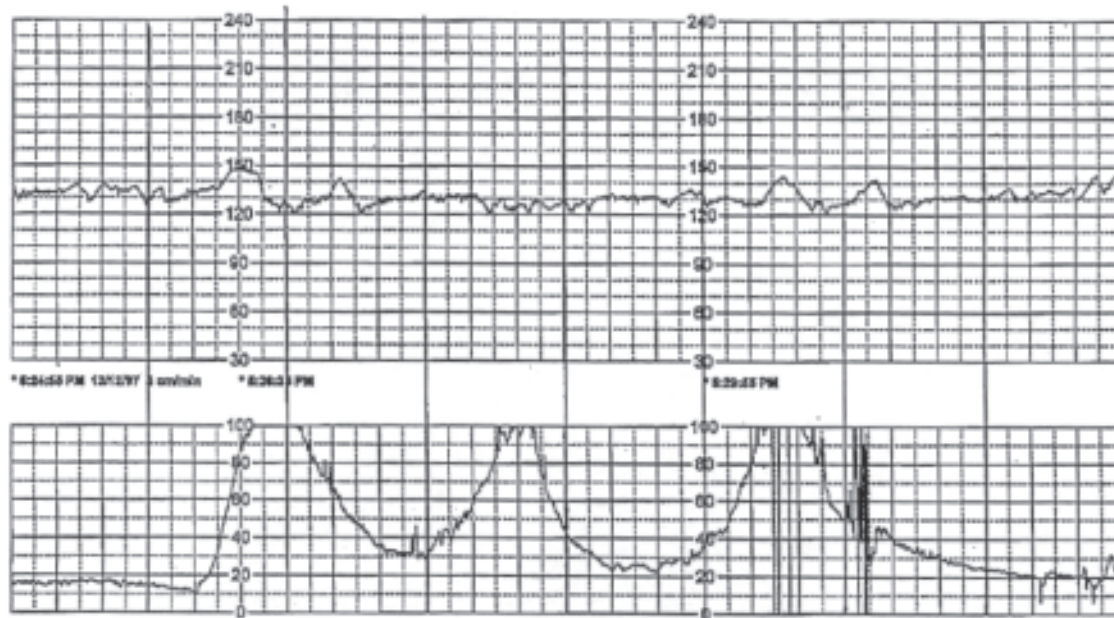
12. In the above tracing, the decelerations present are most likely:

1. early
2. late
3. variable



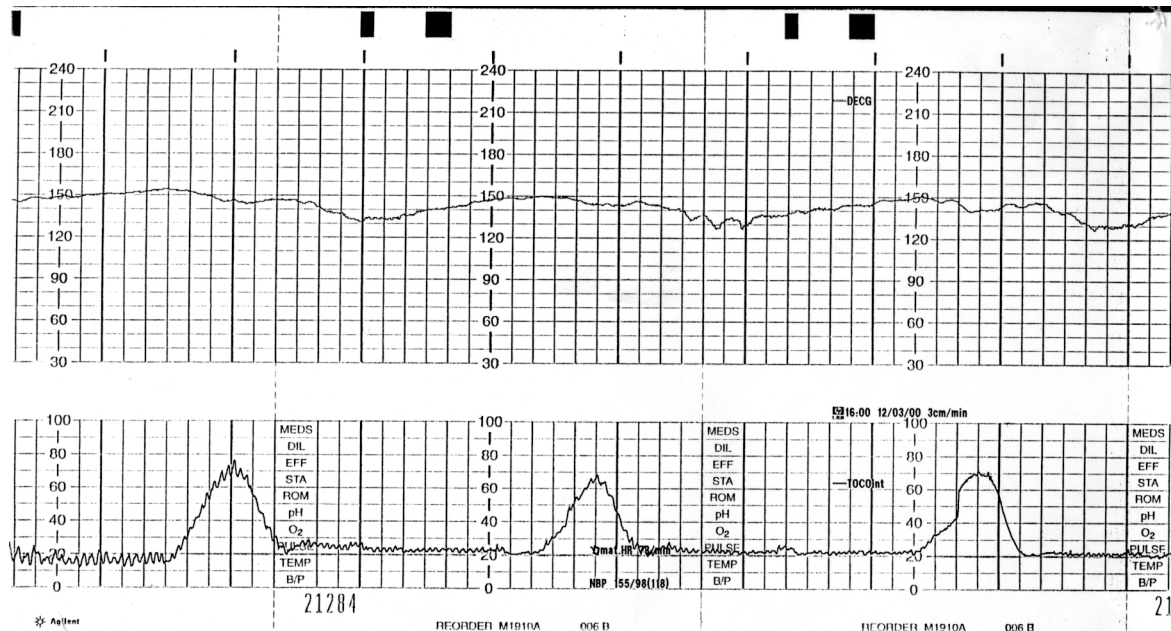
13. The FHR baseline in this tracing should be documented as:

1. 155-165
2. 160
3. Unable to be determined



14. Based on the above tracing of a woman in term in active labor, the main goal of immediate treatment is to:
1. administer oxygen
 2. promote uterine relaxation
 3. treat the underlying infection

The following relates to questions 15-18.



15. A primigravida at 36 weeks gestation has had poorly controlled insulin dependent diabetes for 15 years. She is 3 cm, 100%, and 0 station. There is an intrauterine pressure catheter and spiral electrode in place. Based upon this history, this fetal heart rate pattern most likely indicates decreased

1. amniotic fluid volume
2. baroreceptor response
3. placental function

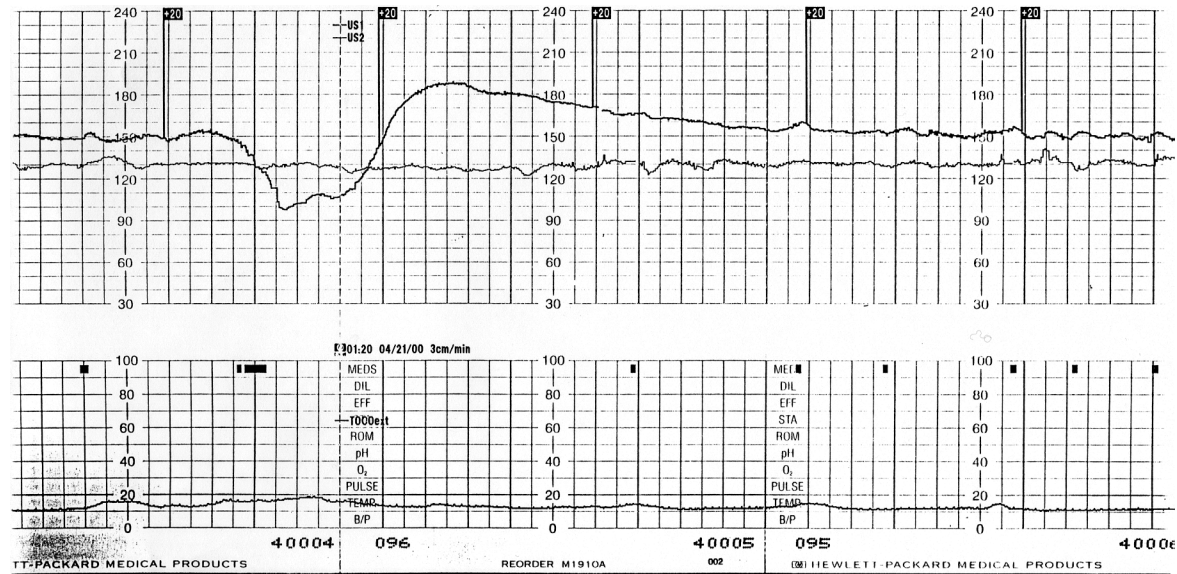
16. The intrauterine pressure would be documented as

1. 20 mm Hg
2. 70 mm Hg
3. moderate

17. Given her history, this woman is at higher risk for

1. anaphylactic syndrome of pregnancy
2. pregnancy induced hypertension
3. pulmonary embolism

The following relates to questions 18-21.



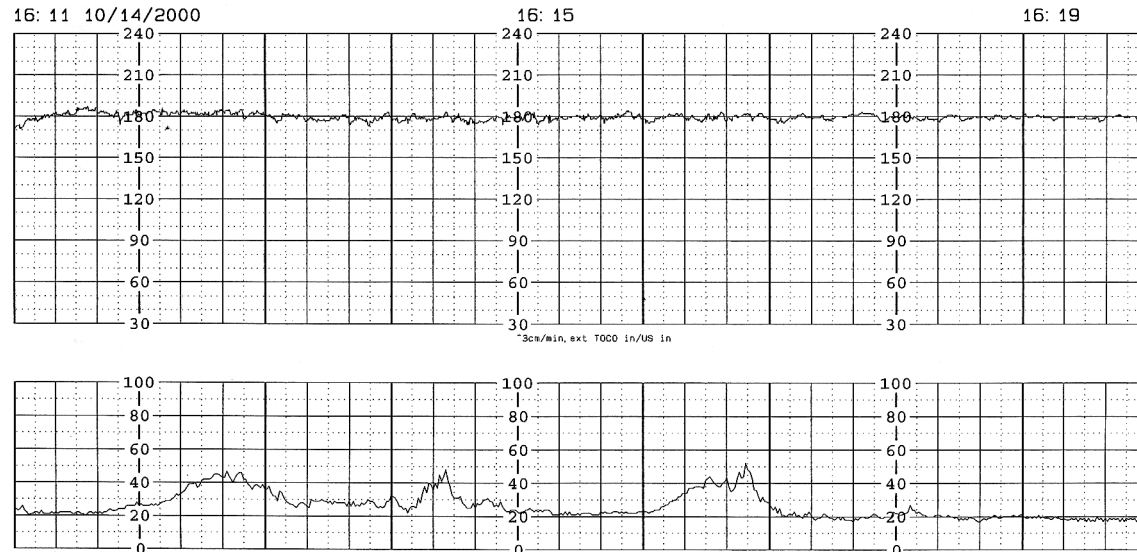
The tracing obtained from a gravida 3, para 1, 28 weeks gestation with monochorionic, diamniotic discordant twins. Twin A is smaller than twin B. The patient was admitted to labor and delivery with preterm contractions. Twin A is the upper tracing (dark line) and twin B is the lower, light tracing.

18. The uterine contraction pattern is best described as

1. hypotonic
2. no contractions present
3. uterine irritability

19. Twin B has variability that is
1. absent
 2. minimal
 3. moderate
20. A nonreassuring tracing is exhibited by
1. Both twins
 2. Twin A
 3. Twin B
21. Twin A has a deceleration that is followed by a(n)
1. lambda pattern
 2. overshoot
 3. secondary acceleration

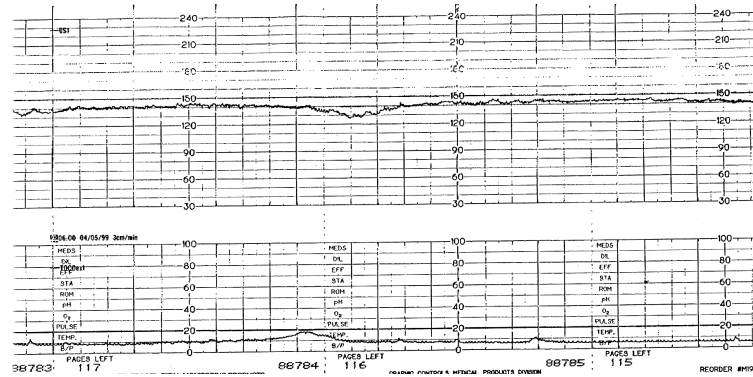
The following relates to questions 22-25.



22. This tracing is that of a primigravida at 39 weeks who is admitted in spontaneous labor. Her history includes a positive group B strep vaginal culture. Based upon this pattern and history, the first maternal assessment should be
1. blood pressure
 2. pulse
 3. temperature

23. The baseline fetal heart rate for most of the tracing is
1. 170-175
 2. 175-185
 3. 180-185
24. This fetal heart rate pattern is best described as
1. minimal variability
 2. saltatory
 3. tachycardia
25. In evaluating reactivity, the nurse notes this tracing to be
1. nonreactive
 2. positive
 3. reactive

The following relates to questions 26-28.



At 34 weeks gestations, a woman (G1, P0) with insulin dependent diabetes is admitted with nausea, vomiting and abdominal pain. The admission tracing is shown.

Vital signs are:

Temperature	97.4°F (36.3°C)
Blood pressure	140/92 mm Hg
Pulse	126 beats per minute
Respirations	16 breaths per minute

The blood sugar is 515 mg/dl.

26. Given this information, the nurse should suspect

1. diabetic ketoacidosis
2. euglycemia
3. insulin shock

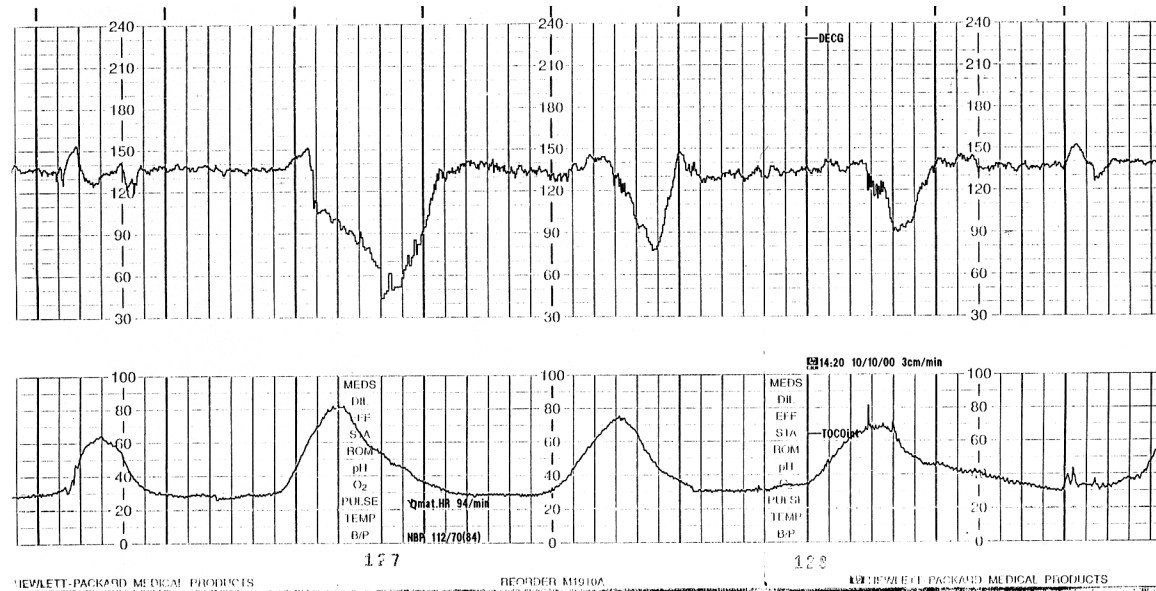
27. The variability in this tracing is best described as

1. absent
2. minimal
3. moderate

28. The best way to improve oxygenation to this fetus is

1. immediate delivery
2. oxygen administration to the mother
3. stabilization of the mother

The following relates to questions 29-32.



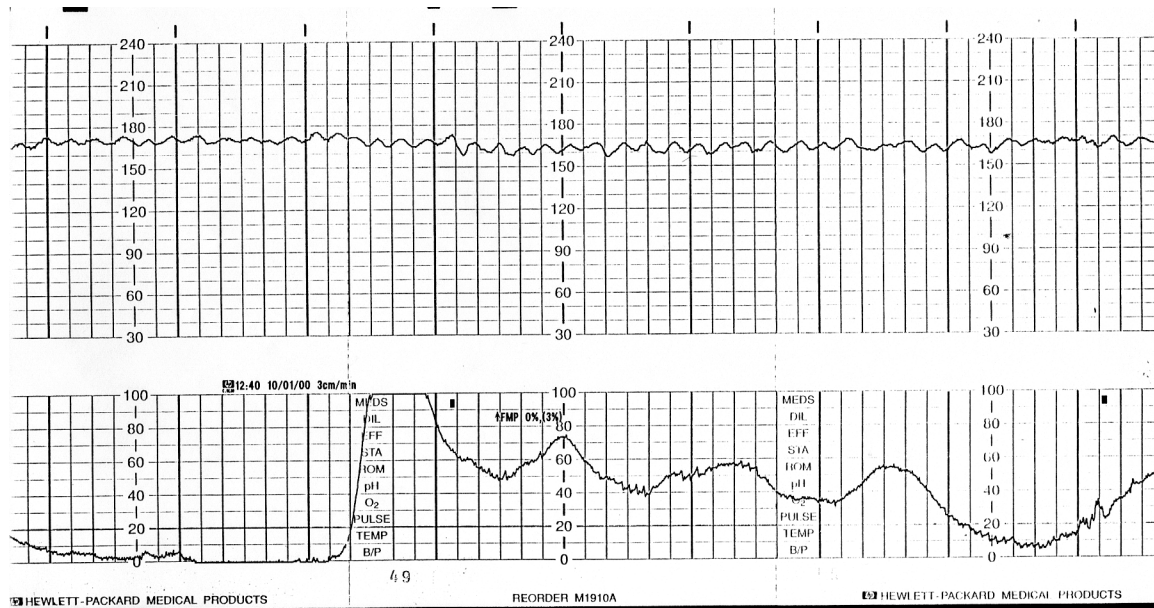
The tracing above is from a gravida 2, para 1 woman at 41 weeks gestation who was admitted in spontaneous labor. Her first delivery was 2 years ago, a spontaneous full term vaginal delivery with no complications. At her last exam 30 minutes prior to this tracing, she was 4 cm, 100%, and 0 station. Her membranes were artificially ruptured one hour ago and there was a small amount of thick meconium. Currently an IUPC and fetal spiral electrode is in place.

29. The uterine resting tone is

1. 30 mm Hg
2. 70-80 mm Hg
3. normal

30. This pattern depicts repetitive decelerations that are
1. early
 2. late
 3. variable
31. The most appropriate initial action would be to
1. administer terbutaline
 2. assess maternal vital signs
 3. perform a vaginal exam
32. Given the woman's history and this tracing, the nurse should anticipate a(n)
1. amnioinfusion
 2. biophysical profile
 3. cesarean delivery

The following relates to questions 33-35.



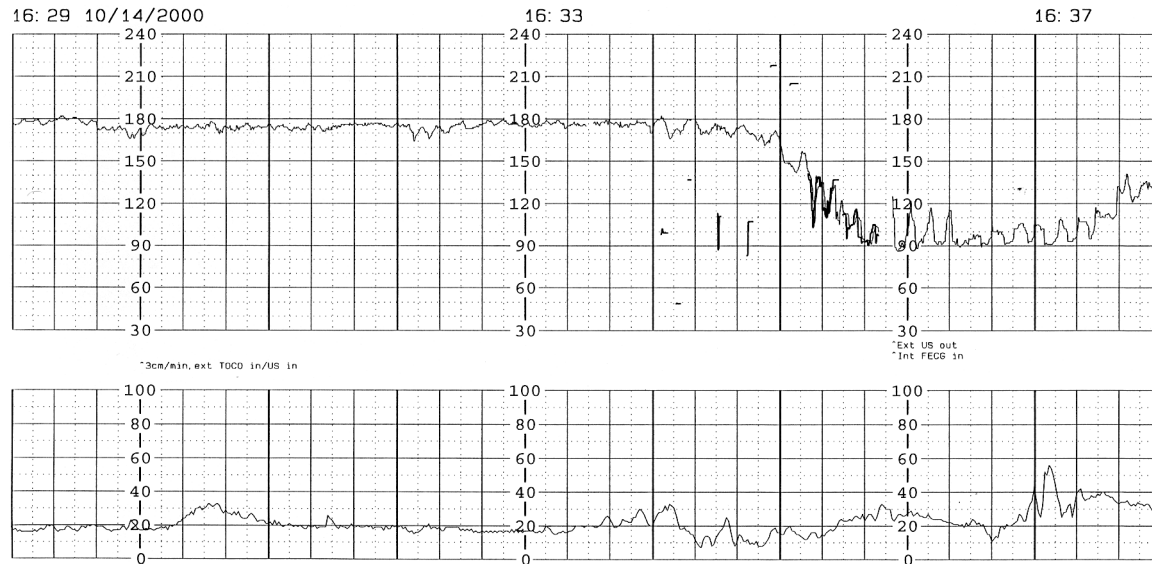
33. The above tracing is from a gravida 2, para 1 woman at 40 weeks gestation. Her pelvic exam is 3 cm, 50% effacement and -2 station. She is being induced for mild elevation in blood pressure. Oxytocin (Pitocin) currently is being administered at 6 mu/min. She received butorphanol (Stadol®) 1 mg, IV, 10 minutes prior to this tracing. Before she received the analgesic, the tracing was reassuring. The nurse should recognize this fetal heart pattern as
1. a lambda pattern
 2. indicative of a fetal bleed
 3. normal after butorphanol (Stadol®)

34. The uterine activity is best described as

1. hypertonic
2. hypotonic
3. normal

35. Based on the uterine activity, the nurse initially should consider

1. administering terbutaline
2. decreasing the oxytocin
3. giving an IV bolus



36. Regarding the above tracing, after repositioning the patient, which one of the following actions should the nurse perform first?
1. administer oxygen
 2. give an IV fluid bolus
 3. vaginal examination

EFM Answer Key

Question	Answer
1	1
2	1
3	2
4	1
5	repositioning administer oxygen infuse IV fluid bolus notify health care provider
6	2
7	2
8	normal baseline rate normal (moderate) variability presence of accelerations absence of decelerations
9	2
10	1
11	1
12	3
13	3
14	2
15	3
16	2
17	2
18	3
19	3
20	2
21	2
22	3
23	2
24	3

Question	Answer
25	1
26	1
27	2
28	3
29	1
30	3
31	3
32	1
33	3
34	1
35	2
36	3