

CONGRESO
separ
MADRID 2017
2-5 JUNIO



Case 1

Level of difficulty: 2/5

Summary

- BULBAR ALS
- Ventilation 24h/24, Good tolerance
- PaO₂ 82; PaCO₂ : 42, pH=7,42 (under ventilation)

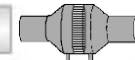
Settings in the ventilator

- Mode: S/T
- Main parameters :
- Pressure Support +12
- Variable EPAP (4-14)
- Backup rate: 12
- Secondary parameters:
 - Trigger 3
 - Cycling 3
 - Ramp 200ms
 - Ti min/max ?.

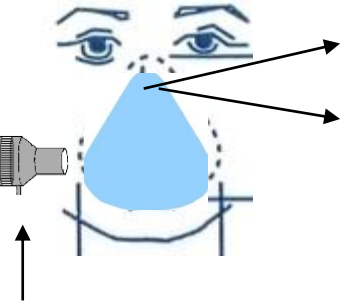
Ventilator /interface

- Ventilator: PRISMA Lowenstein

- Circuit



- Bucconasal
masjintentional
leak

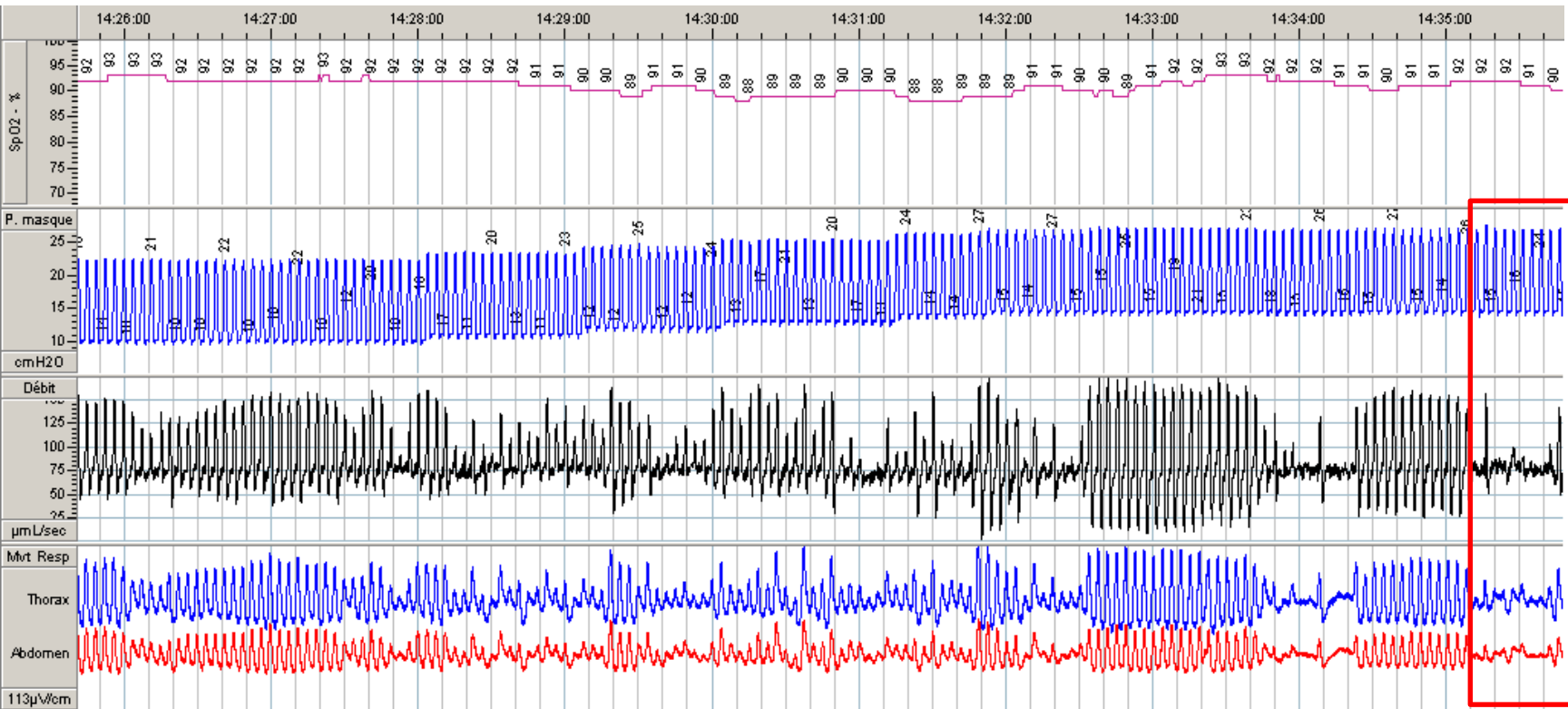


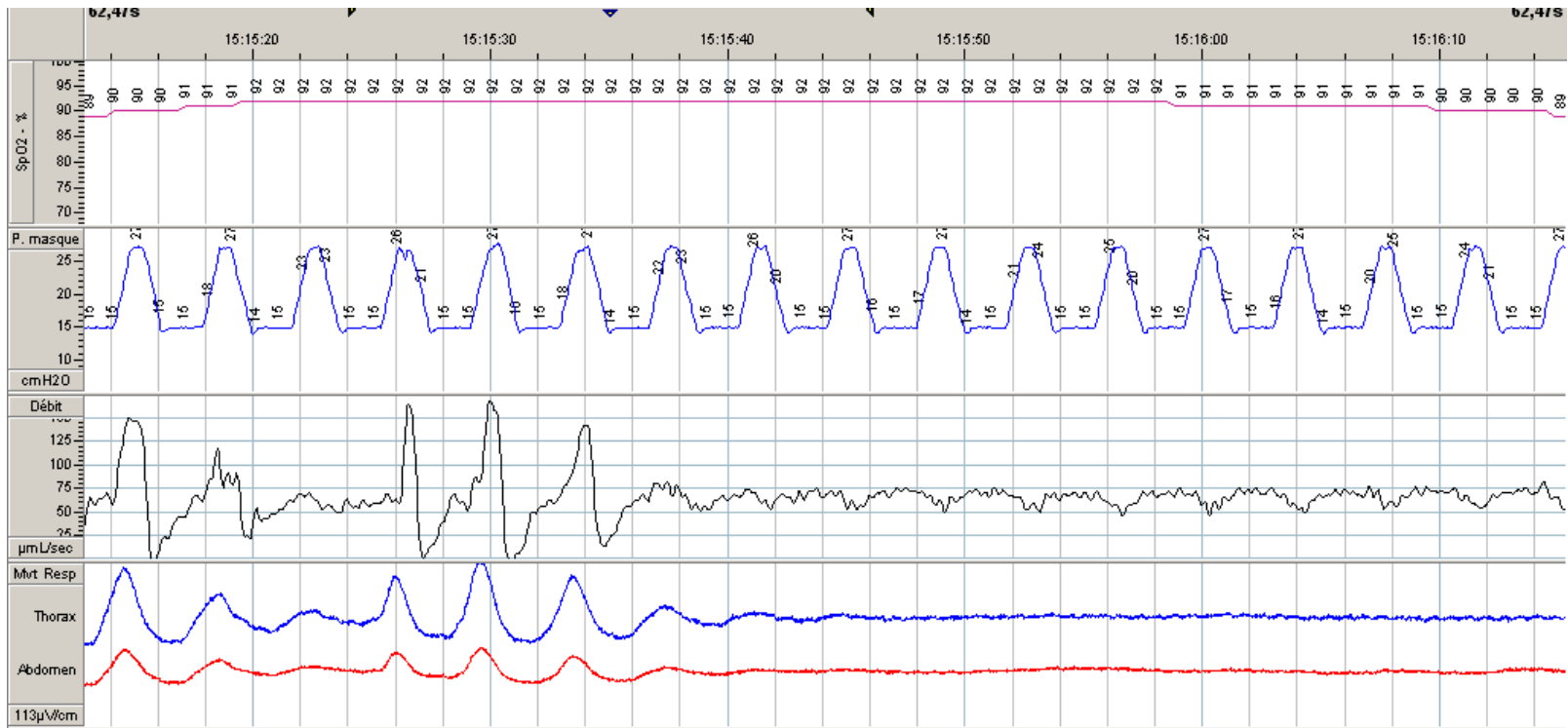
Monitoring procedures

- *Built in software NO*

- Polygraph

- Pneumotach
- Belts





Possible answers

- 1 Obstructive event without effort
- 2 Obstructive event with effort
- 3 Massive Leaks
- 4 Technical dysfunction of the device

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Case 2

Level of difficulty: 3/5

Summary

- 72-year-old female
- **TB sequelae:** Right upper lobe lobectomy 1967, apical pleural thickening. BMI 30 kg.m⁻²
- HMV was started 8 years ago
- Well tolerated, 8hr/night
Morning headache, sleepiness (ESS 10)
- FVC 1.24 (48%), FEV1 0.75 (42%), FEV1/FVC 61%
- ABG (Room air): pH 7.43, PaO₂ 74, PaCO₂ 46, Bic 29, Sat 96%

Settings in the ventilator

- Mode: ST (VPAP IV, Resmed®)
- IPAP 16/EPAP 6
- Backup rate: 15x'
- Secondary parameters:
 - Trigger, medium
 - Cycling, medium
 - Rise time, 200ms
 - Ti min/max, 0.5/1.6 sec.

Ventilator /interface

- Ventilator:



- Single-limb circuit



- Facial mask with intentional leak

Monitoring procedure

- Overnight polysomnography
 - EEG /EOG / EMGchin / Video
 - External pneumotach
 - Mask pressure transducer
 - Chest and abdominal belts
 - Snoring, body position
 - ECG, SpO2, TcCO2
 - Surface diaphragm EMG.

What is your diagnosis?

- 1. Leaks
- 2. Obstruction of the upper airway with effort
- 3. Decrease of the ventilatory command
- 4. None of the previous.

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Case 3

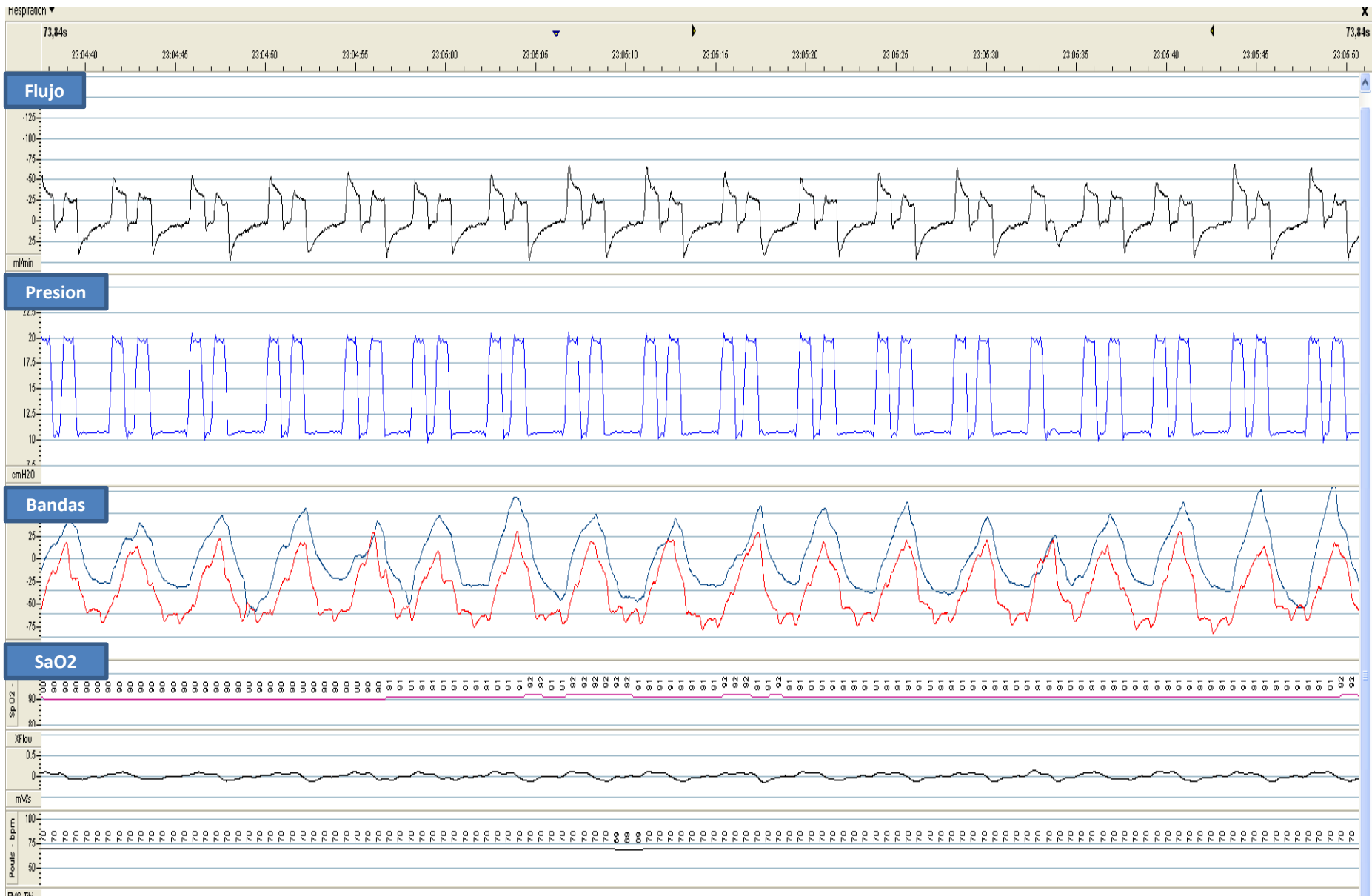
Level of difficulty: 4/5

Summary

- COPD + SAHS (overlap syndrome)
- Uncomfortable with the ventilator during sleep.

Settings in the ventilator

- Mode: (VPAP IV, Resmed®)
S9 Resmed, mode ST
IPAP 20, EPAP 11, FR de backup
20 Secondary parameters:
 - Trigger, medium
 - Cycling, medium
 - Rise time, 200ms
 - Ti min/max, 0.5/1.6 sec.



What is your diagnosis?

- 1) Double triggering
- 2) Auto triggering
- 3) Reverse triggering
- 4) Uncoupling

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Case 4

Level of difficulty: 5/5

Summary

- Cystic Fibrosis in 28 yrs old man, waiting for transplantation
- ABG during the day time (O₂=2 l/min):
PaO₂= 65 mmHg, PaCO₂= 70 mmHg
pH=7.34
- Night time ventilation well tolerated
- Respiratory Function Tests:
FEV₁/FVC=34%, FEV₁= 24% pred,
FVC= 46% pred; TLC= 60% pred.

Settings in the ventilator

- Mode: APCV
- Main parameters (IPAP=26/EPAP=5)
- Backup rate: 12
- Secondary parameters:
 - Trigger= 1
 - Ti=1.0
 - Ramp=1

Ventilator /interface

•Ventilator: VIVO50 Breas



•Circuit



•Facial Mask/ Valve

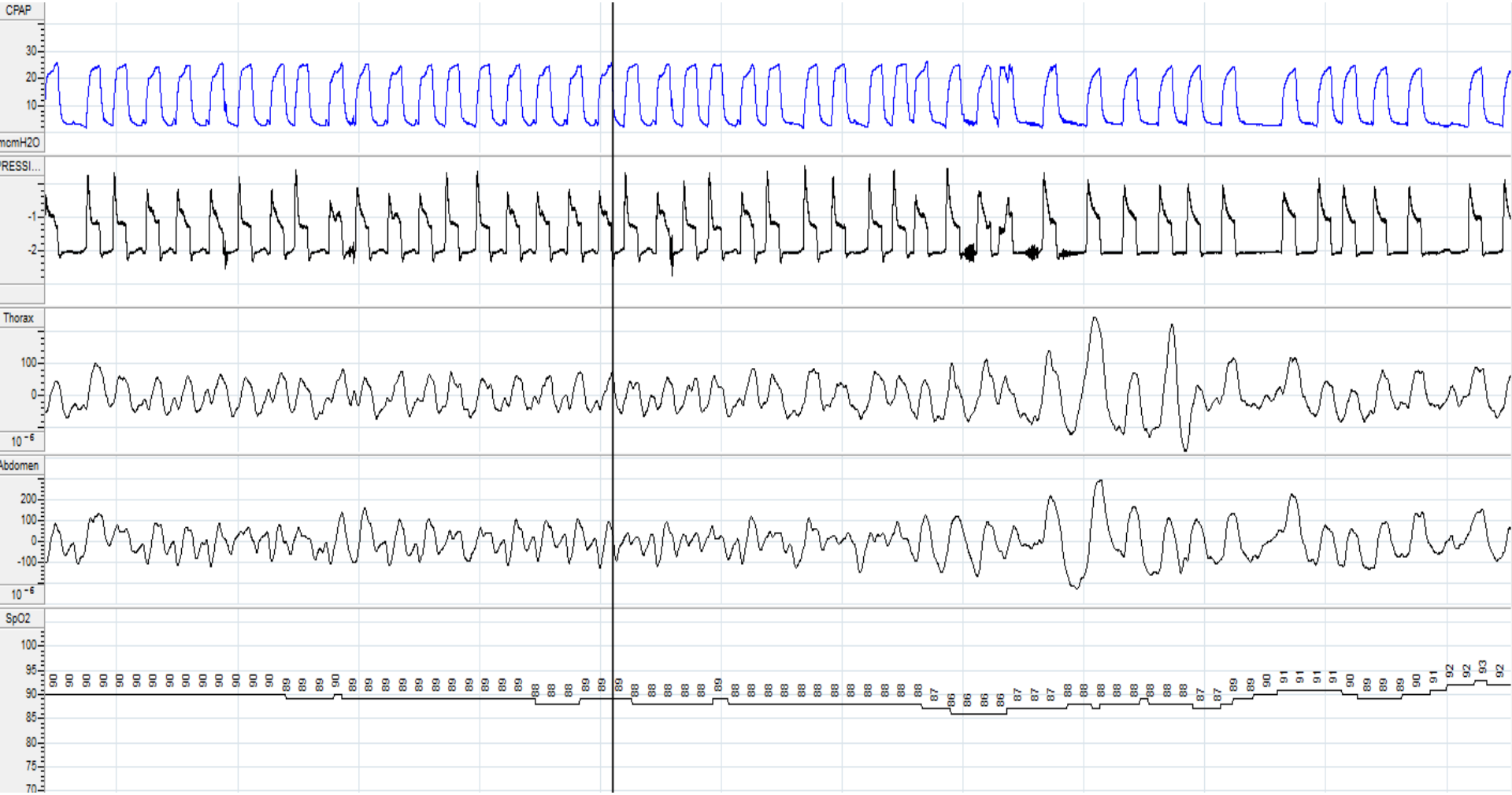


Monitoring procedures

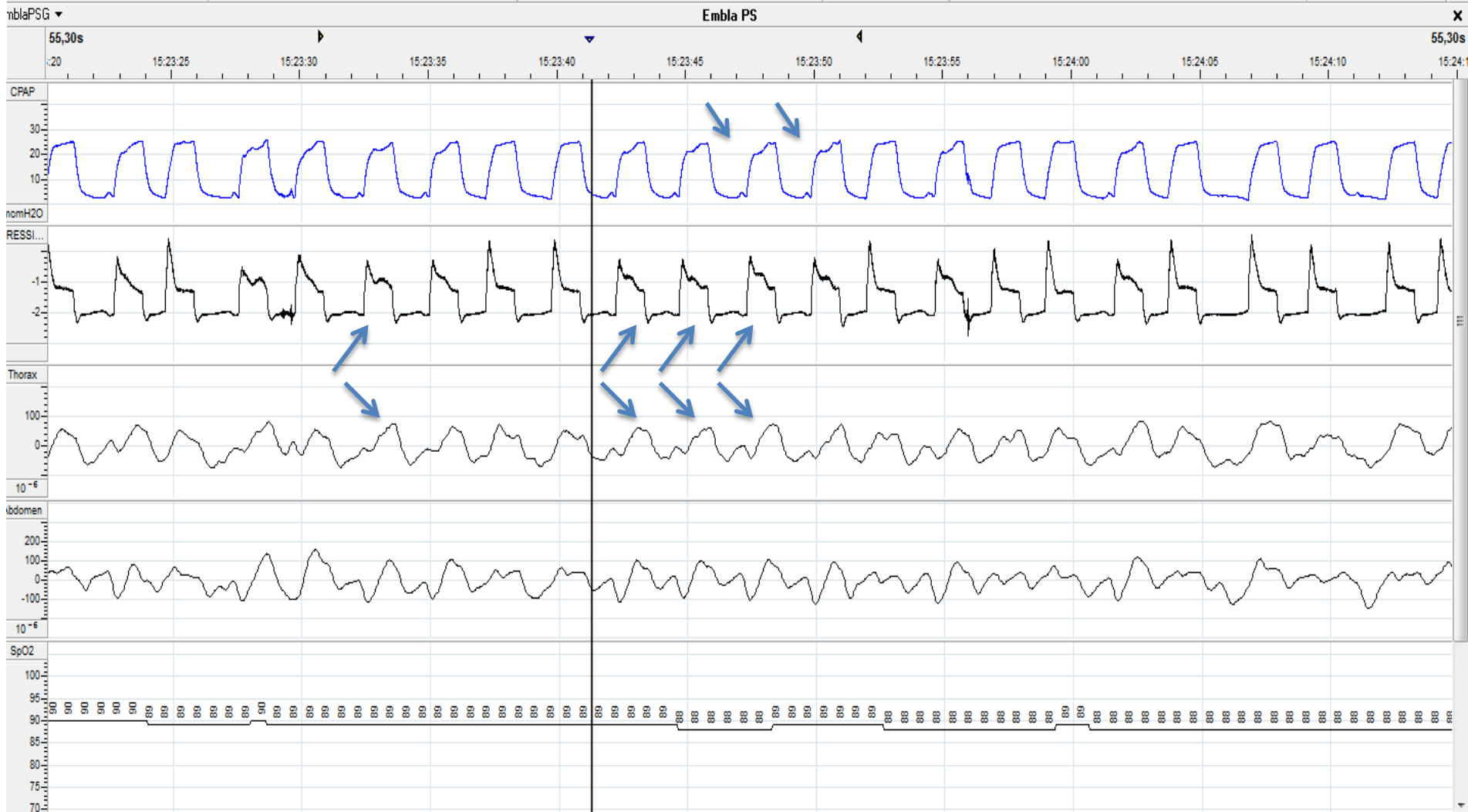
•Polygraph

- Pneumothac
- Belts
- Oxymeter

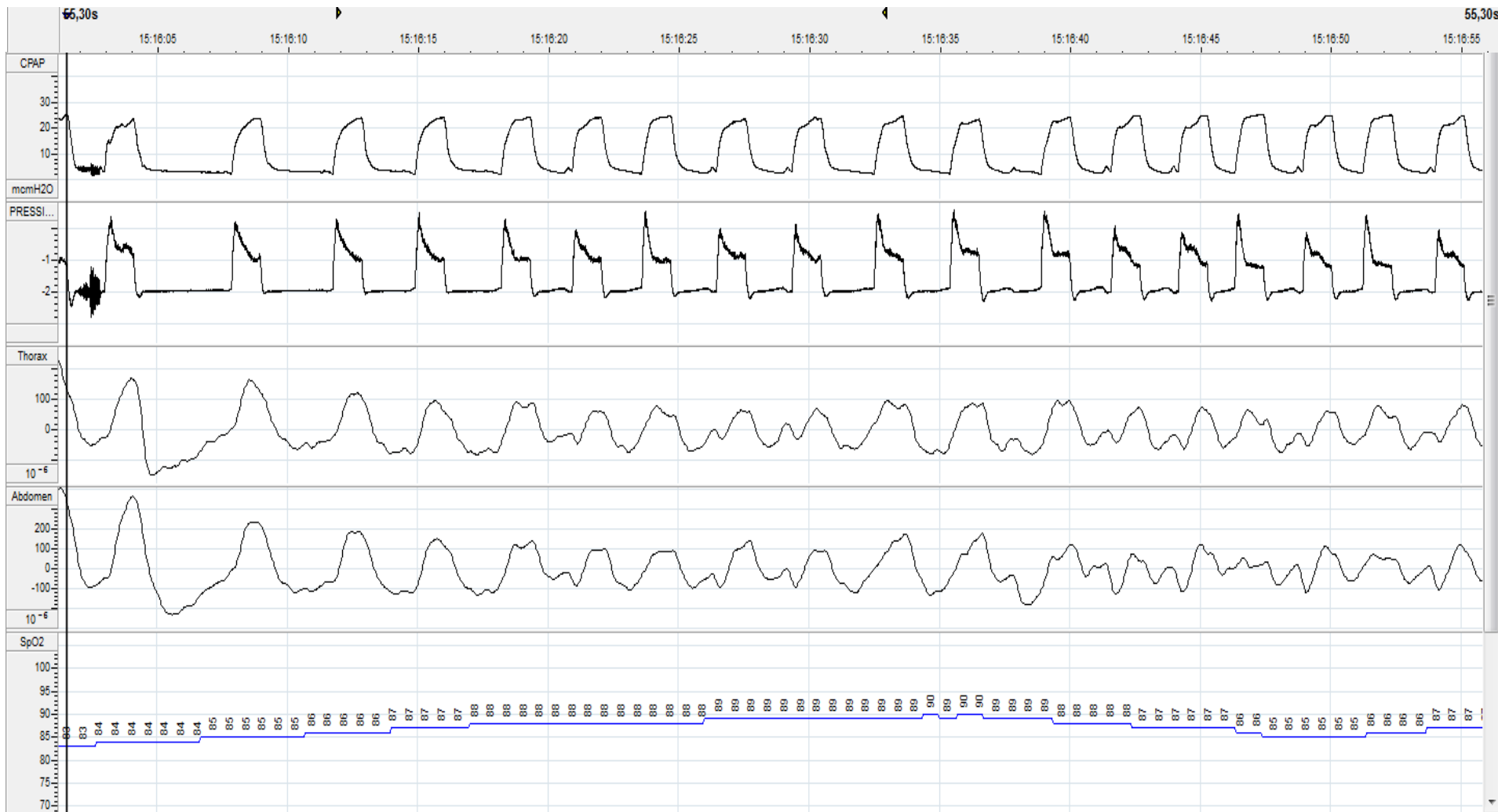
2 min tracing



1 min tracing



1 min tracing



Possible answers

- 1 Overassistance
- 2 Double Triggering
- 3 Short cycle
- 4 Underassistance (intracycle effort)

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Case 5

Level of difficulty: 5/5

Summary

- 67 years old, male, Spastic paraparesia ALS
- OSAS, starts with CPAP in 2012 due to Severe restrictive (muscular) disease (FVC 42%) shifts to NIV in 2015
- Routine “built-in” sw monitoring.
- Unspecific sleep complaints: sleep fragmentation, morning headache,..
- ABG, early morning, under NIV: pH 7,45 pCO₂ 45 pO₂ 65 HCO₃⁻: 26

Settings in the ventilator

- Mode: Resmed VPAP S9
- Main parameters:
 - IPAP 16
 - EPAP 10
 - Backup RR: 14 bpm
- Secondary parameters:
 - Trigger “medium”
 - Cycling “medium”
 - Ramp “250ms”
 - Ti min/max 0,3-1,5”
 - Other. Oronasal mask

Ventilator /interface

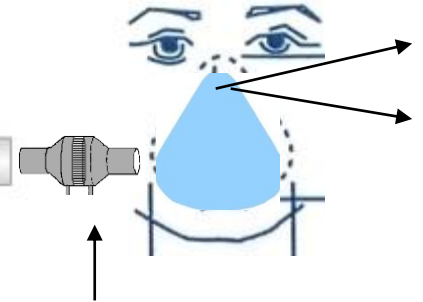
- Ventilator:



- Circuit



- Mask /
intentional leak



Monitoring procedures

- Built in software: ResCan*

Ver 1 minuto

35 21:18:40 21:18:45 21:18:50 21:18:55 21:19:00 21:19:05 21:19:10 21:19:15 21:19:20 21:19:25 21:19:30 21:19:35

Presión (alta res.)

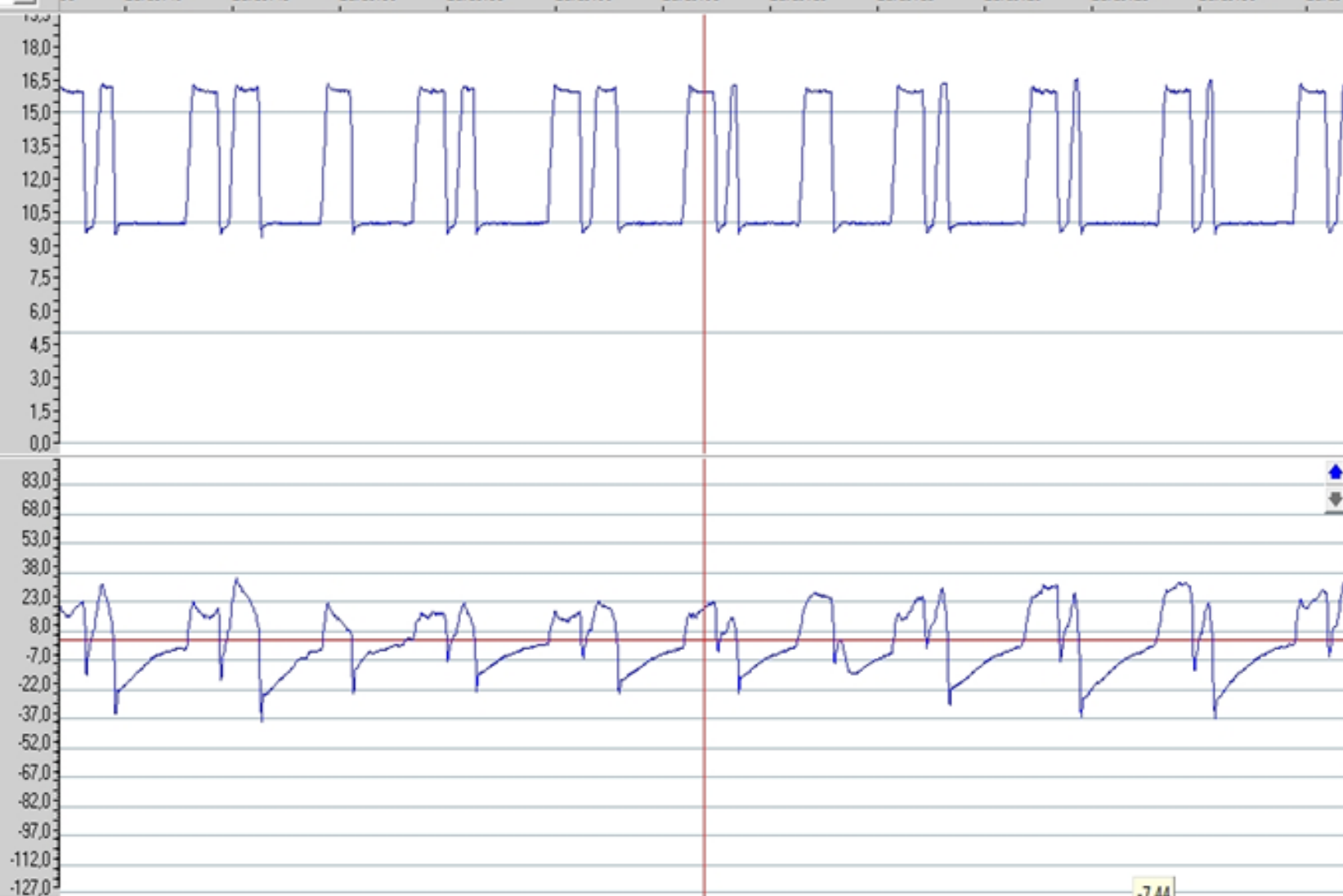
cmH2O

— Presión (alta res.)

Flujo

(/min)

— Flujo



Summary

- As ventilation dependence increases...a “life support”, battery powered ventilator is prescribed

Settings in the ventilator

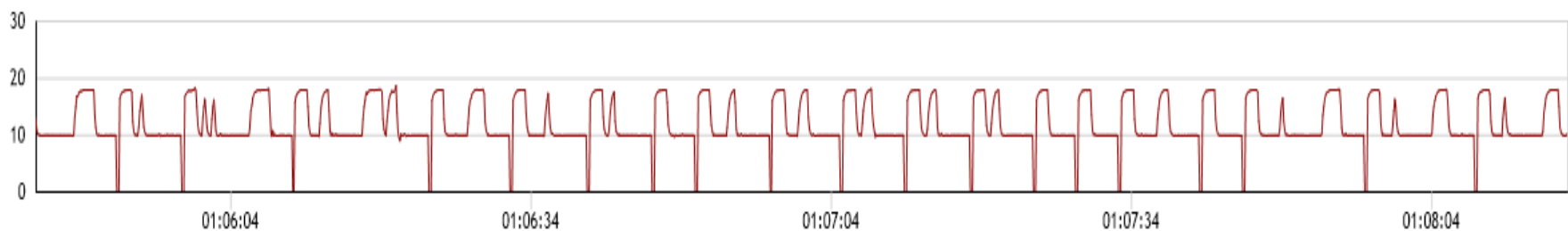
- Mode: Trilogy
- Main parameters:

Dispositivo	TRILOGY 100		
Número de serie	TV112050128		
Versión	14.1.03		
Configuración de hardware			
Tipo de circuito	Pasivo		
Configuración principal			
Modo	S/T		
AVAPS	OFF		
IPAP	18		cmH2O
EPAP	10		cmH2O
Frecuencia respiratoria	14		RPM
Tiempo inspiratorio	1.5		segundos
Tipo de activación	Activación por flujo		
Sensibilidad de activación por flujo	4		l/min
Sensibilidad de ciclo por flujo	60		%
Tiempo de subida	2		
Duración de rampa	OFF		

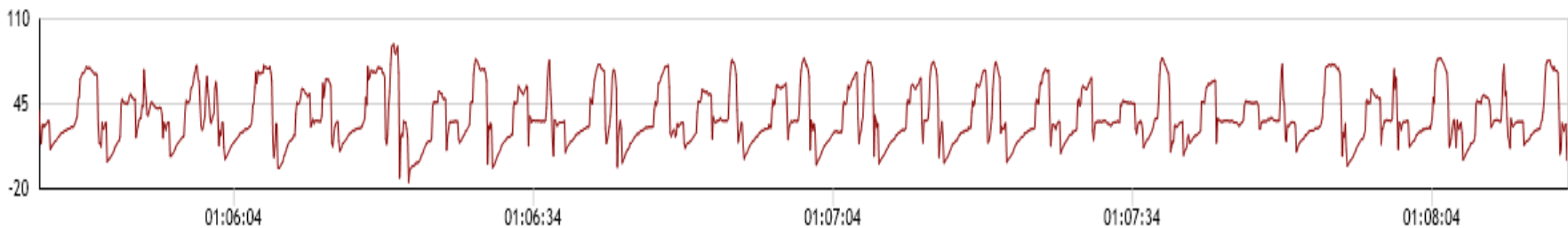
Formas de onda [Tendencias](#) [Datos diarios](#) [Patrones de uso](#) [Resumen de cumplimiento terapéutico](#) [Estadísticas](#) [Resumen](#) [Configuración y alarmas](#) [Historial de prescripciones](#)

Formas de onda 24/01/2017 2:00 - 31/01/2017 8:08

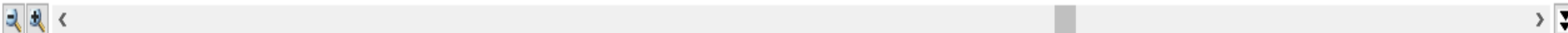
Presión (cmH2O) 29/01/2017



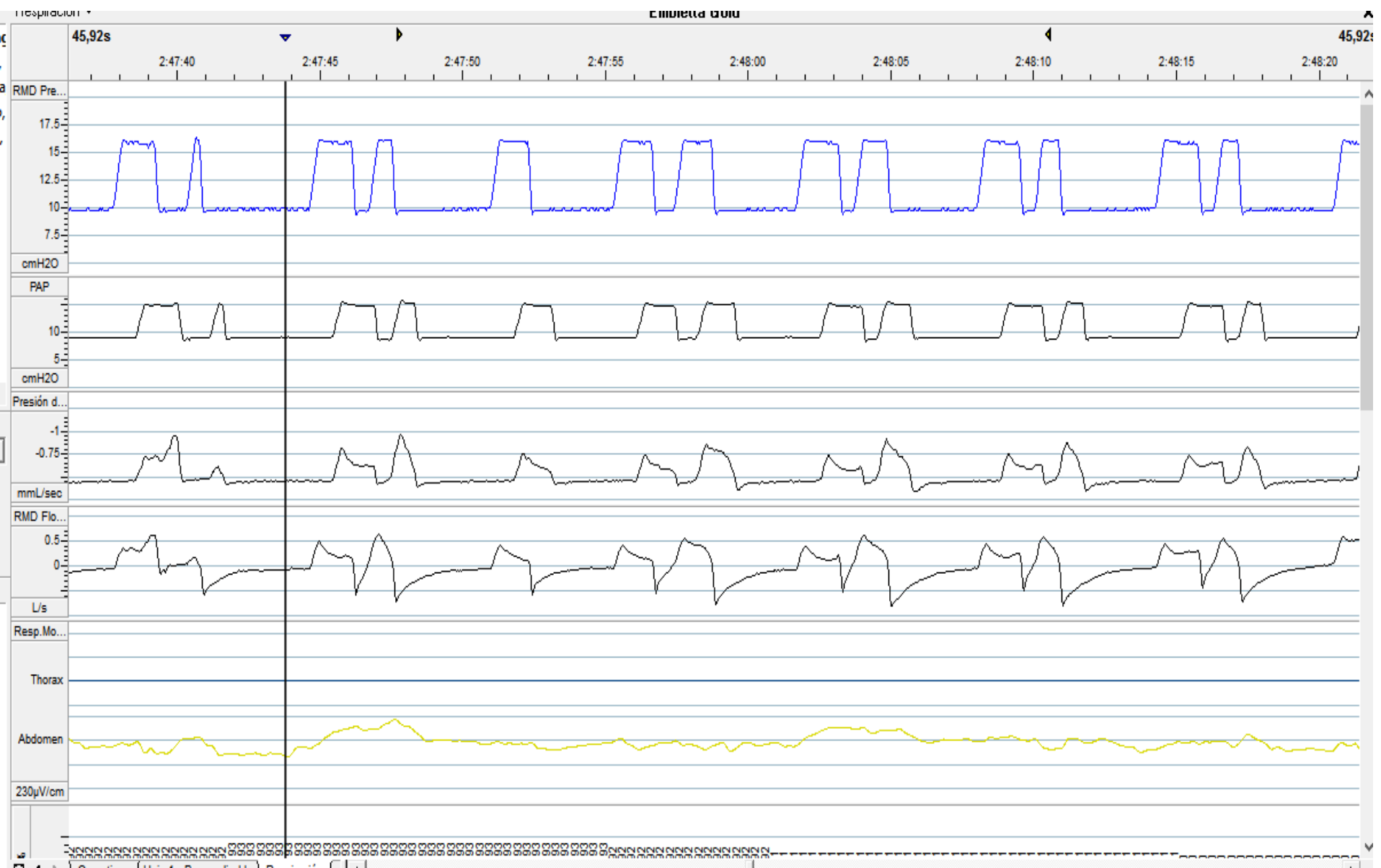
Flujo (l/min) 29/01/2017



Fuga (l/min) 29/01/2017



Polygraphy (embletta): Resmed S9 flow and pressure signals+mask pressure+pneumotach for raw flow signal, before intentional leak



Ventilator /interface

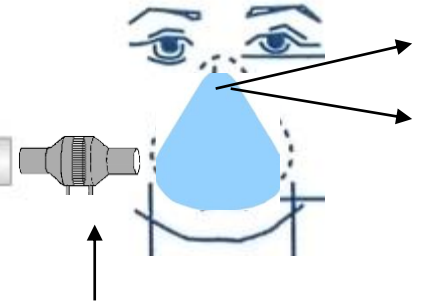
- Ventilator:



- Circuit



- Mask / intentional leak

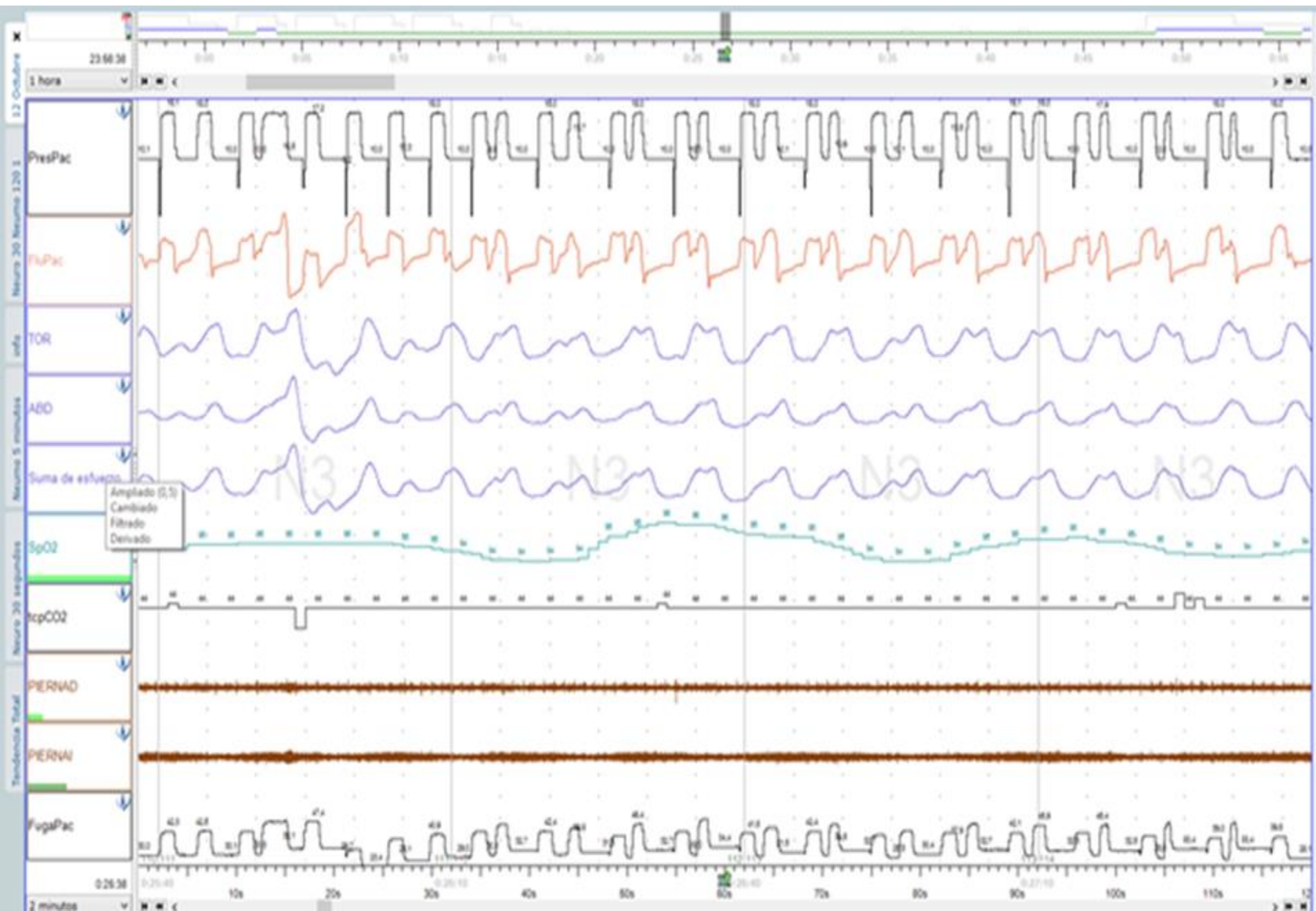


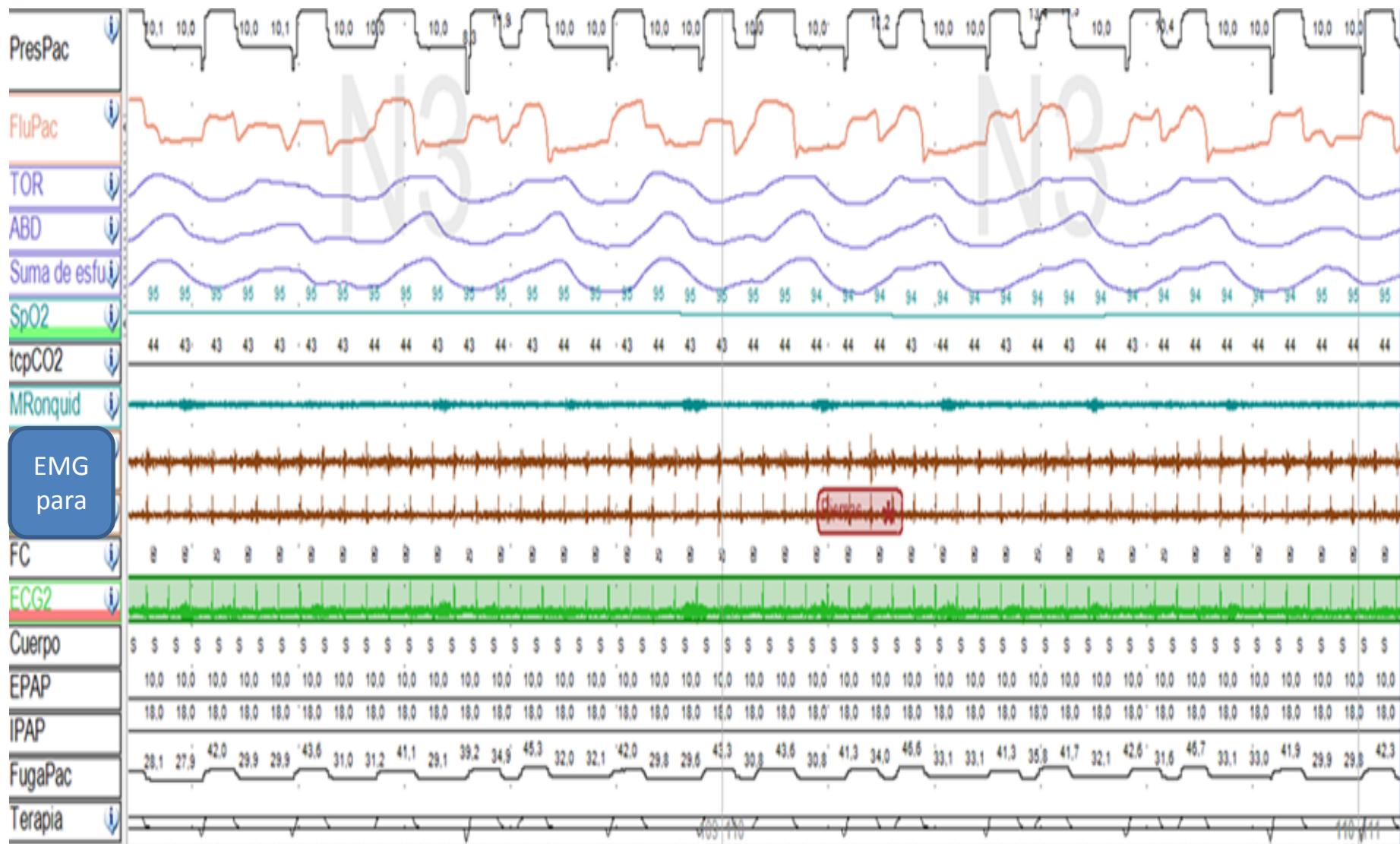
Monitoring procedures

- FULL PSG:*

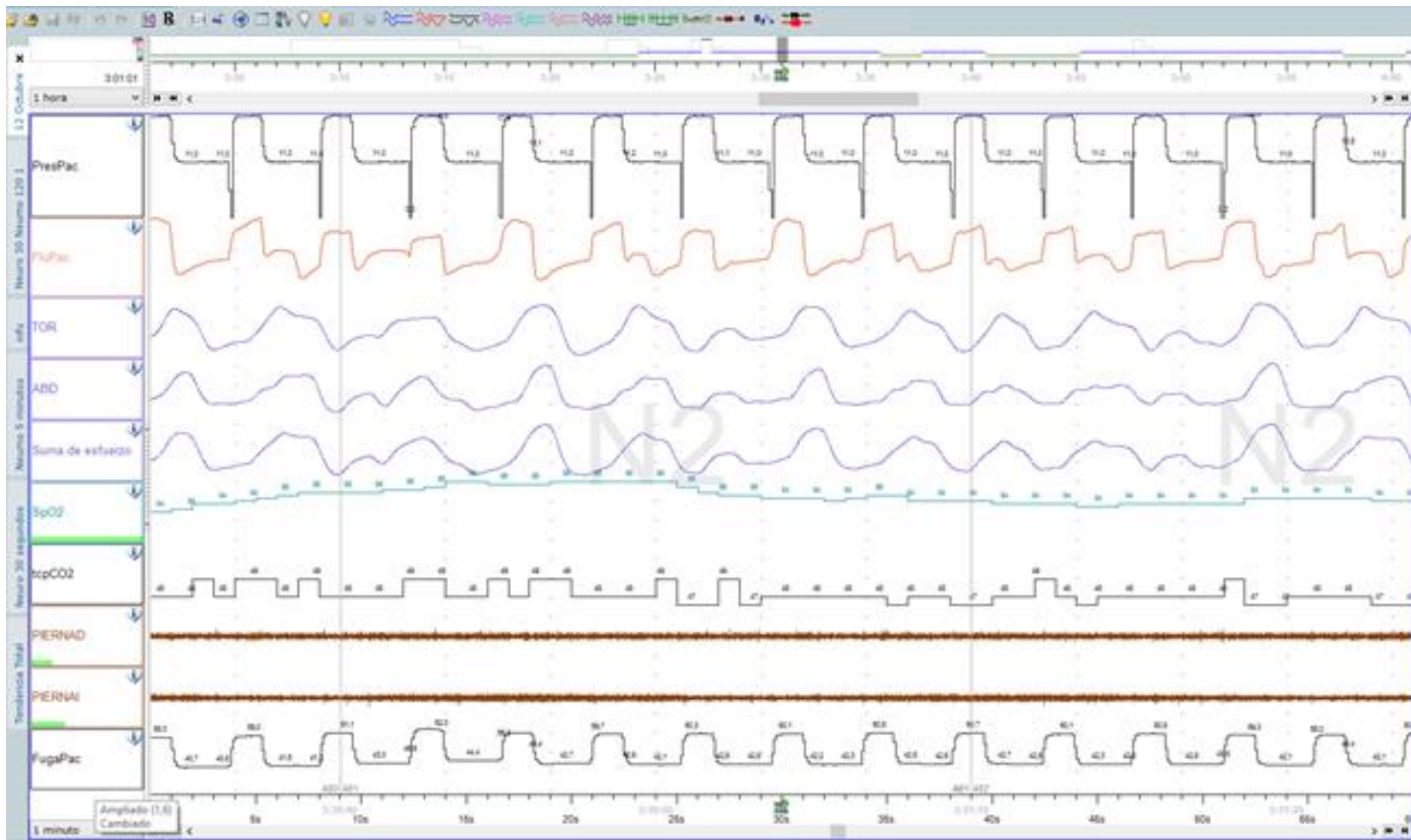
- OMNILAB (PHILIPS)+EXTERNAL PNEUMOTACH (channel failure, ommited)+mask pressure (ommitted)*
- Paraesternal EMG*
- TcpCO2*
- Oronasal mask*

2', only respiratory channels





1' respiratory channels



Multiple choice questions...

- 1. Uncoupling: neural and mechanical times are completely independent
- 2. Double triggering,
- 3. Double triggering and premature cycling
- 4. Reverse triggering

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Case 6

Level of difficulty: 3/5

Summary

- 66 years old, male
- Advanced COPD with hypercapnia
- Poor NIV compliance.
- Tracings corresponding to reassessment.

Settings in the ventilator

- Mode: VIVO 40
- Main parameters:
 - IPAP 18
 - EPAP 6
 - Backup RR: 14
- Secondary parameters:
 - Trigger. 3 (1-9)
 - Cycling 4 (1-9)
 - Presur. Time: 1 (1-9)
 - Ti min/max / 0.3-1.2
 - Other. Oronasal mask

Ventilator /interface

- Ventilator: Vivo 40



- Circuit

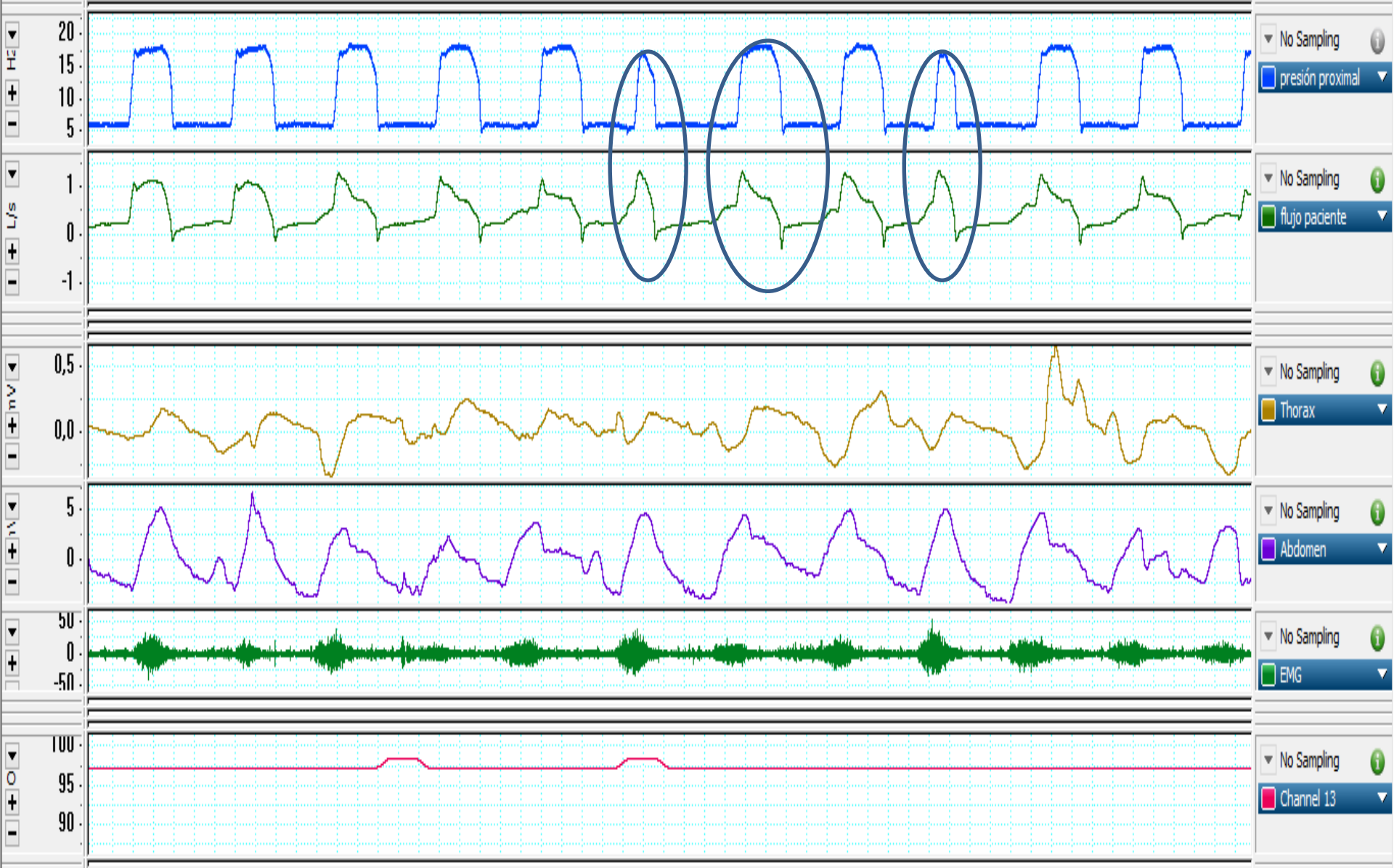


- Bucconasal mask with intentional leak

Monitoring procedures

- Polygraph
 - Pneumotach
 - Belts
 - SpO2
 - Parasternal EMG.

Channel: * 1 Comment Add 2k/s



What happens in the indicated cycles?

- 1. Underassistance
- 2. Overshooting (overassistance)
- 3. Delayed triggering
- 4. Upper airway obstruction

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Case 7

Level of difficulty: 5/5

Summary

- COPD GOLD 4-D
- Ventilation well tolerated, 11h/day
- pH=7,36; PaCO₂=67; PaO₂ 65; HCO₃-33mmol/l

Settings in the ventilator

- Mode: S/T
- Main parameters (IPAP=16/EPAP-6)
- Backup rate: 12
- Secondary parameters:
 - Trigger Medium
 - Cycling Medium
 - Ramp 150ms
 - Ti min/max 0,8-1,6.

Ventilator /interface

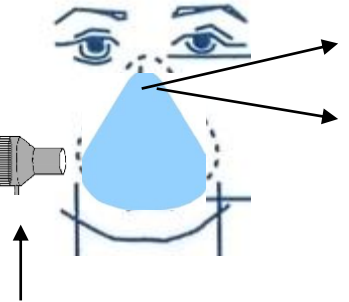
- Ventilator:



- Circuit



- Oronasal mask with intentional leaks



Monitoring procedures

- Built in software Rescan*

- Polygraph

- Pneumotach
- Belts

Pression (haute rés.)

cmH2O

20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0

— Pression (haute)

230.0
190.0
150.0
110.0
70.0
30.0
-10.0
-50.0
-90.0
-130.0

Débit

l/min

— Débit

Fuites

L/min

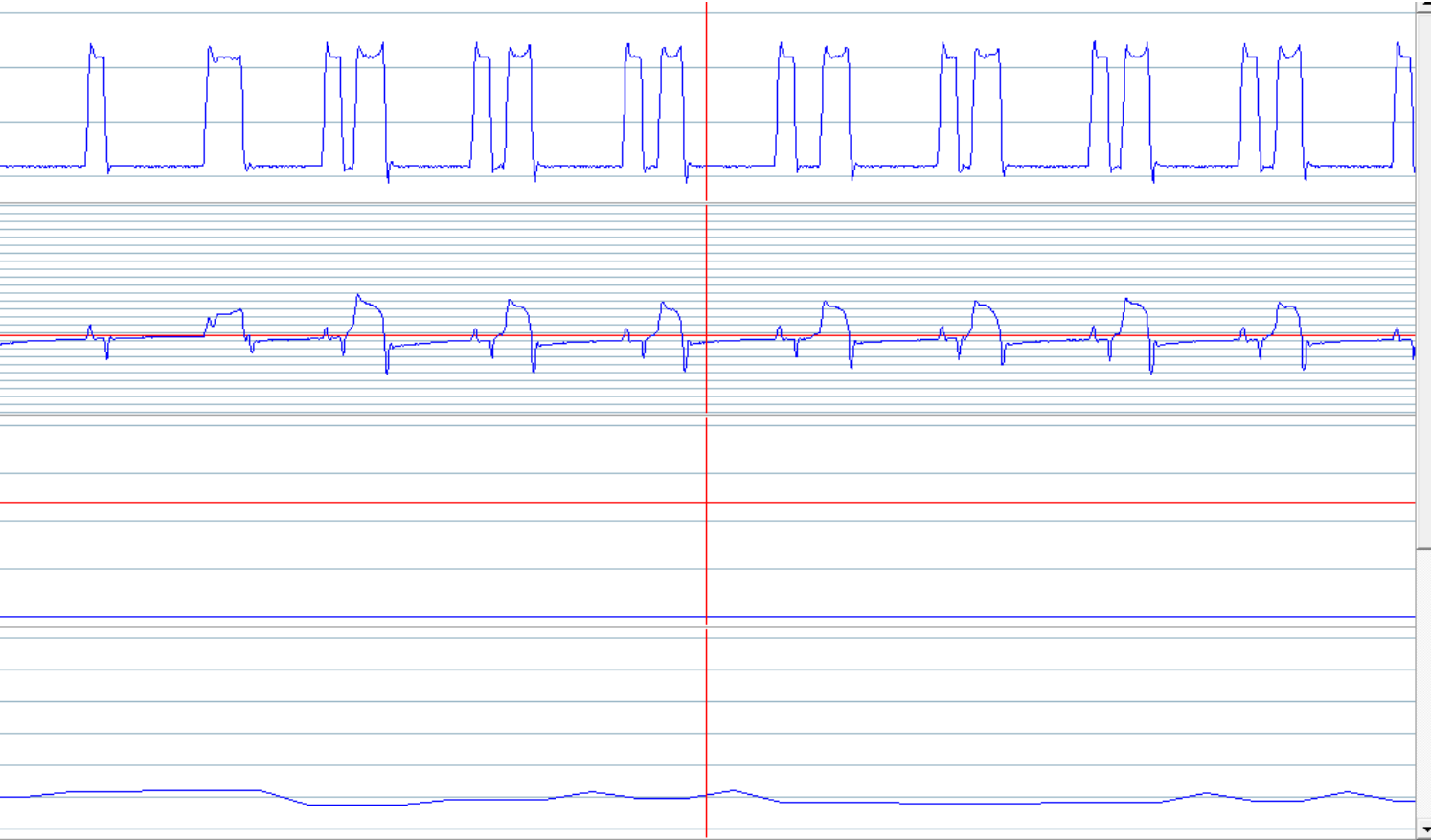
0,4 l/sec = 24 l/min

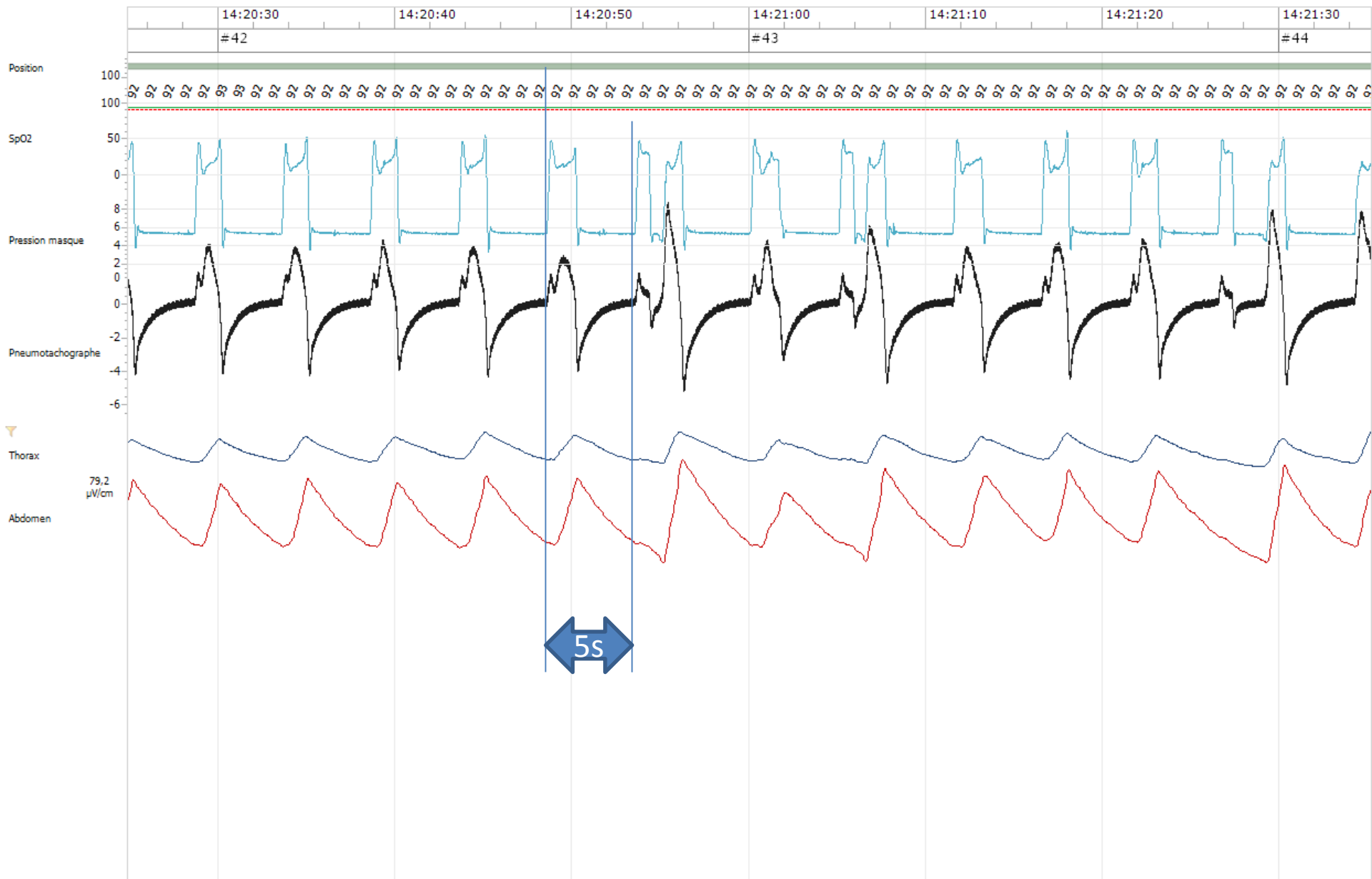
40,00
35,00
30,00
25,00
20,00
15,00
10,00
5,00
0,00

Volume courant

ml

3000
2700
2300
1900
1500
1200
800
400
0





Possible answers

- 1 Autotrigger
- 2 Uncoupling
- 3 Double trigger
- 4 Premature cycling

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Case 8

Level of difficulty: 4/5

Summary

- Male, 70-years-old
- HMV started after acute respiratory failure / CAP
- Kyphoscoliosis + Obesity (IMC 33 kg.m⁻²)
- FVC 1.63 (45%), FEV1 1.16 (45%)
- Good ventilation tolerance, objective adherence 8h/night
- ABG (Room Air): pH 7.42, PaO₂ 74, PaCO₂ 43, Bic 28, Sat 96%
- PSG performed 3 months after HMV starting

Settings in the ventilator

- Mode: PSV (VIVO 40, Breas)
- IPAP 20/EPAP 10
- Backup rate: 15x'
- Secondary parameters:
 - Trigger 3
 - Cycling 3
 - Ramp 2
 - Ti min/max 0.3/1.4 sec
 - Target Volume: Off

Ventilator /interface

- Ventilator:



- Single-limb Circuit



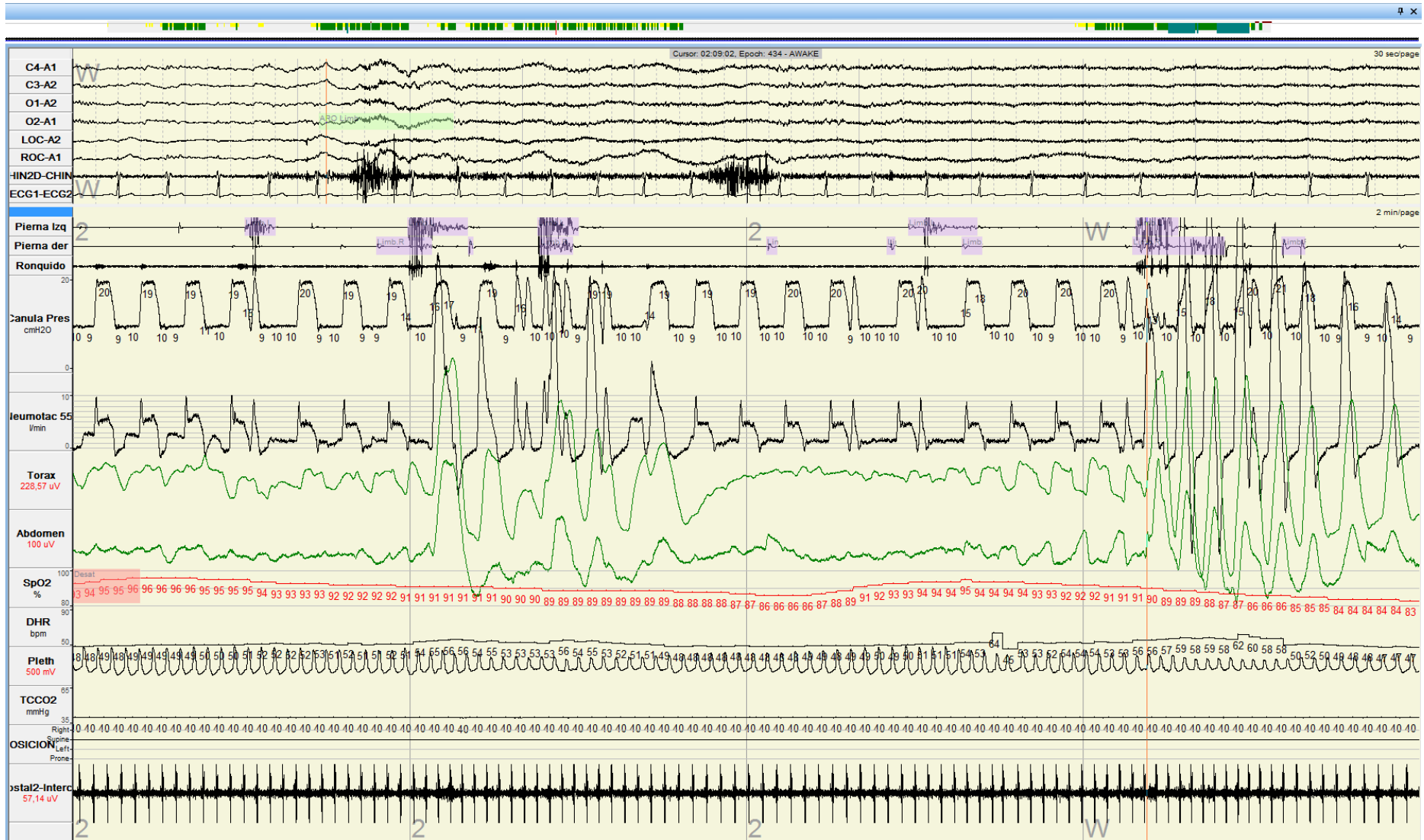
- Facial Mask with intentional leak

Monitoring procedures

- Polysomnography

- EEG
- External Pneumotach
- Thorax and abdominal Belts
- SpO₂, TcCO₂.

2 min tracing



Possible answers

- 1. Double triggering (1) in a obstructive event without effort (2)
- 2. Autotriggering (1) in a “mixed” obstructive event (2)
- 3. Autotriggering (1) in leaks (2)
- 4. Uncoupling (1) due to leaks (2)

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Case 9

Level of difficulty: 1/5

Summary

- COPD patient

Settings in the ventilator

Main parameters

IPAP 24, EPAP 9,

FR backup 16,

Secondary parameters:

Ti min 0,7, Ti max 1,5,

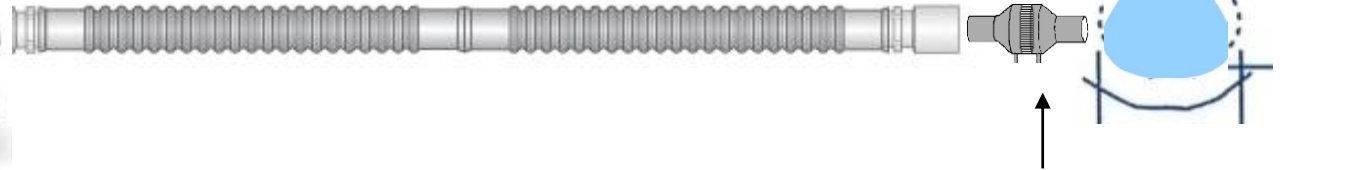
Rise time min (< 100 mseg),

Trigger /cycling: medium

Ventilator /interface

- Ventilator: Lumis (ResMed)

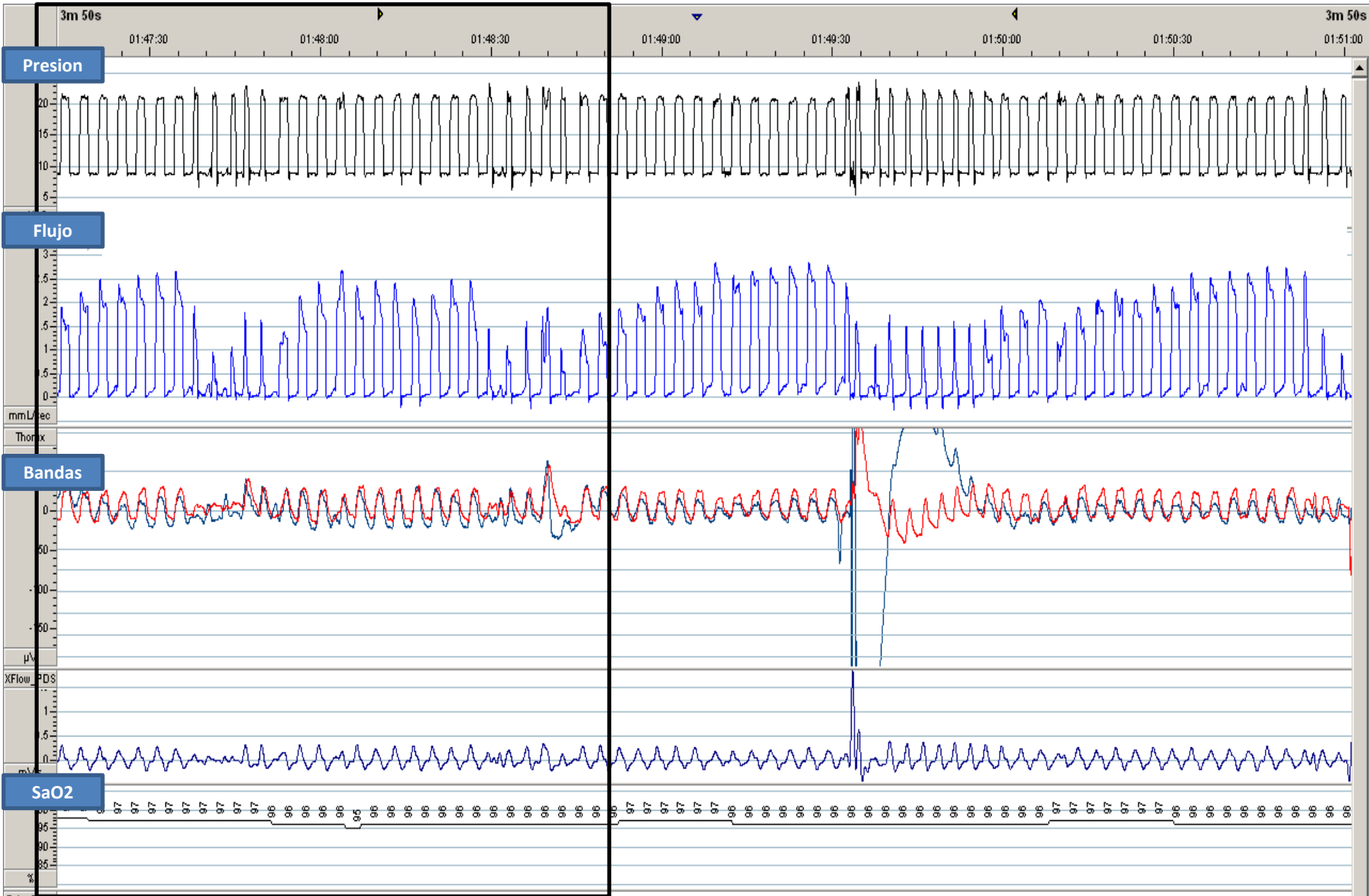
- Circuit

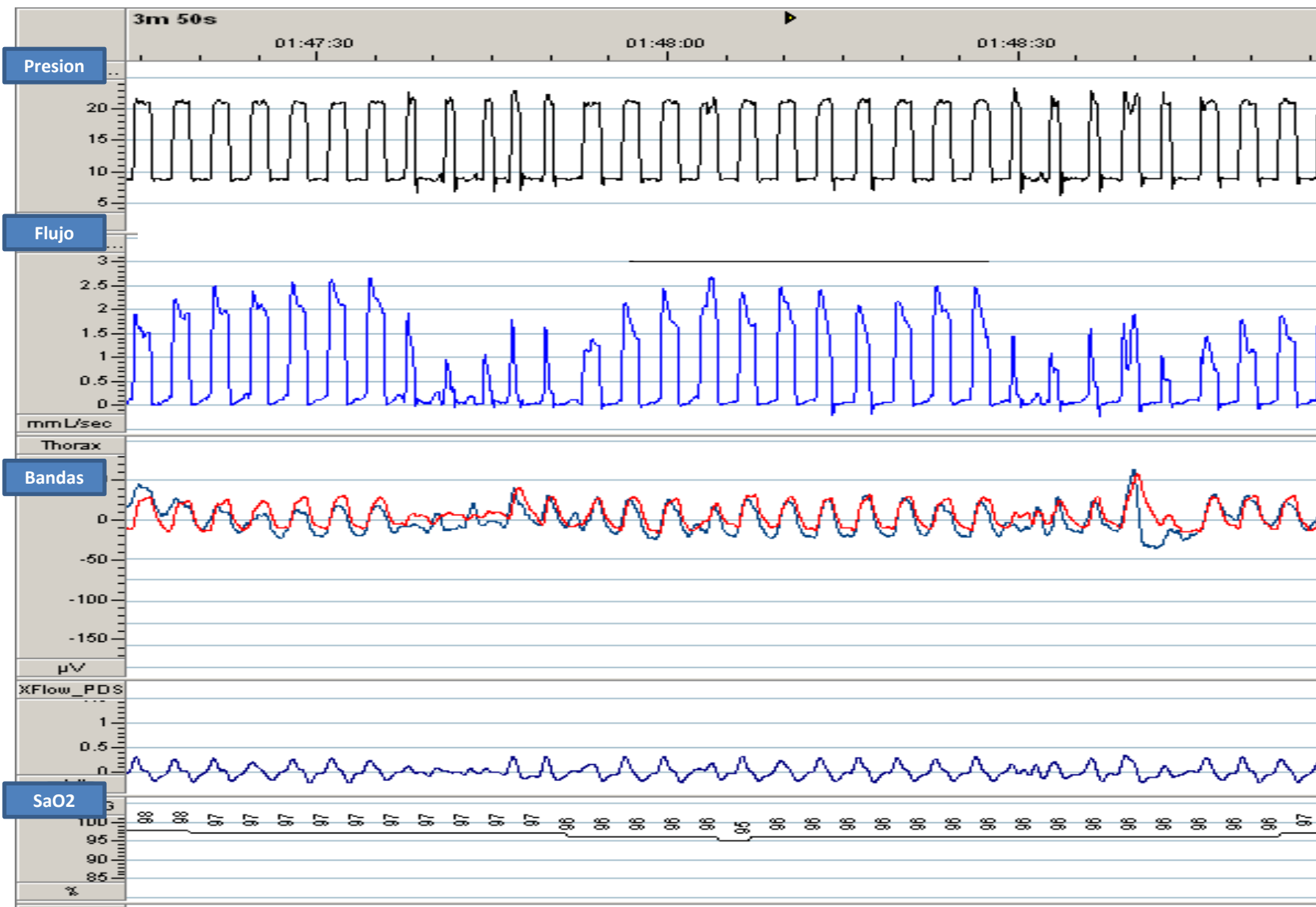


- Bucconasal
masjintentional
leak

Monitoring procedures

- Polygraph
 - Pneumotach
 - Belts





What is your diagnosis?

- 1) Intermittent leakage
- 2) Intermittent upper airway obstruction
- 3) Episodic patient's effort
- 4) Wrong parameters: The ventilator is in assured volume mode (IVAPS)

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Case 10

Level of difficulty: 3/5

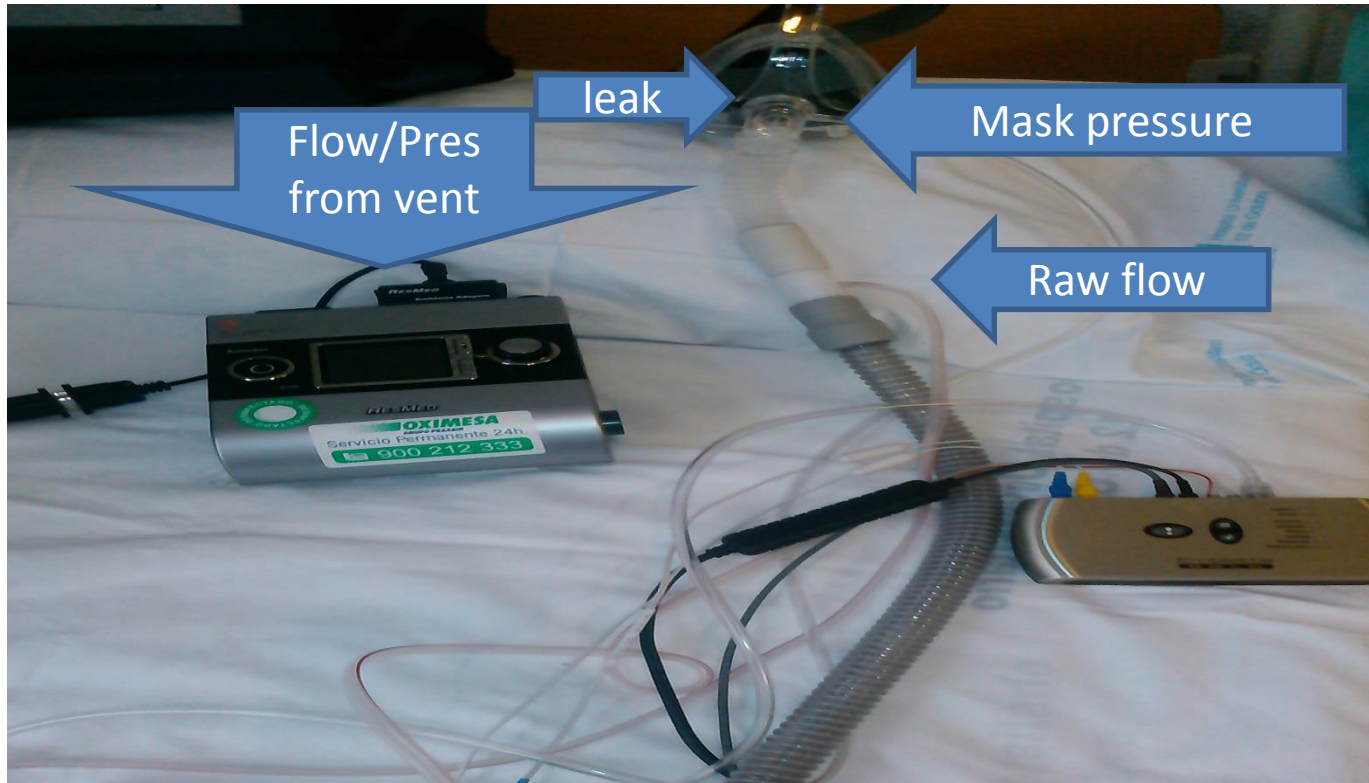
Summary

- 34 years old, female
- Immunosuppressed due to renal transplantation
- CNS disease, JC virus, bulbar injury
- ABG:
- Acute ventilatory failure with acidosis
- Hypoventilation symptoms, headache, somnolence, flapping

Settings in the ventilator

- Mode: Resmed Stellar 150
- Main parameters:
 - IPAP 14
 - EPAP 6
 - Backup RR: 14
- Secondary parameters:
 - Trigger “high”
 - Cycling “medium”
 - Presur. Time: 250ms
 - Ti min/max / 0.3-1.2
 - Other. Oronasal mask

Ventilator /interface



Monitoring procedures

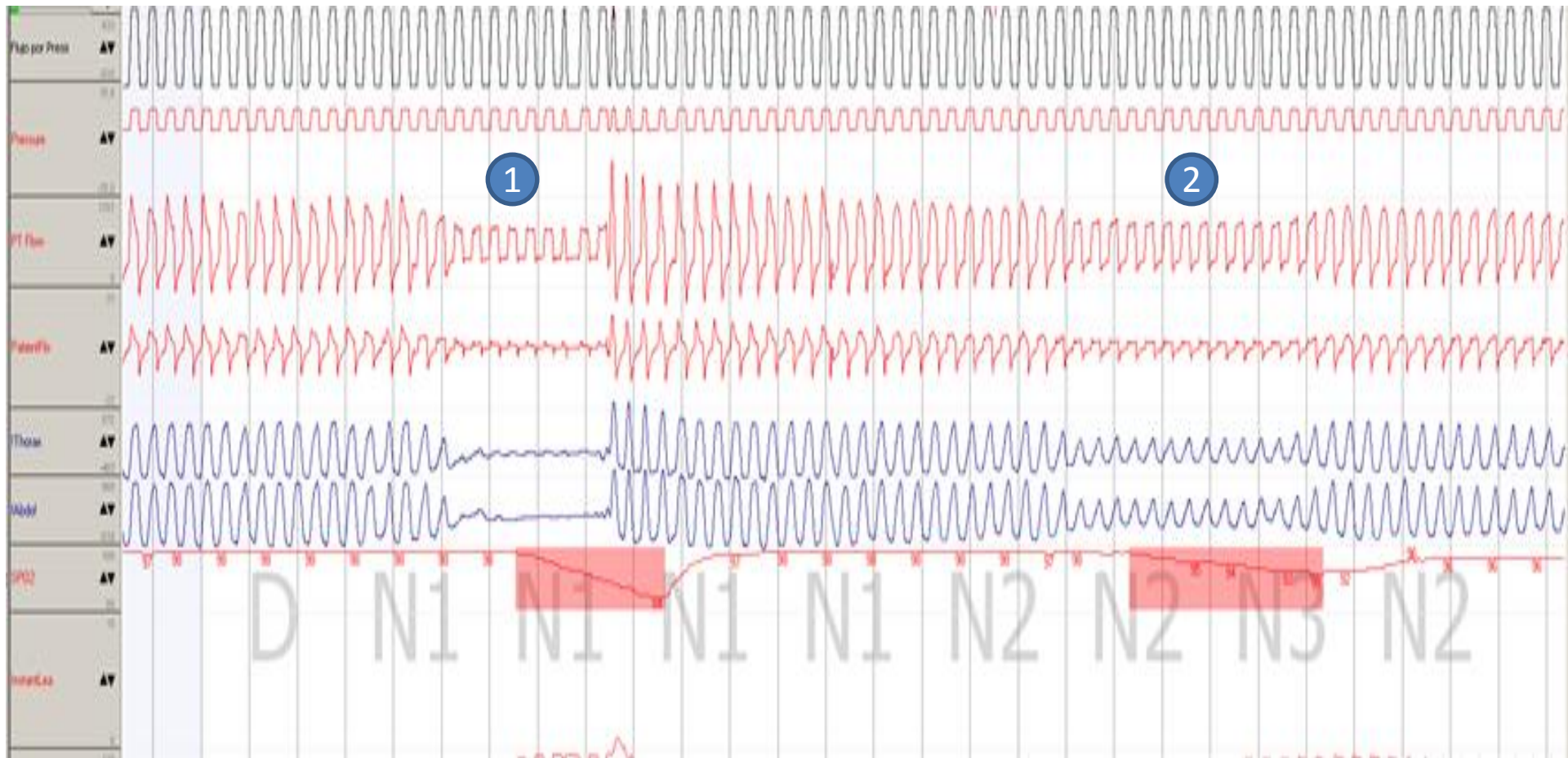
- *Built in software: ResCan*
- *Full PSG, raw (pneumotach and mask pressure) and ventilator signals*
- *Neural channels omitted_*



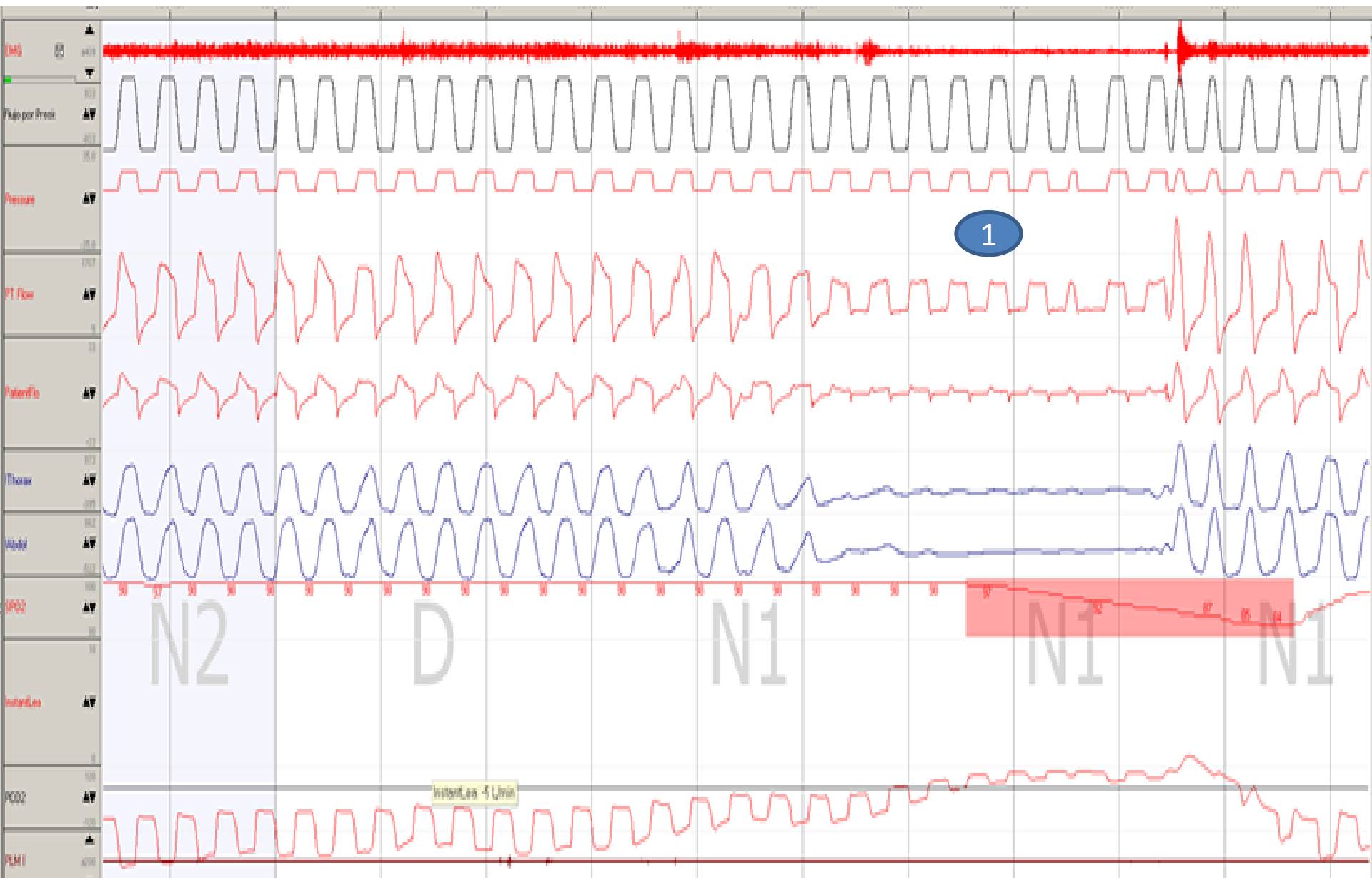
Most of night time spent on BARR



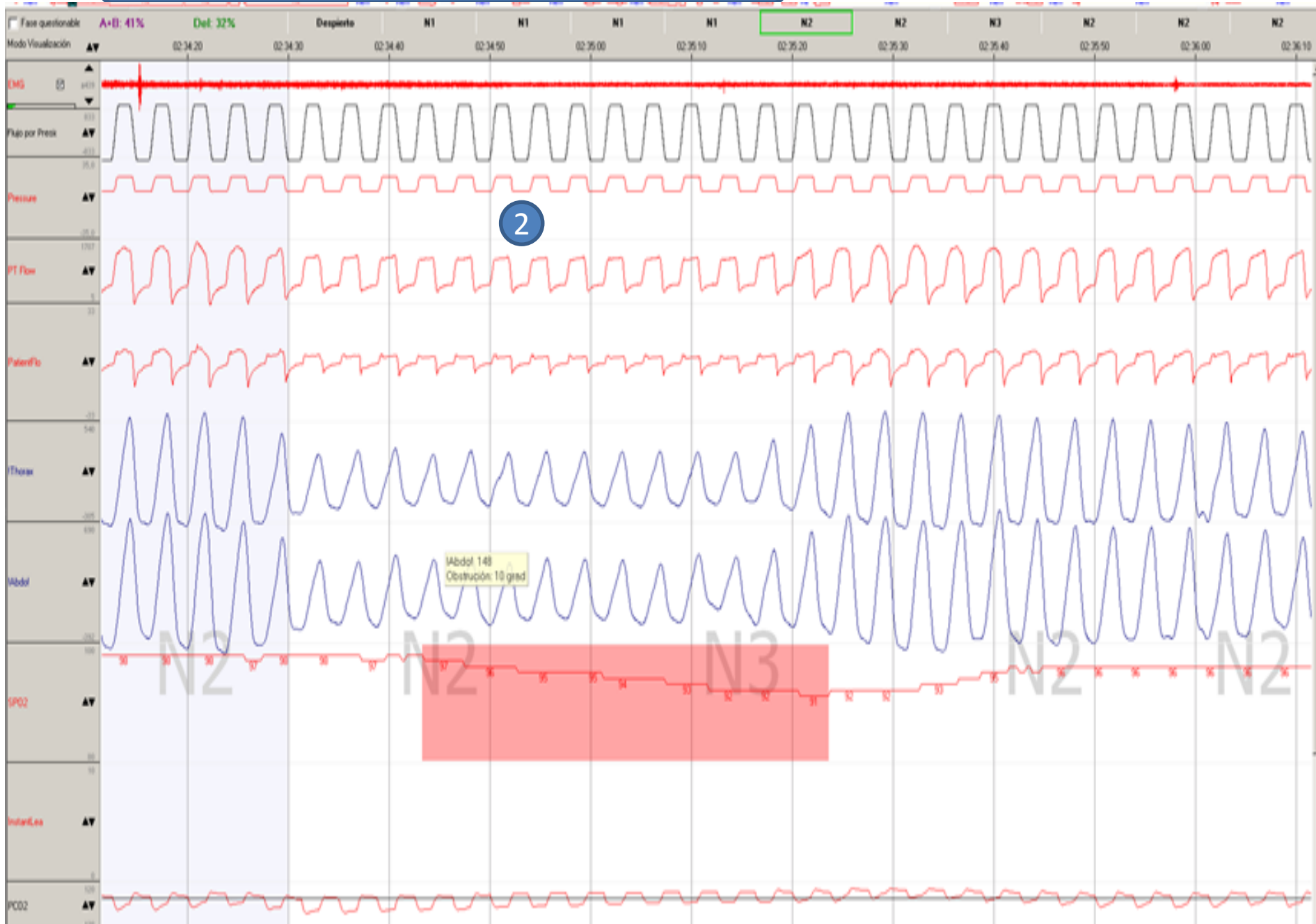
5 minutes PSG



2 minutes



2 minutes



Multiple choice question

- A. Both events are obstructions with effort
- B. 1.- Upper airway obstruction without effort and
2.- Upper airway obstruction with effort
- C. 1.- Upper airway obstruction without effort and
2.- “decreased ventilatory command” with
passive movements of the bands.
- D. Both are decrease in ventilatory command.

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Case 11

Level of difficulty: 5/5

Summary

- 64 years old, male
- Obesity hypoventilation syndrome
- During adaptation's process, built in software was downloaded and upper airway obstructions were documented.

Settings in the ventilator

- Mode: Lumis 150
- Main parameters:
 - IPAP 15
 - EPAP 5
 - Backup RR: 14
- Secondary parameters:
 - Trigger. medium
 - Cycling medium
 - Presur. Time: 150 msec
 - Ti min/max / 0.5-1.5
 - Other. Oronasal mask

Ventilator /interface

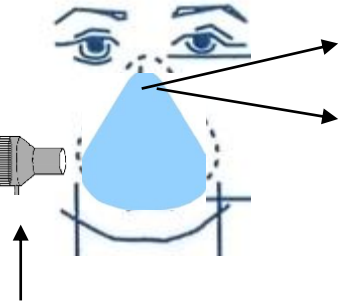
- Ventilator: Vivo 40



- Circuit

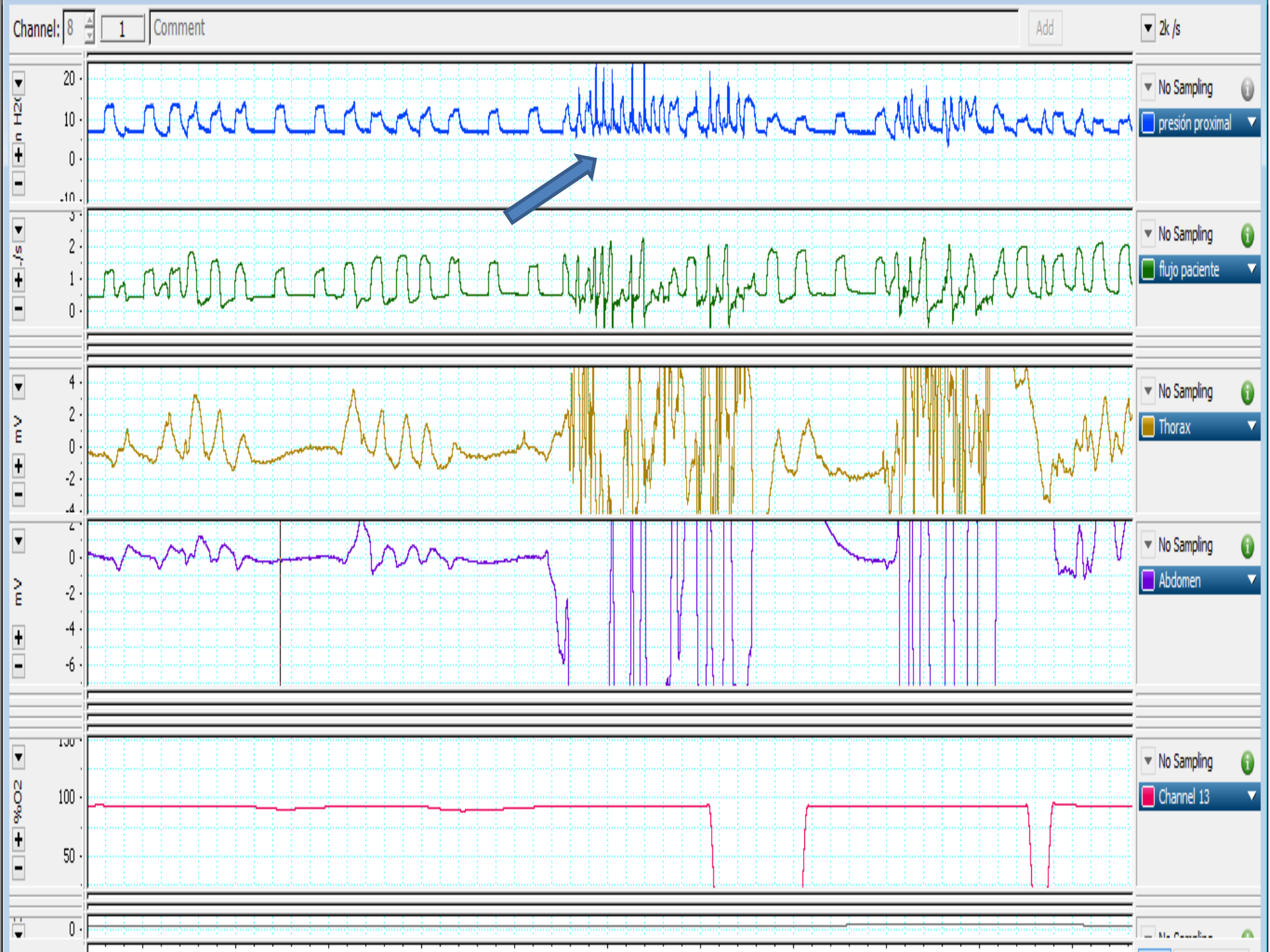


- Bucconasal mask with intentional leak



Monitoring procedures

- Polygraph
 - Pneumotach
 - Belts
 - SpO2
 - Parasternal EMG.



Channel: 9 1 Comment Add 2k/s



What happens in the indicated cycles

- It is a delayed cycling, with active exhalation
- Underassistance. The support provided by the ventilator does not match the patient's needs
- Leaks after the obstruction
- It is a pressure support with assured volume mode (iVAPS).

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Case 12

Level of difficulty: 4/5

Summary

- Diaphragm paralysis after surgery for timentomy
- ABG during the day time($F_iO_2=21\%$):
PaO₂= 67.6 mmHg
PaCO₂=34.2 mmHg
pH=7.44
HCO₃⁻: 23
- Night time ventilation uncorfortable with several arousals

Settings in the ventilator

- Mode: APCV
- Main parameters (IPAP=14/EPAP=4)
- Backup rate: 12
- Secondary parameters:
 - Trigger= 1 l/min
 - Ti=1.2
 - Ramp=2

Ventilator /interface

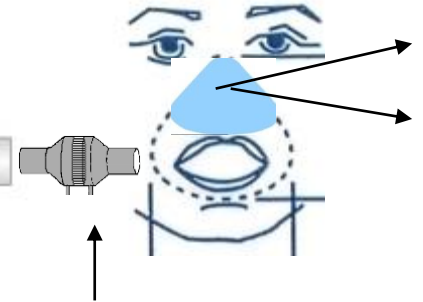
- Ventilator A40 (Philips):



- Circuit



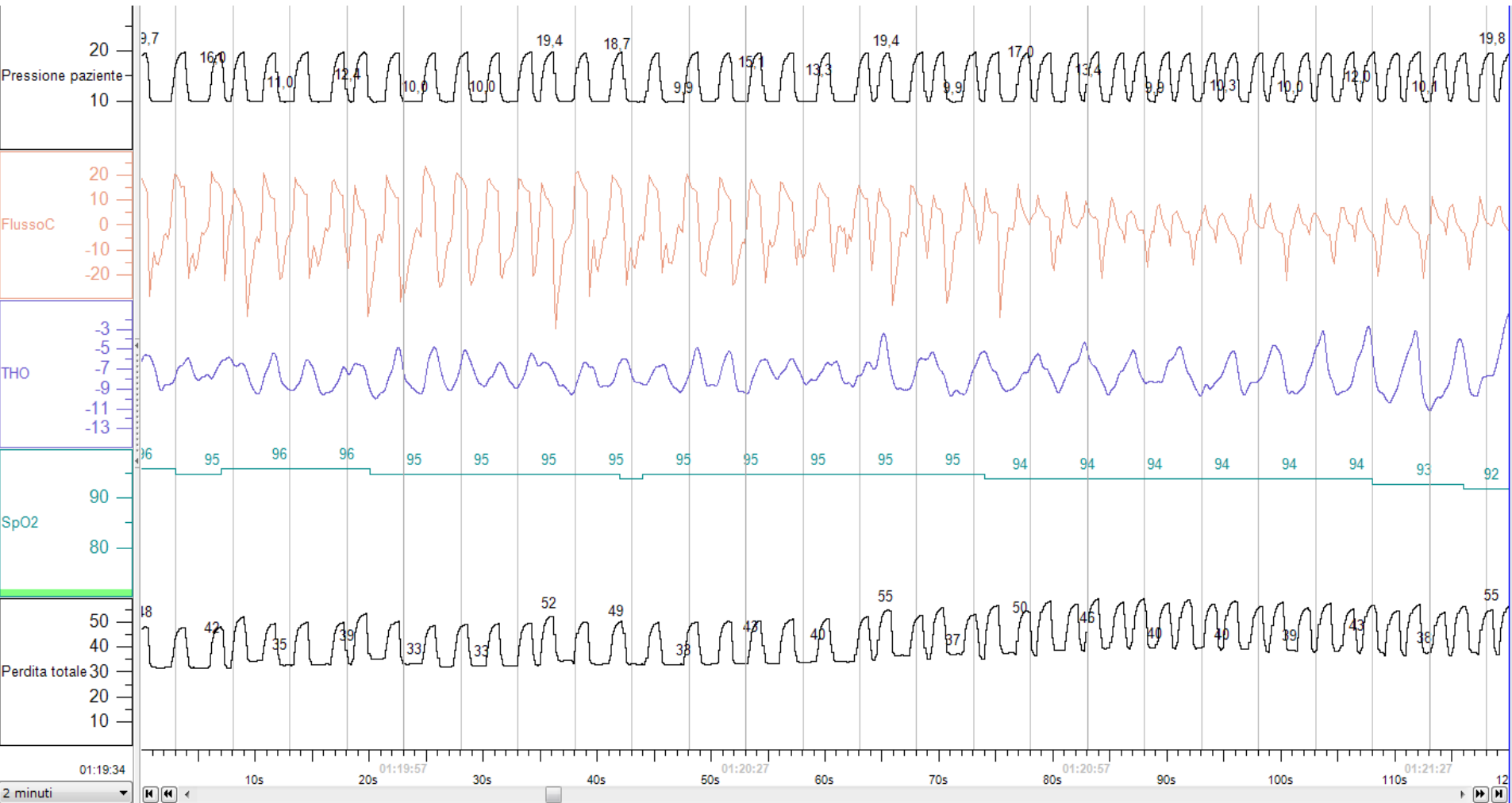
- Nasal Mask / intentional leak



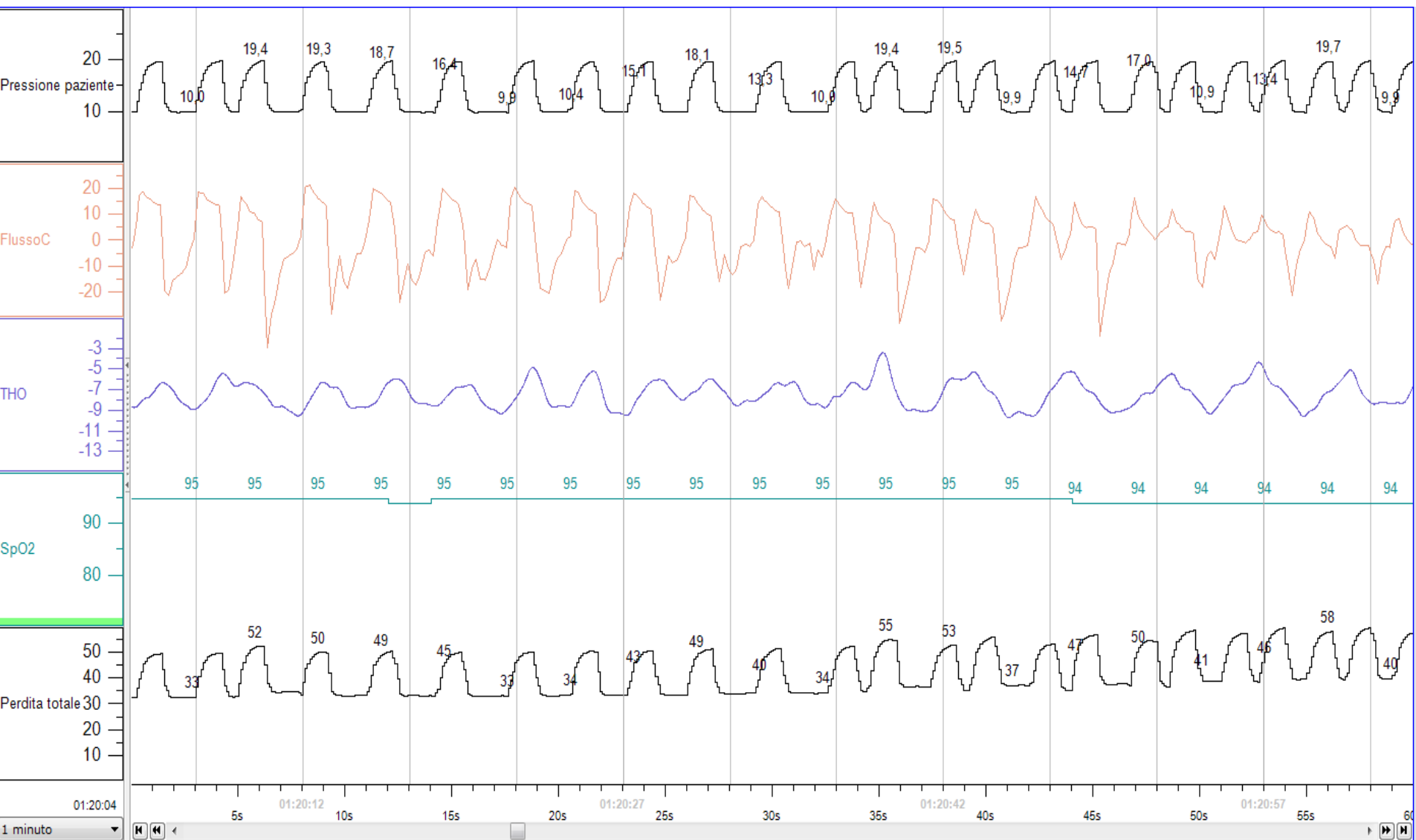
Monitoring procedures

- Polygraph
 - Belt (one belt)
 - Oxymeter
 - Pressure and Flow signals treated by the ventilator

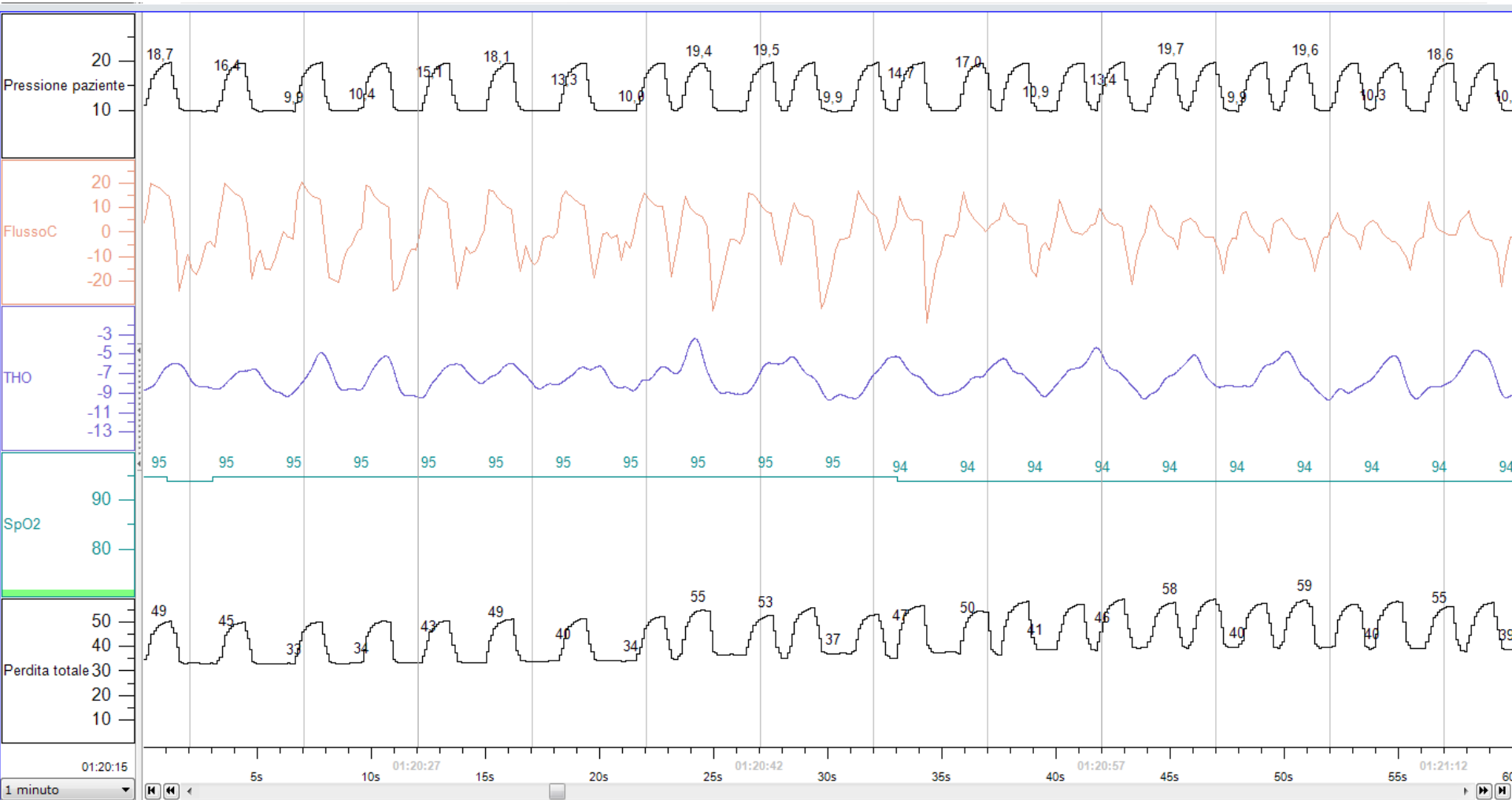
2 min tracing



1 min tracing



1 min tracing



Possible answers

- 1 Uncoupling
- 2 Double Triggering
- 3 Auto-triggering
- 4 Underassistance