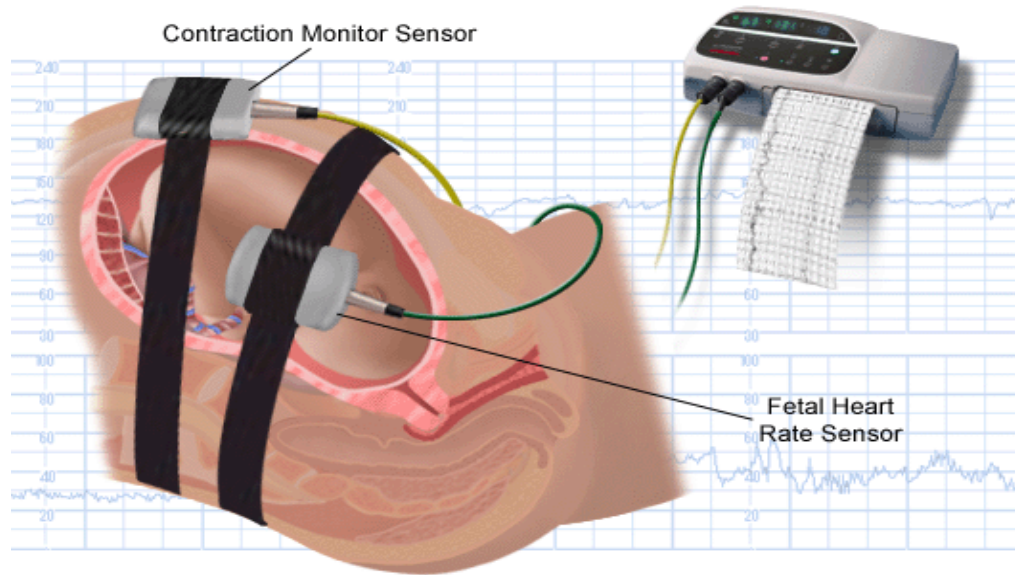
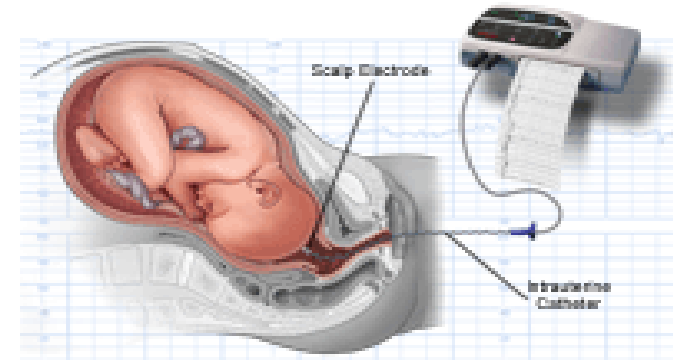


Fetal heart rate monitoring

External Fetal Heart Rate Monitoring

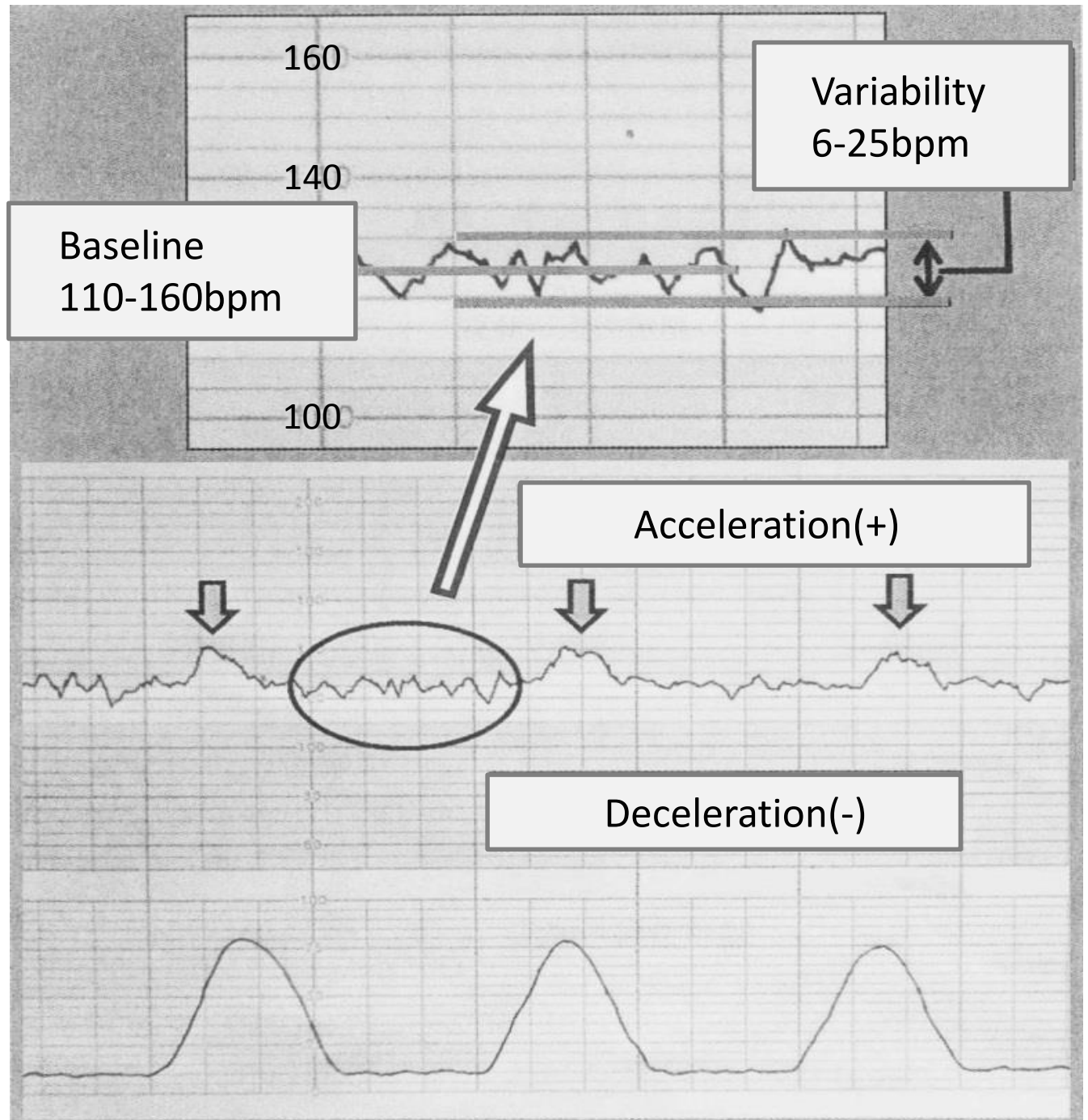


Internal Fetal Heart Rate Monitoring



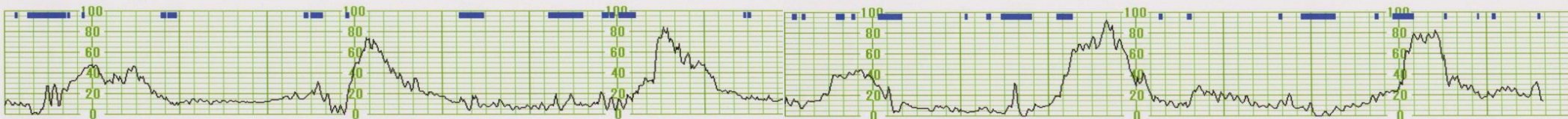
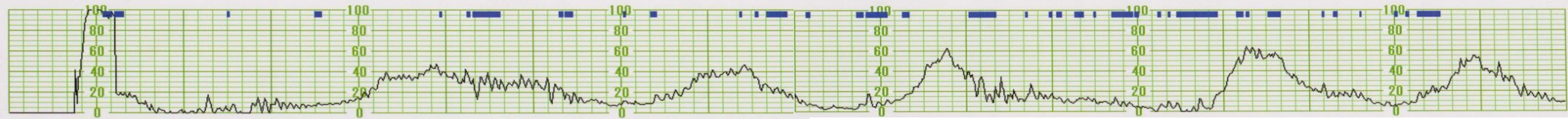
“Normal”
= non-acidemia,
well being

- ① Normal rate
(baseline)
(110-160bpm),
- ② normal variability
(6-25bpm)
- ③ Acceleration(+)
- ④ Decelerations(-)



“Normal” = non-acidemia, well being
normal rate (baseline)(110-160bpm),
normal variability(6-25bpm), acceleration
absence of decelerations

abrupt increase
less than
<30seconds and
less than 2 minutes
in duration.



Acceleration

An acceleration is an abrupt increase in FHR above baseline with onset to peak of the acceleration less than <30seconds and less than 2 minutes in duration. The duration of the acceleration is defined as the time from the initial change in heart rate from the baseline to the time of return to the FHR to baseline.

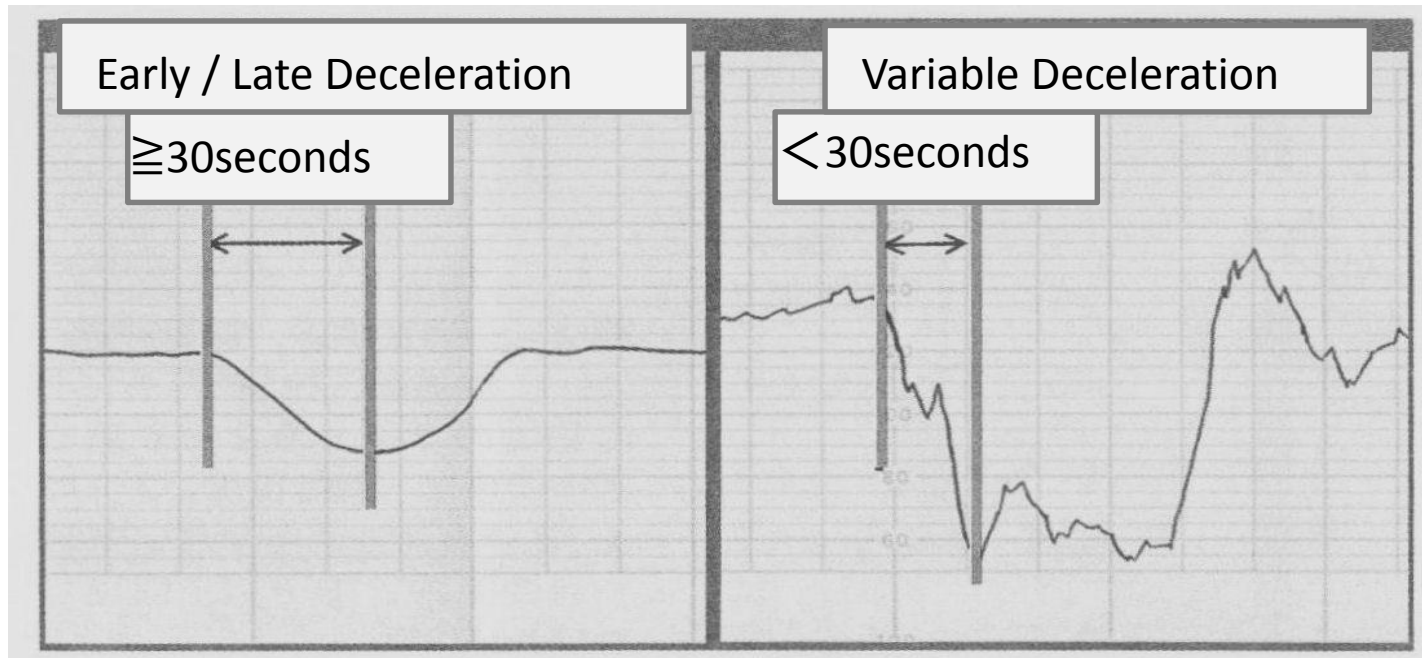
Adequated accelerations are difined as;

<32weeks: ≥ 10 bpm above baseline for ≥ 10 seconds

≥ 32 weeks: ≥ 15 bpm above baseline for ≥ 15 seconds

Prolonged accleration: increase in heart rate lasts for 2 to 10 minutes

The absence of acceleration for more than 80 minutes correlates with increased neonatal morbidity

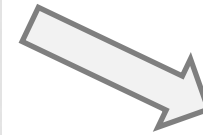
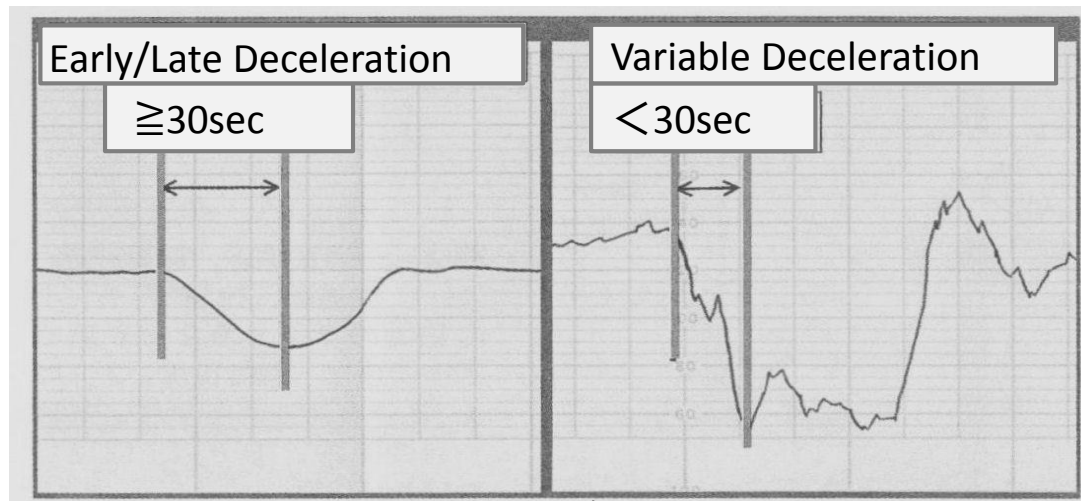


Variable deceleration

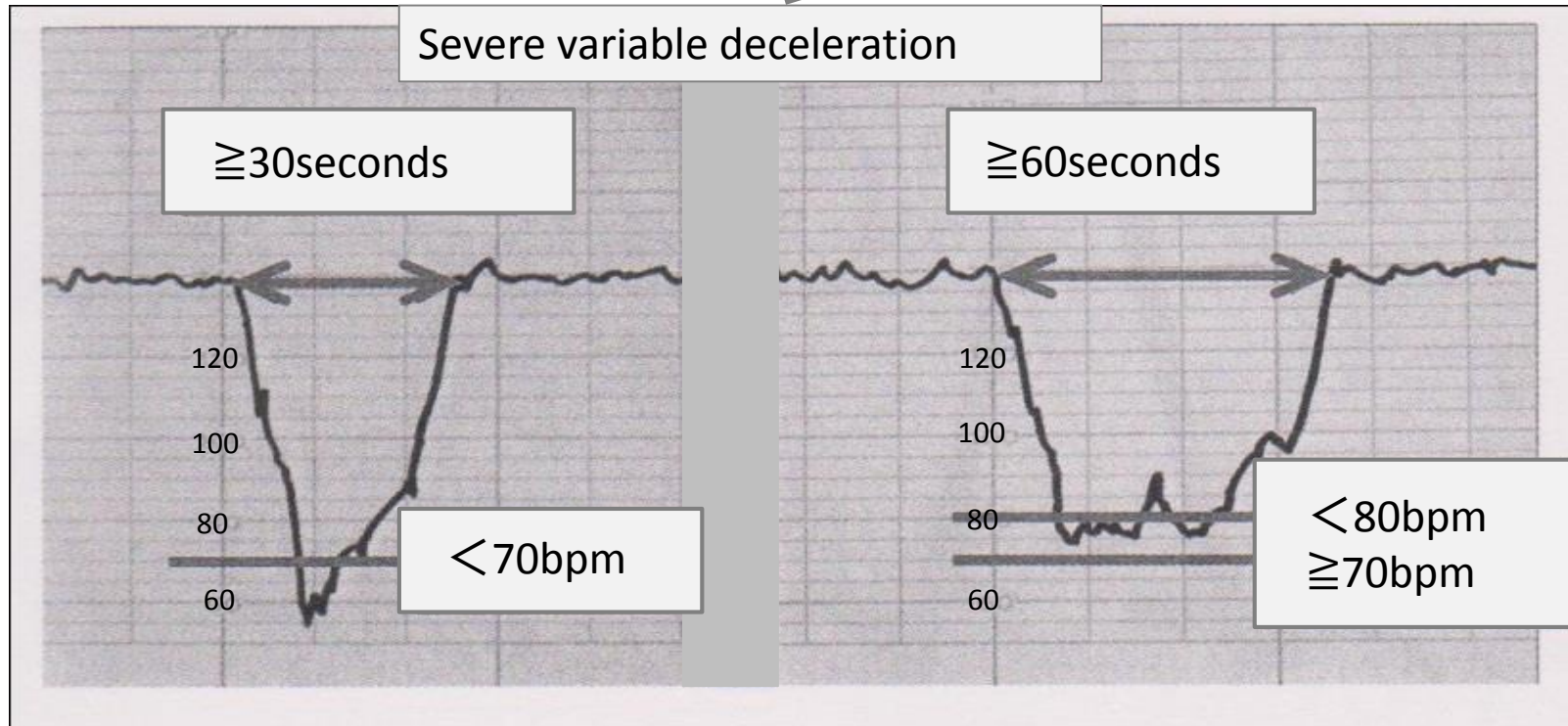
Visually apparent abrupt decrease in FHR.

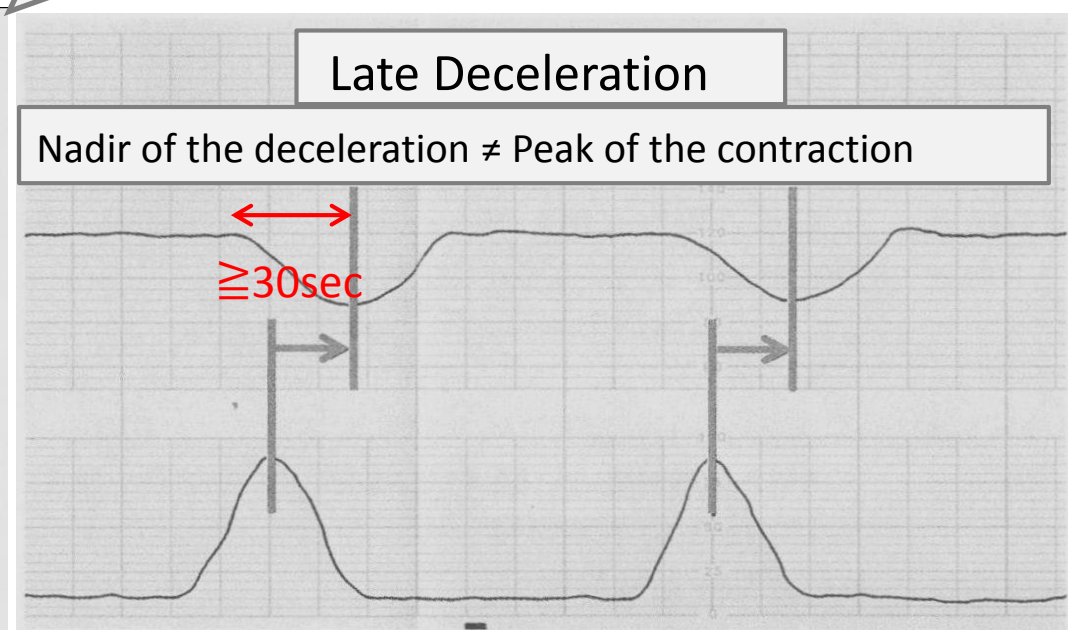
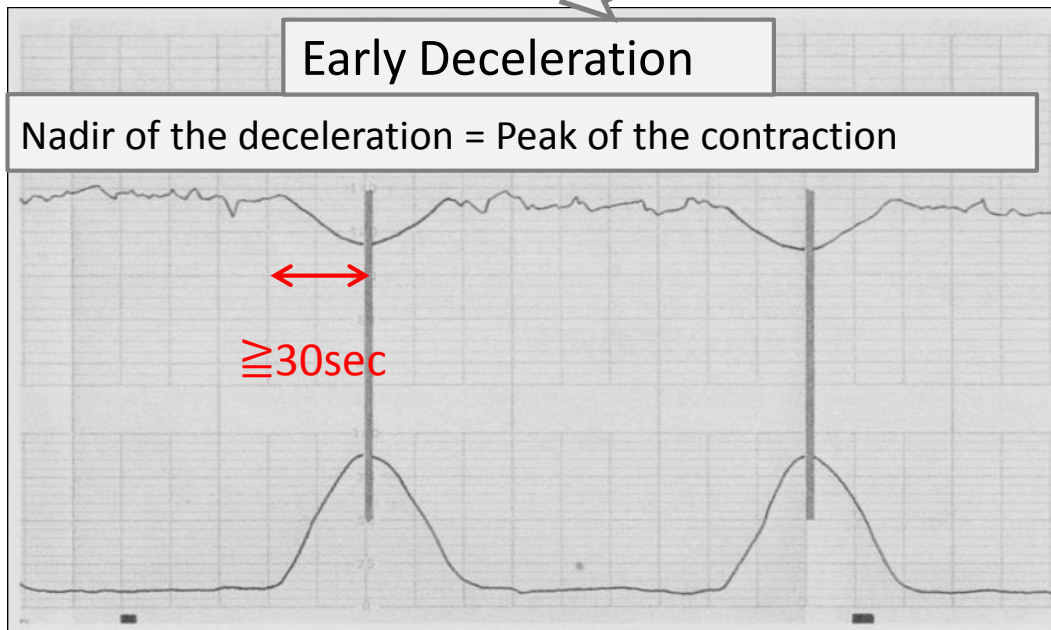
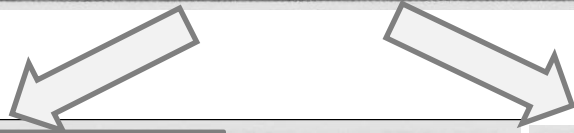
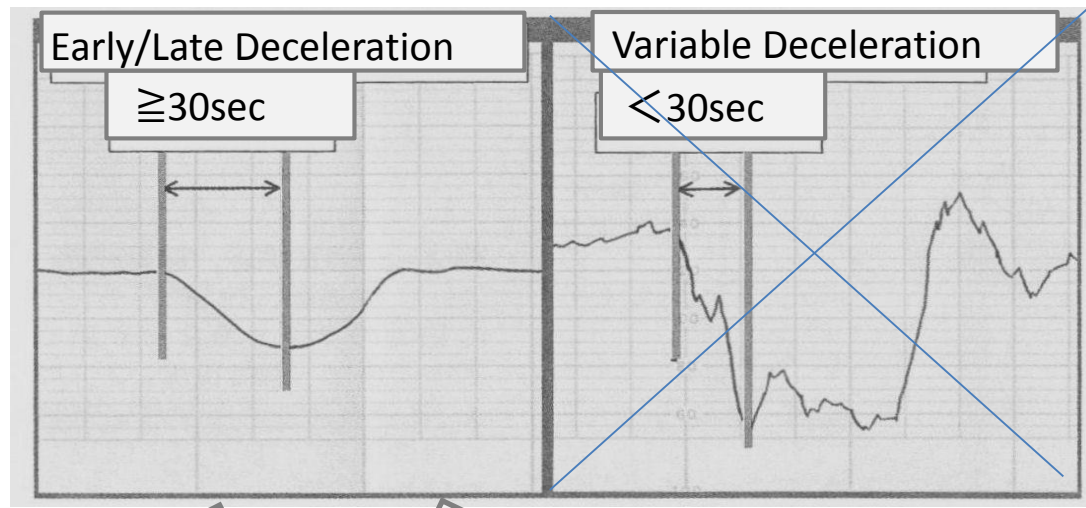
An abrupt FHR decrease is defined as from the onset of the deceleration to the beginning of the FHR nadir of <30seconds. The decrease in FHR is calculated from the onset to the nadir of the deceleration.

The decrease in FHR is >15 beats per minute, lasting >15seconds, and <2minutes induration.



Mild variable deceleration



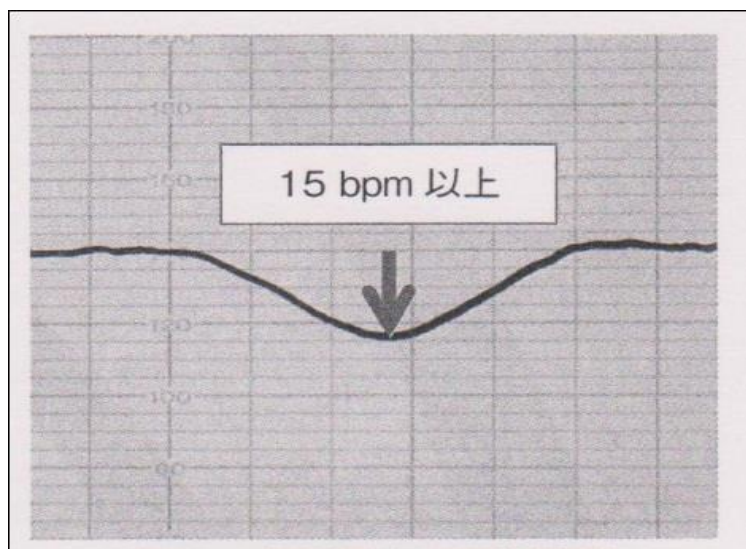
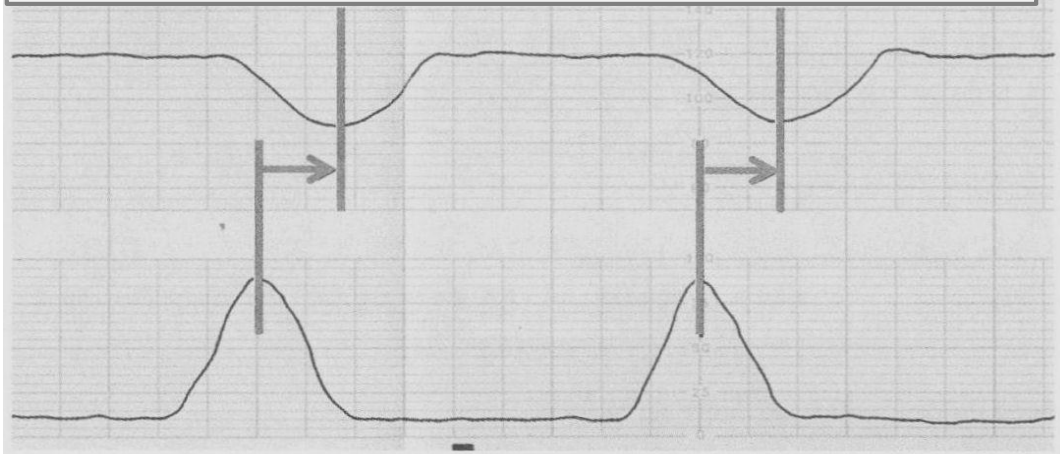


The nadir of the deceleration occurs at the same time as the peak of the contraction.

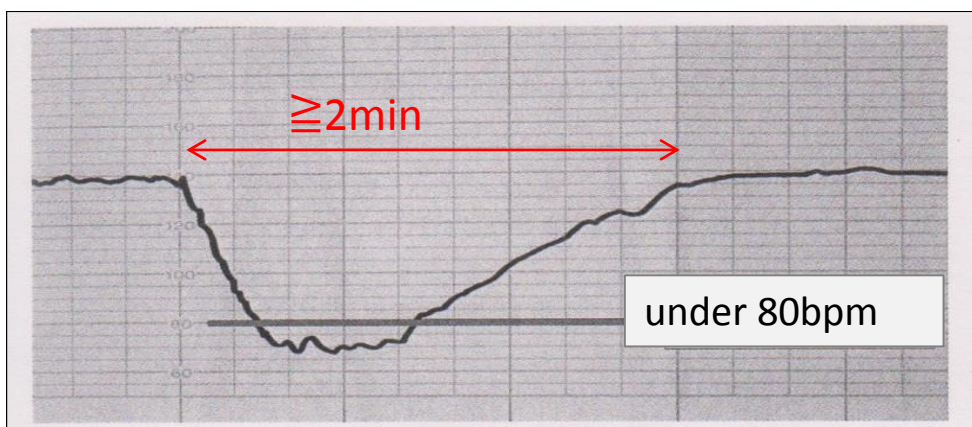
The deceleration is delayed in timing, with the nadir of the deceleration occurring after the peak of the contraction.

Late Deceleration

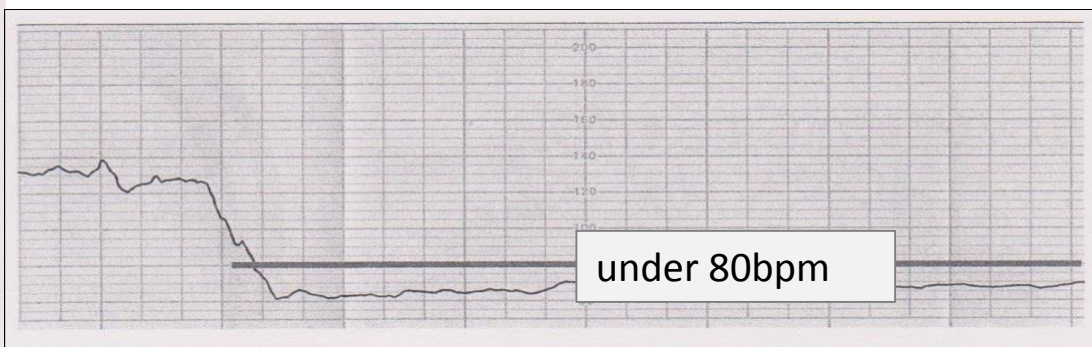
Nadir of the deceleration \neq Peak of the contraction



Severe late deceleration

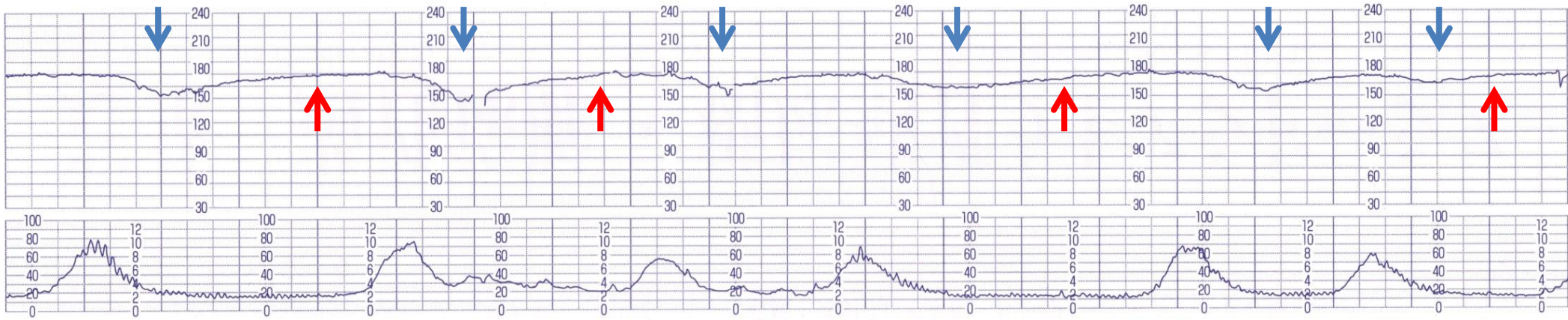


Severe prolonged deceleration



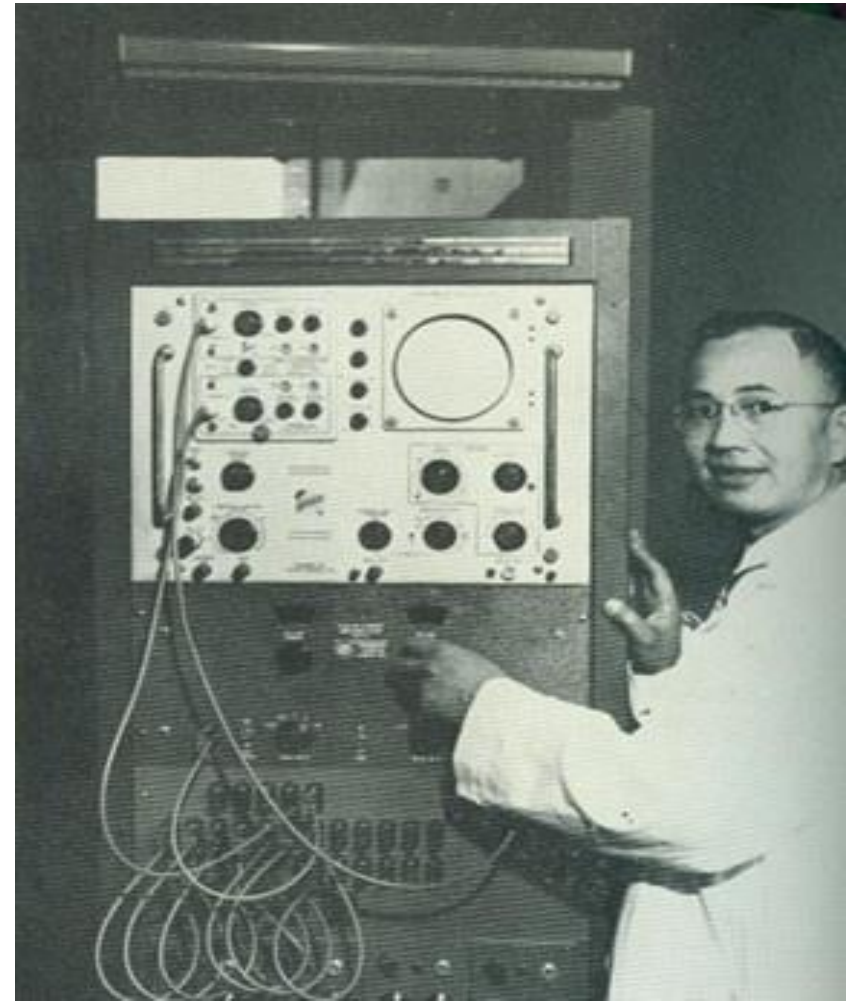
“Abnormal” = acidemia
absent variability with decelerations
or bradycardia

Late deceleration



absent variability

33weeks, 1990g, female, Apgar2-7, UA-pH:6.98,
PO2: 8.2mmHg, PCO2: 67.9mmHg, BE:16.9



Electronic intrapartum fetal heart monitoring was processed by Edward Hon in the late 50's.

3-tiers classification

CATEGORY I TRACINGS: DEFINITION AND MANAGEMENT

— A category I tracing is defined by

- Baseline rate: 110 to 160 beats per minute (beats per minute [bpm])
- Moderate baseline fetal heart rate (FHR) variability (amplitude 6 to 25 bpm)
- No late or variable decelerations
- Early decelerations may be present or absent
- Accelerations may be present or absent

①



CATEGORY II TRACINGS: DEFINITION AND MANAGEMENT

— Category II fetal heart rate (FHR) tracings include all FHR patterns that are not classified as category I (normal) or category III (abnormal)



②

③

④



CATEGORY III TRACINGS: DEFINITION AND MANAGEMENT

— A category III tracing is defined by either of the following criteria:

- Absent baseline fetal heart rate (FHR) variability and (any of the following):
 - Recurrent late decelerations
 - Recurrent variable decelerations
 - Bradycardia

OR

- A sinusoidal pattern

⑤



5 tiers classification in JAPAN

Level 1: normal pattern

Level 2: benign variant pattern

Level 3: mild variant pattern

Level 4: moderate variant pattern

Level 5: severe variant pattern

Moderate variability (6-25bpm)

Deceleration	none	Early	Variable		Late		Prolonged	
Baseline			Mild	Severe	Mild	Severe	Mild	Severe
Normal (110-160)	1	2	2	3	3	3	3	4
Tachycardia	2	2	3	3	3	4	3	4
Bradycardia	3	3	3	4	4	4	4	4
Bradycardia(<80)	4	4		4	4	4		

Minimal variability (≤ 5 bpm)

Deceleration	none	Early	Variable		Late		Prolonged	
Baseline			Mild	Severe	Mild	Severe	Mild	Severe
Normal (110-160)	2	3	3	4	3	4	4	5
Tachycardia	3	3	4	4	4	5	4	5
Bradycardia	4	4	4	5	5	5	5	5
Bradycardia(<80)	5	5		5	5	5		

Absent variability

Deceleration	none	Early	Variable		Late		Prolonged	
			Mild	Severe	Mild	Severe	Mild	Severe
	4	5	5	5	5	5	5	5

Marked variability (≥ 26 bpm)

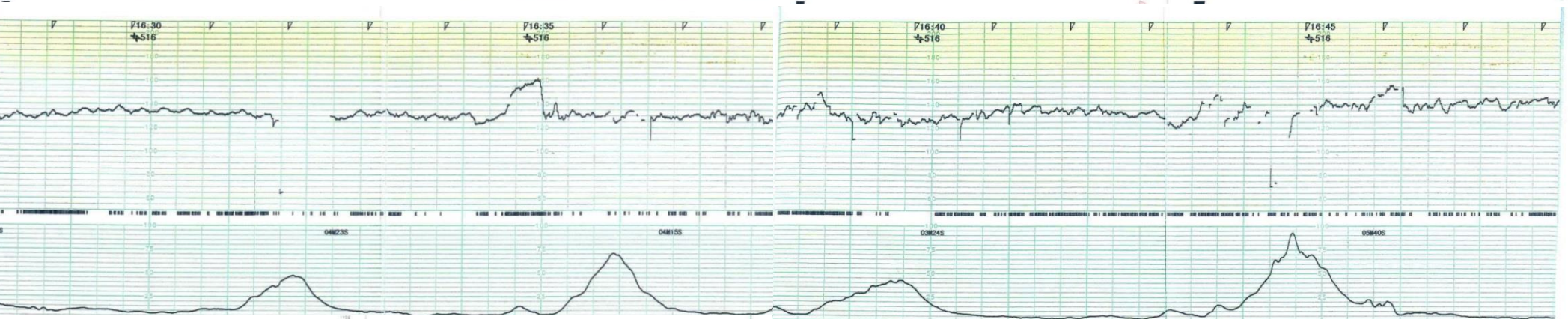
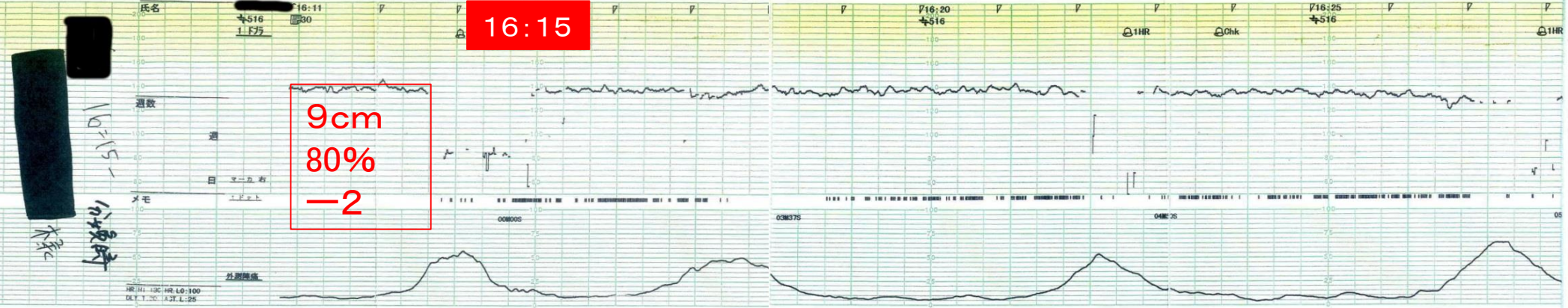
Deceleration	none	Early	Variable		Late		Prolonged	
			Mild	Severe	Mild	Severe	Mild	Severe
	2	2	3	3	3	4	3	4

Sinusoidal pattern

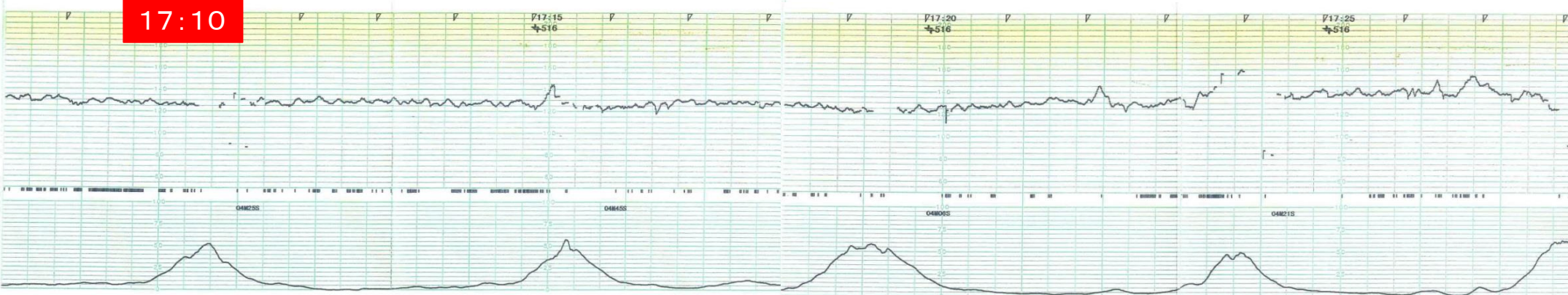
Deceleration	none	Early	Variable		Late		Prolonged	
			Mild	Severe	Mild	Severe	Mild	Severe
	4	4	4	4	5	5	5	5

Level	Management	
	Doctor	Midwife
1	A: observation	A: observation
2	A: observation B: Strengthen check of the fetal condition, conservative treatment	A: observation B: check of the fetal condition, Dr. call
3	B: Strengthen check of the fetal condition, conservative treatment C: conservative treatment, Forced delivery	B: check of the fetal condition, Dr. call C: request a Dr. For attendance, preparation of forced delivery
4	C: conservative treatment, Forced delivery D: Forced delivery, neonatal resuscitation	C: request a Dr. For attendance, preparation of forced delivery D: Forced delivery, neonatal resuscitation
5	D: Forced delivery, neonatal resuscitation	D: Forced delivery, neonatal resuscitation

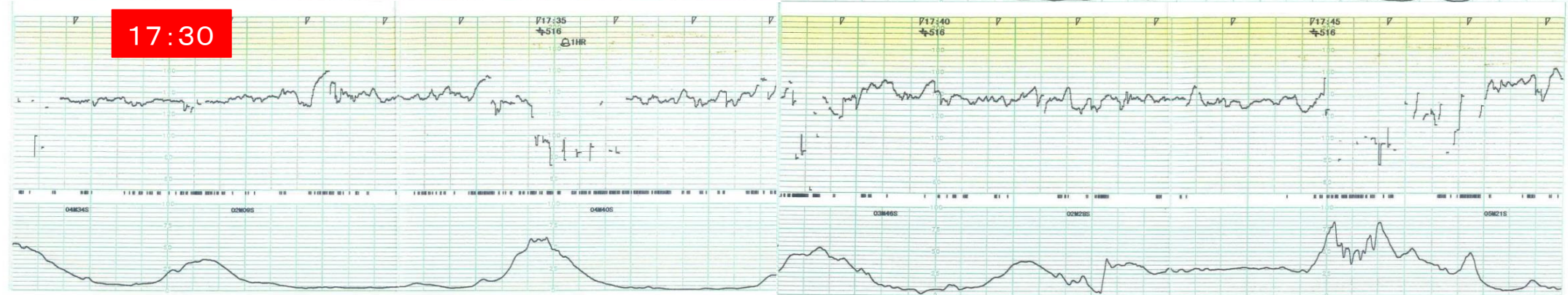
conservative treatment: changing position, oxygenation, hydration, Oxytocin control, amnioinfusion, vibroacoustic stimulation, tocolysis



17:10

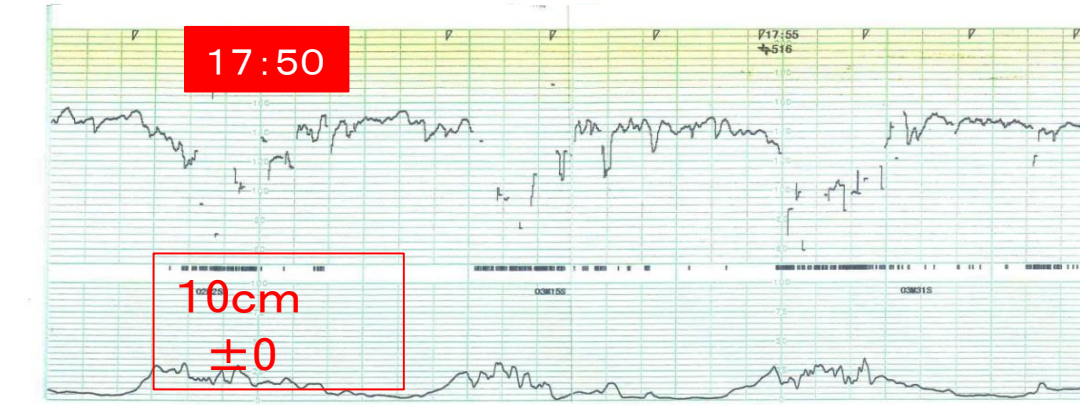


17:30



17:50

10cm
 ± 0



18:00

Appearing



18:10

F18:15
516

F18:20
516

F18:25
516

Crowning

Amniotomy
Meconium(-)

Station +
4

160
120

18:30

F18:35
516

F18:40
516

160
120

18:50

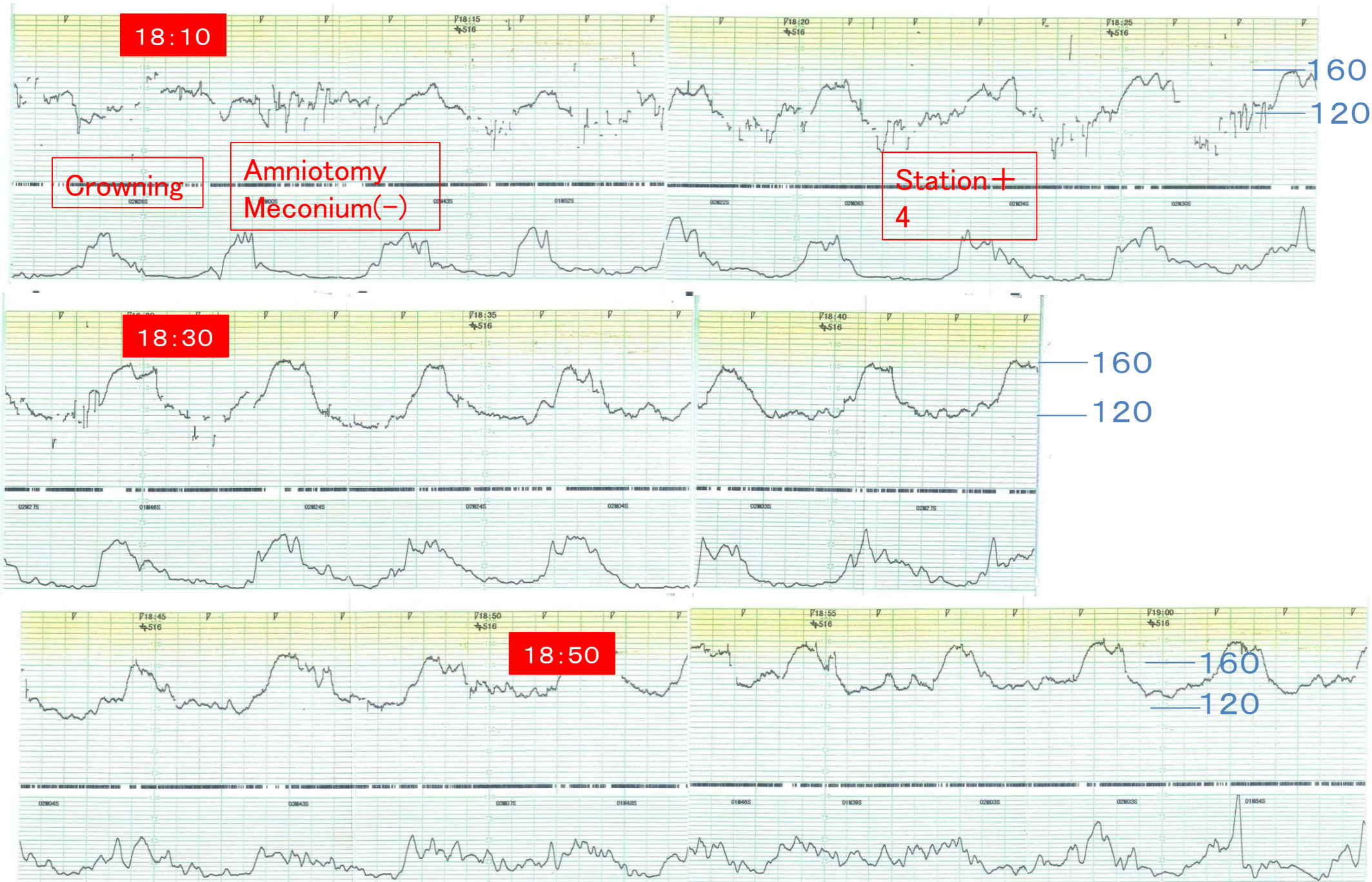
F18:45
516

F18:50
516

F18:55
516

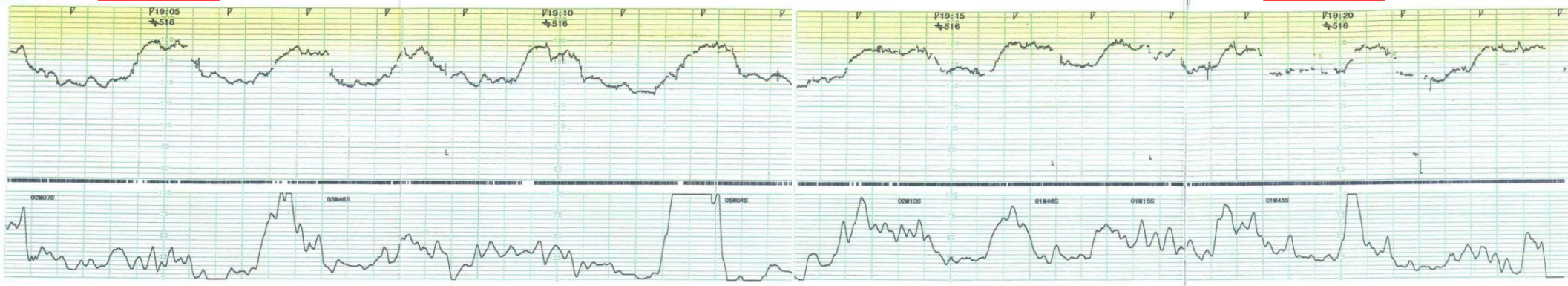
160
120

F19:00
516



19:05

19:20



19:24 Spontaneous vaginal delivery

2498g, female, Apgar 0(1min)→0(5min)→1(11min)

Blood gases of Umbilical artery

UA-pH:6.582, PCO₂:138.3mmHg, PO₂: 15.1mmHg, HCO₃⁻:12.7mmol/L, BE:-29.5mmol/L, BS:85mg/dl

⇒ severe acidemia

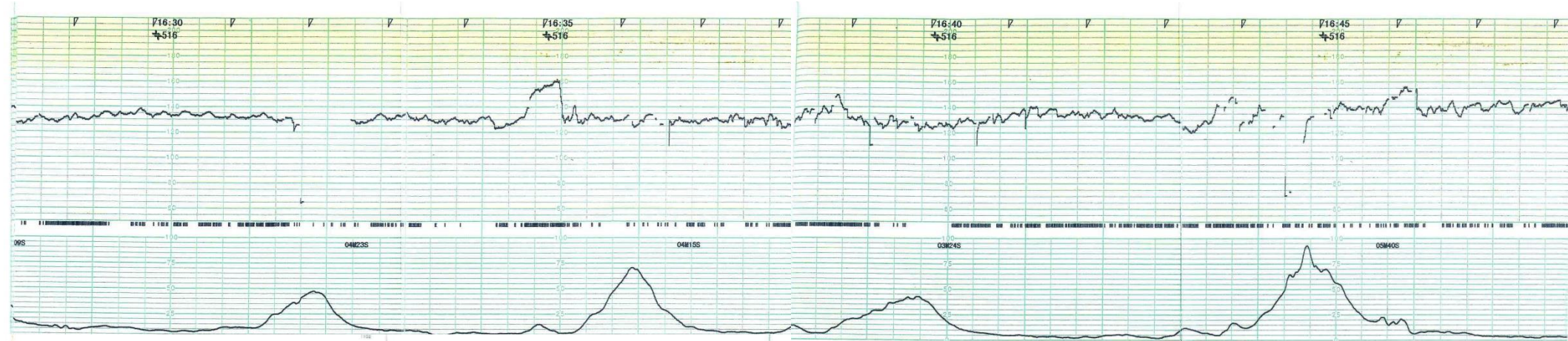
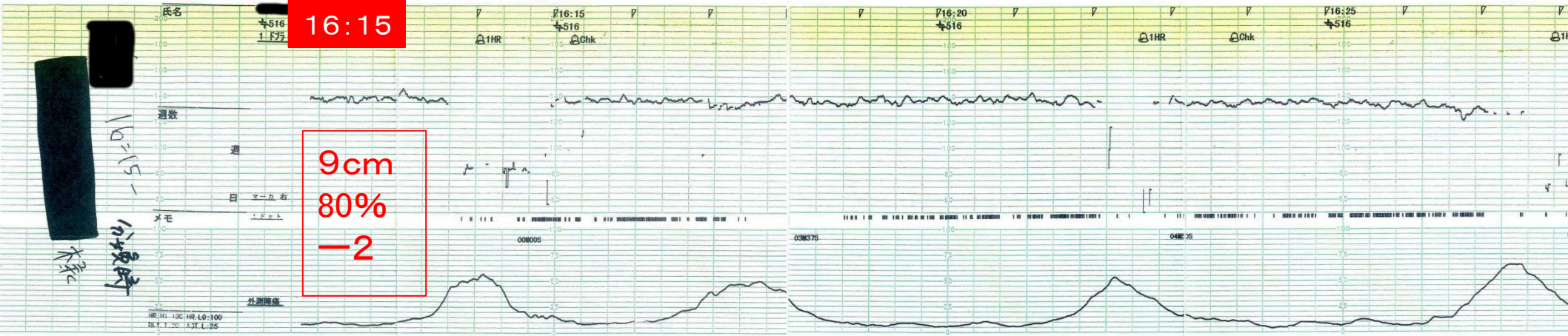
Result: cerebral palsy

16:15

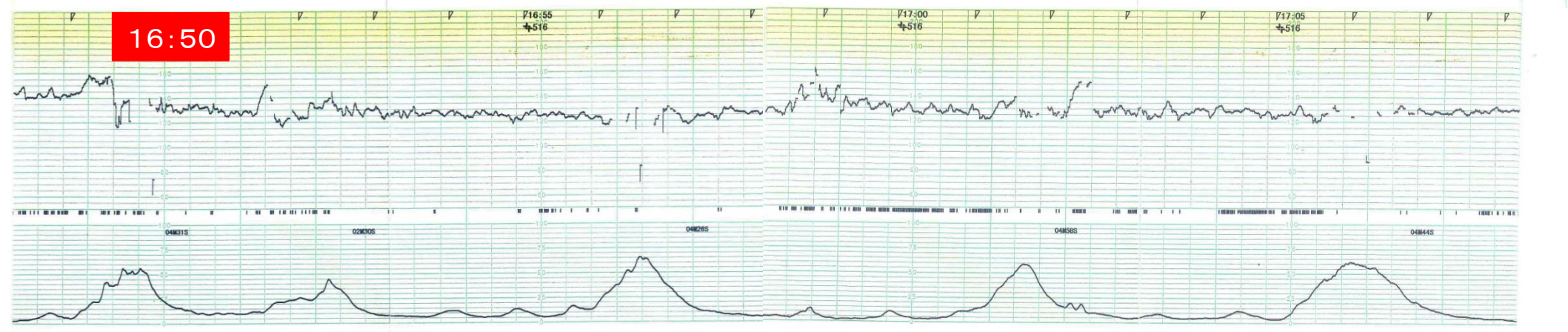
氏名 4516 1.1375

10-15-1
分換時
木原

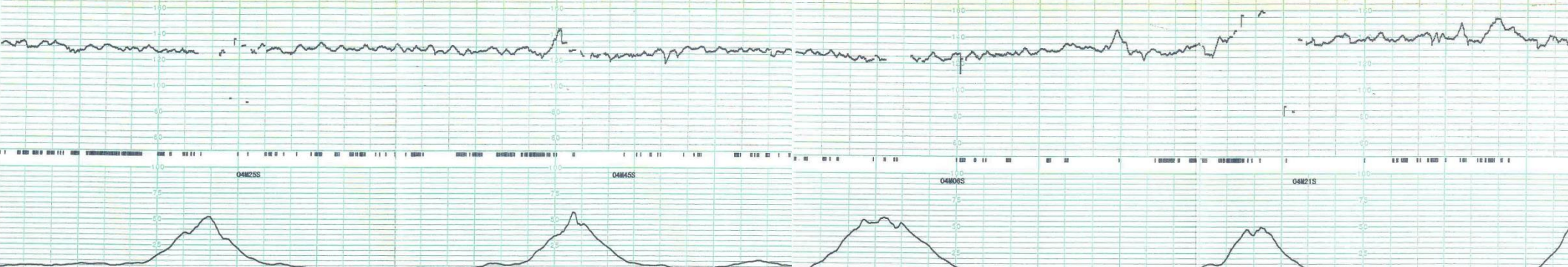
9cm
80%
-2



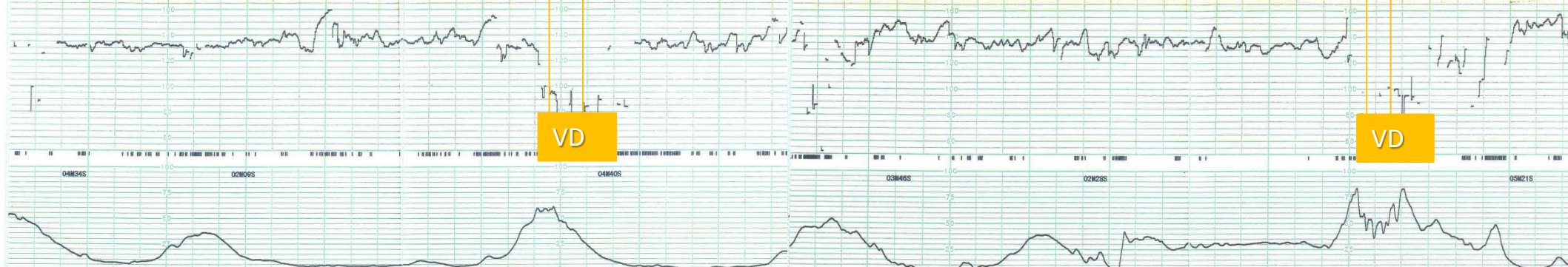
16:50



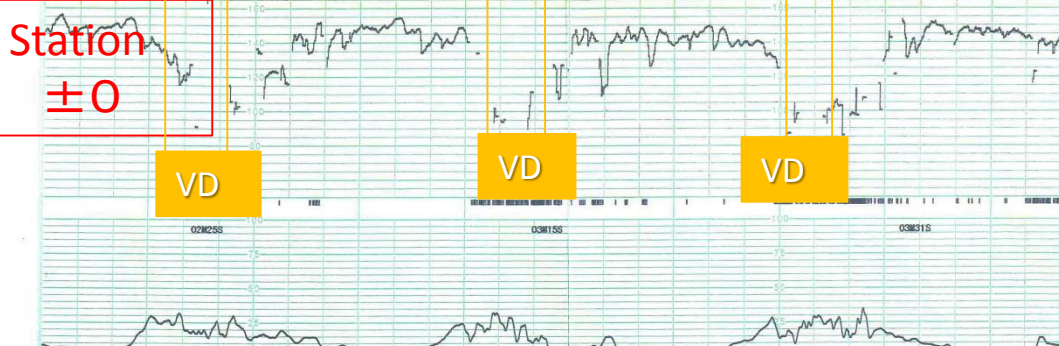
17:10



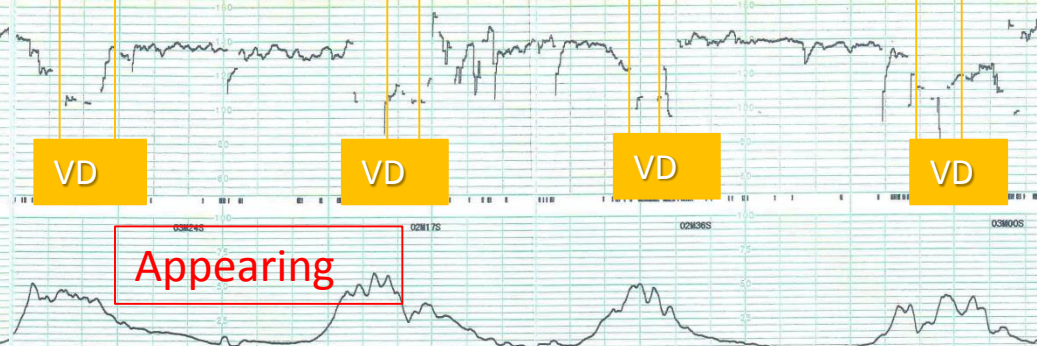
17:30

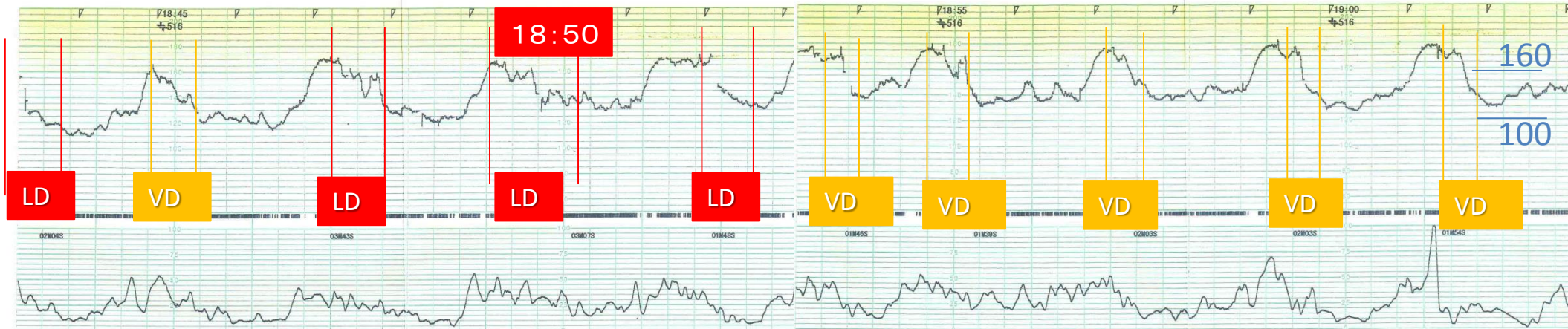
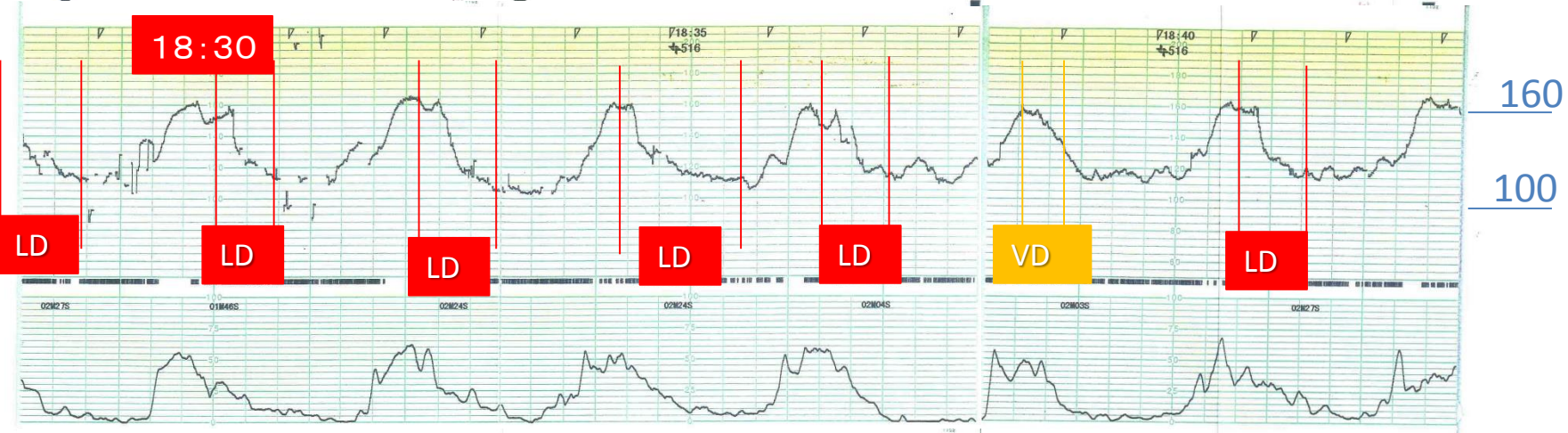
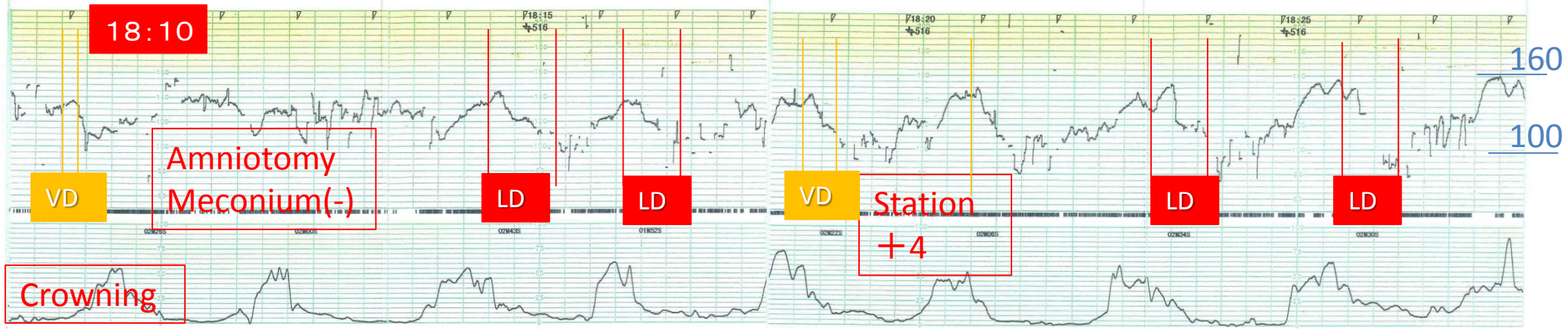


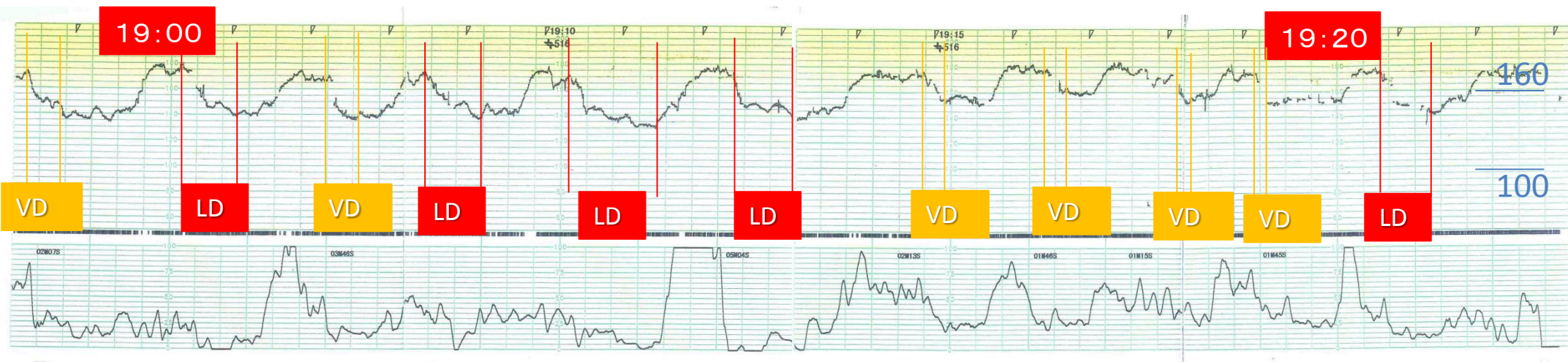
17:50



18:00



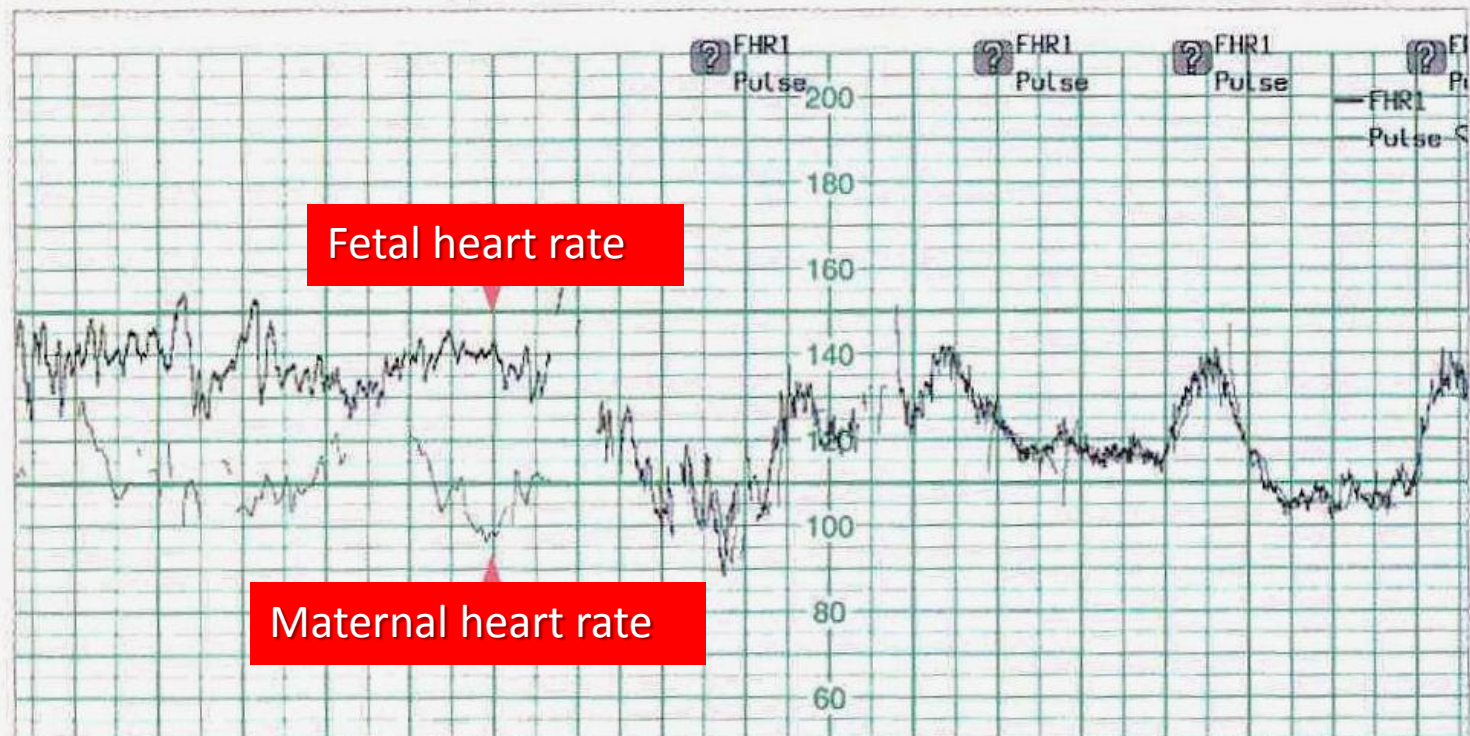




Pathology of the placenta: normal placenta, tumor(-),
 infarction(-), chorioamnionitis(-), cord anomaly(-)

Moderate variability (6-25bpm)

Deceleration	none	Early	Variable		Late		Prolonged	
			Mild	Severe	Mild	Severe	Mild	Severe
Normal (110-160)	1	2	2	3	3	3	3	4
Tachycardia	2	2	3	3	3	4	3	4
Bradycardia	3	3	3	4	4	4	4	4
Bradycardia (<80)	4	4		4	4	4		

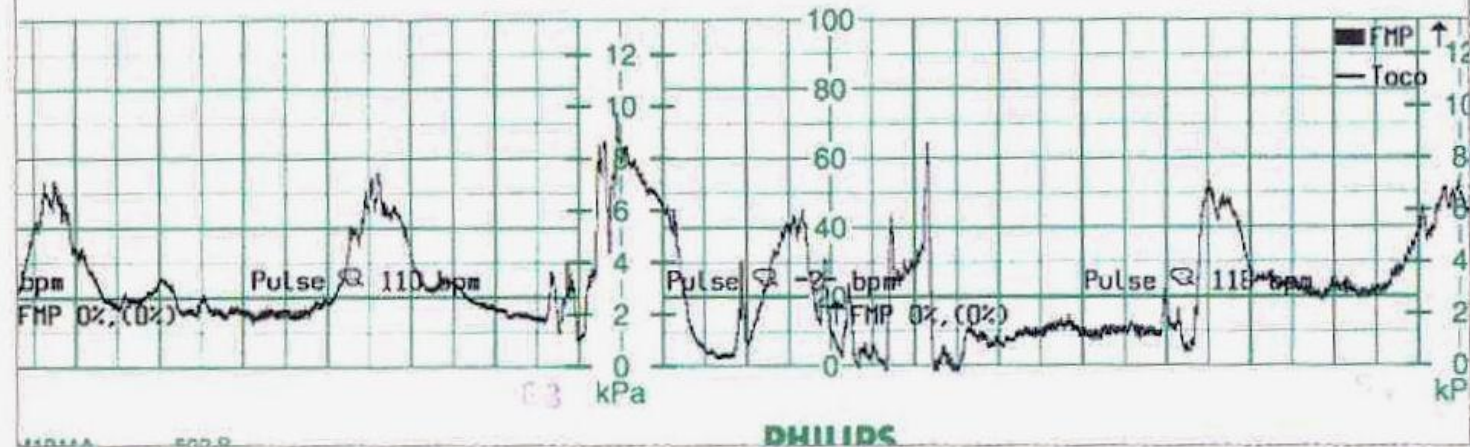


Fetal heart rate

Maternal heart rate

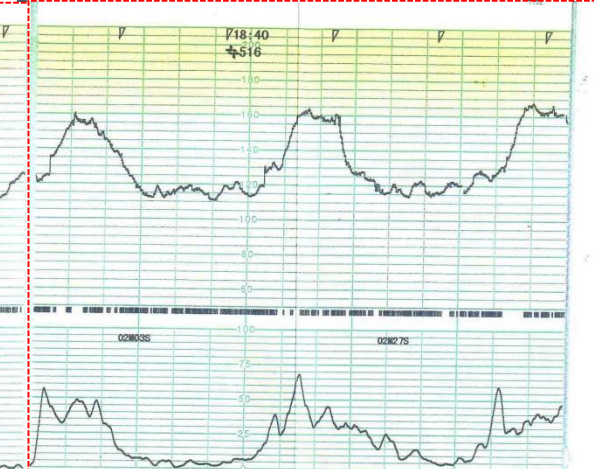
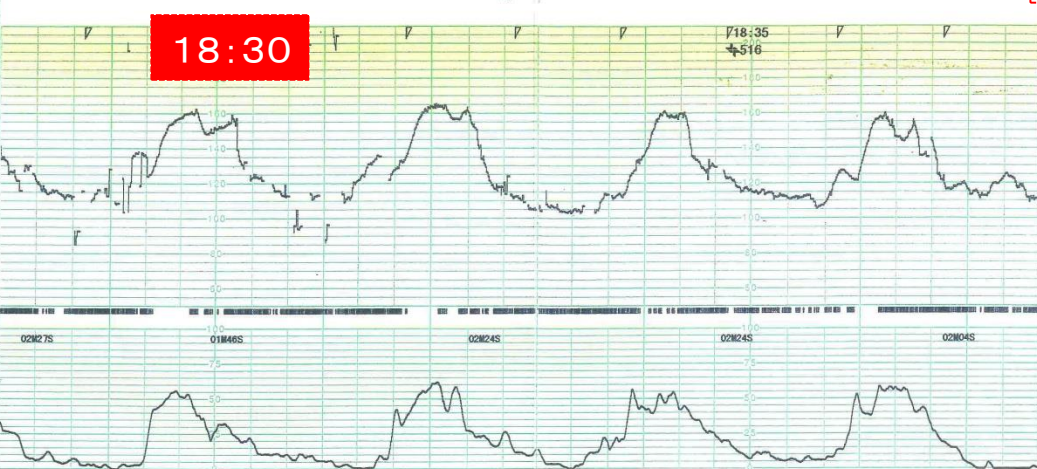
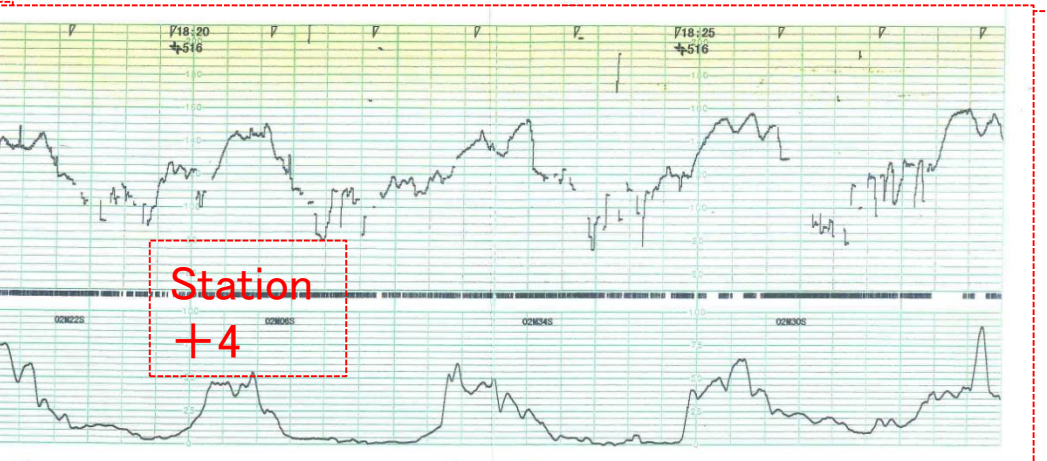
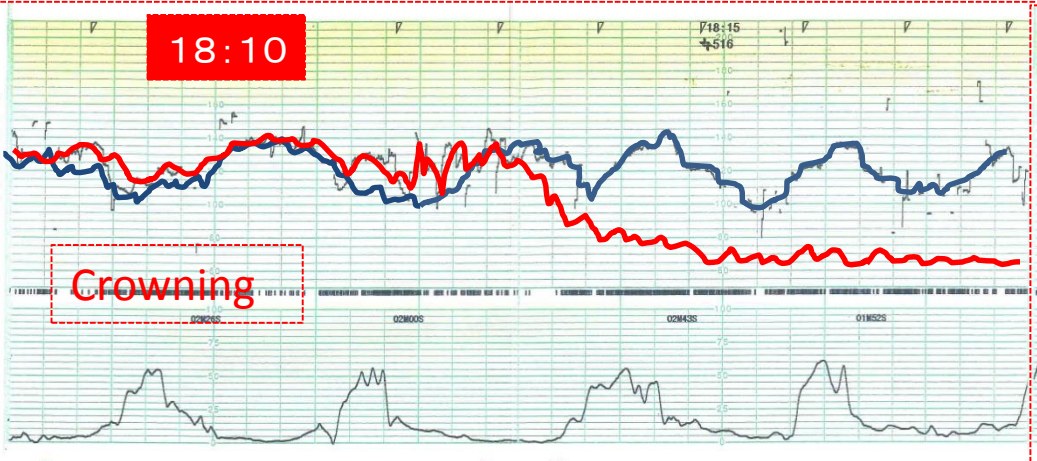
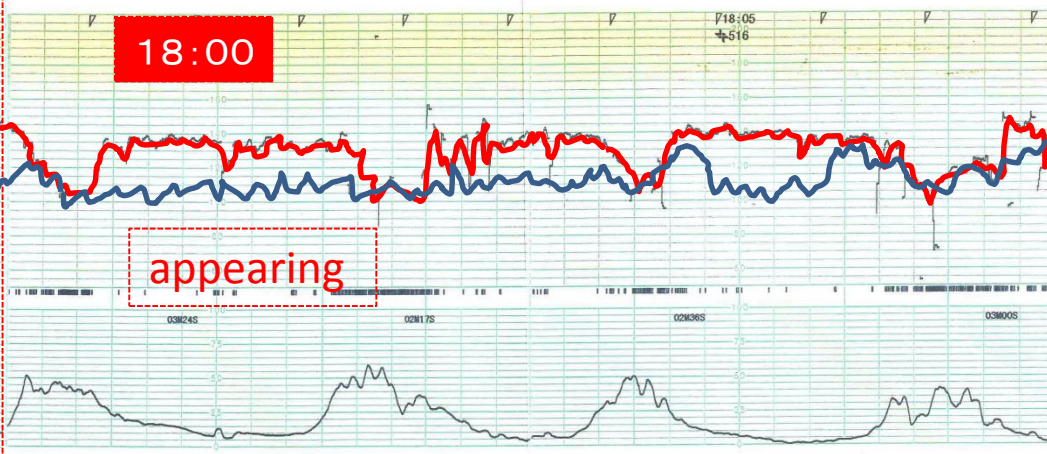
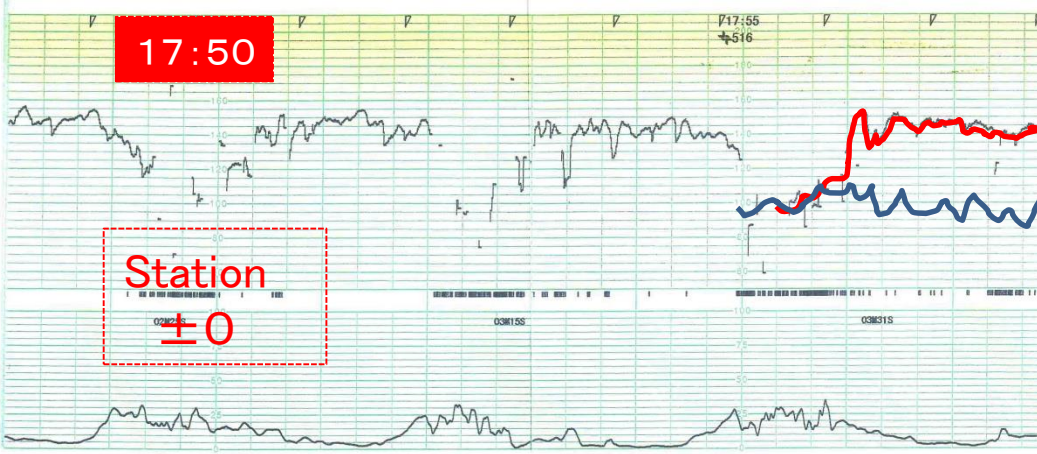
↑ 12:50, 13 Nov 2009, 1 cm/min

↑ 13:00, 13 Nov 2009, 1 cm/min



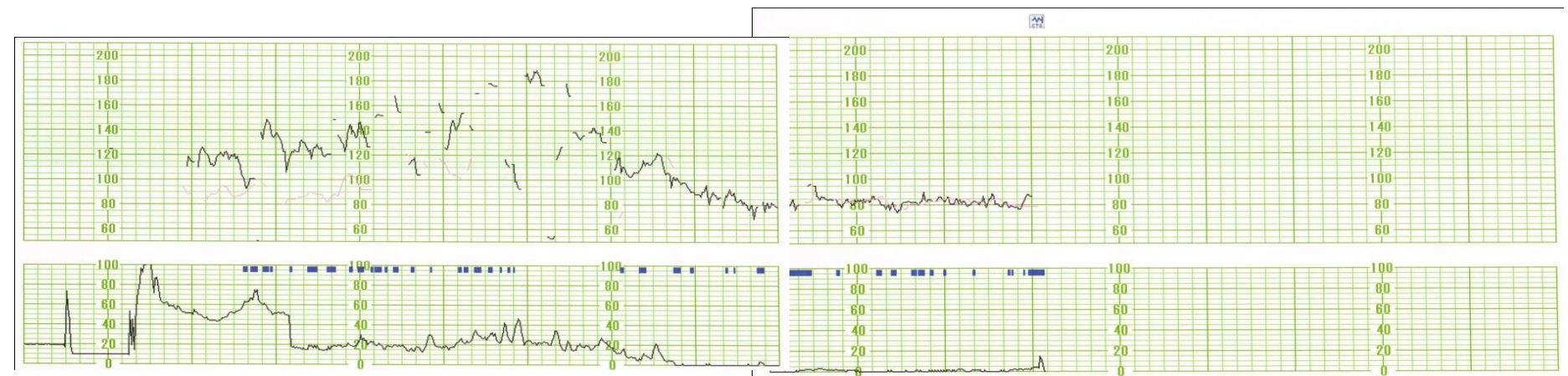
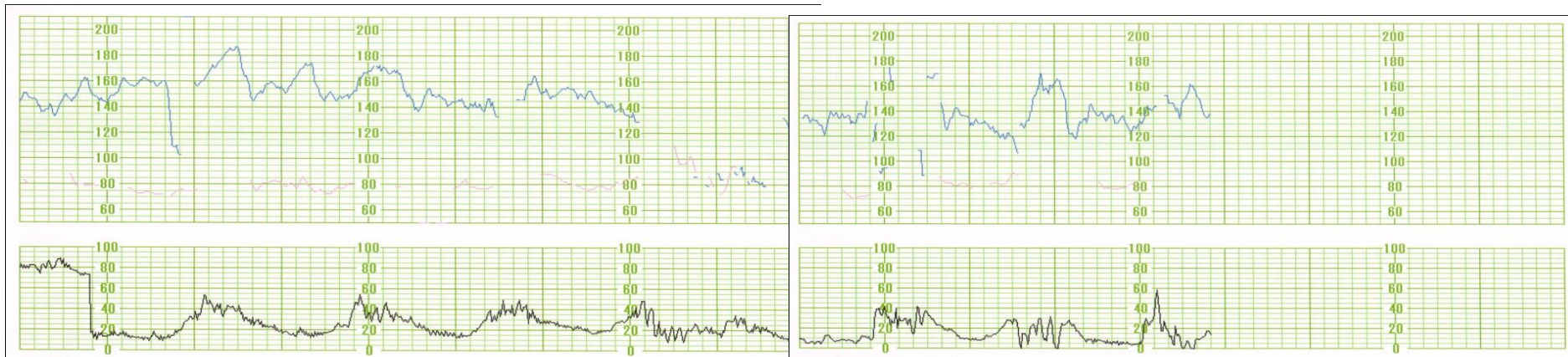
48000 500.0

DHILDS



— Maternal heart rate

— Fetal heart rate



スライド差し替え予定