INTERPRETATION DES TRACES DE POLYGRAPHIE RESPIRATOIRE SOUS VNI

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POLYGRAPHIE VENTILATOIRE VOIRE POLYSOMNOGRAPHIE SOUS VNI

« GOLD STANDARD »

Adler D et al.
Sleep Breath 2012; 16 : 1081

BPCO

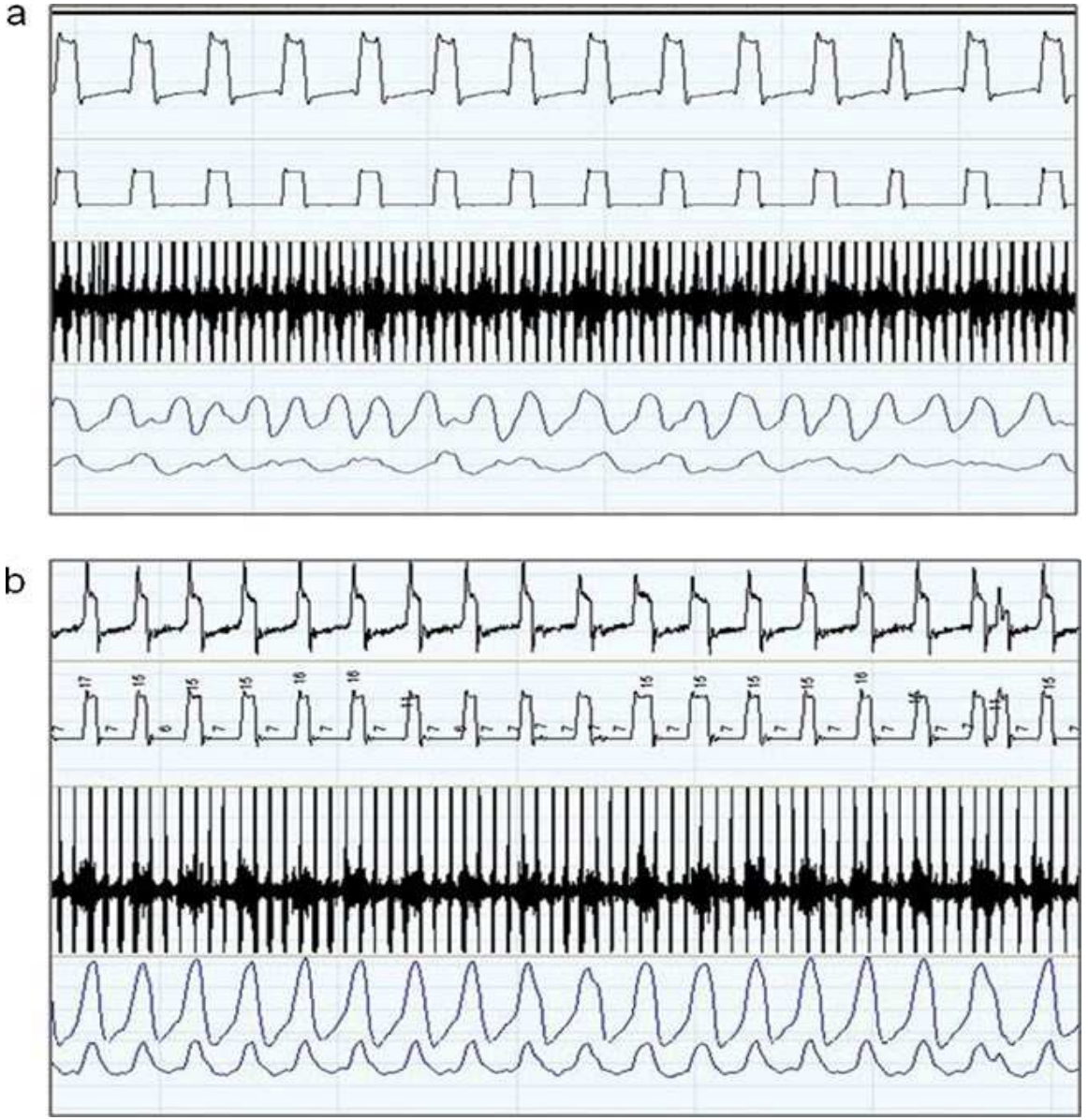
8 patients / 32

Dyspnée (arrêt VNI)

Asynchronisme P/M

Adaptation réglages / PSG

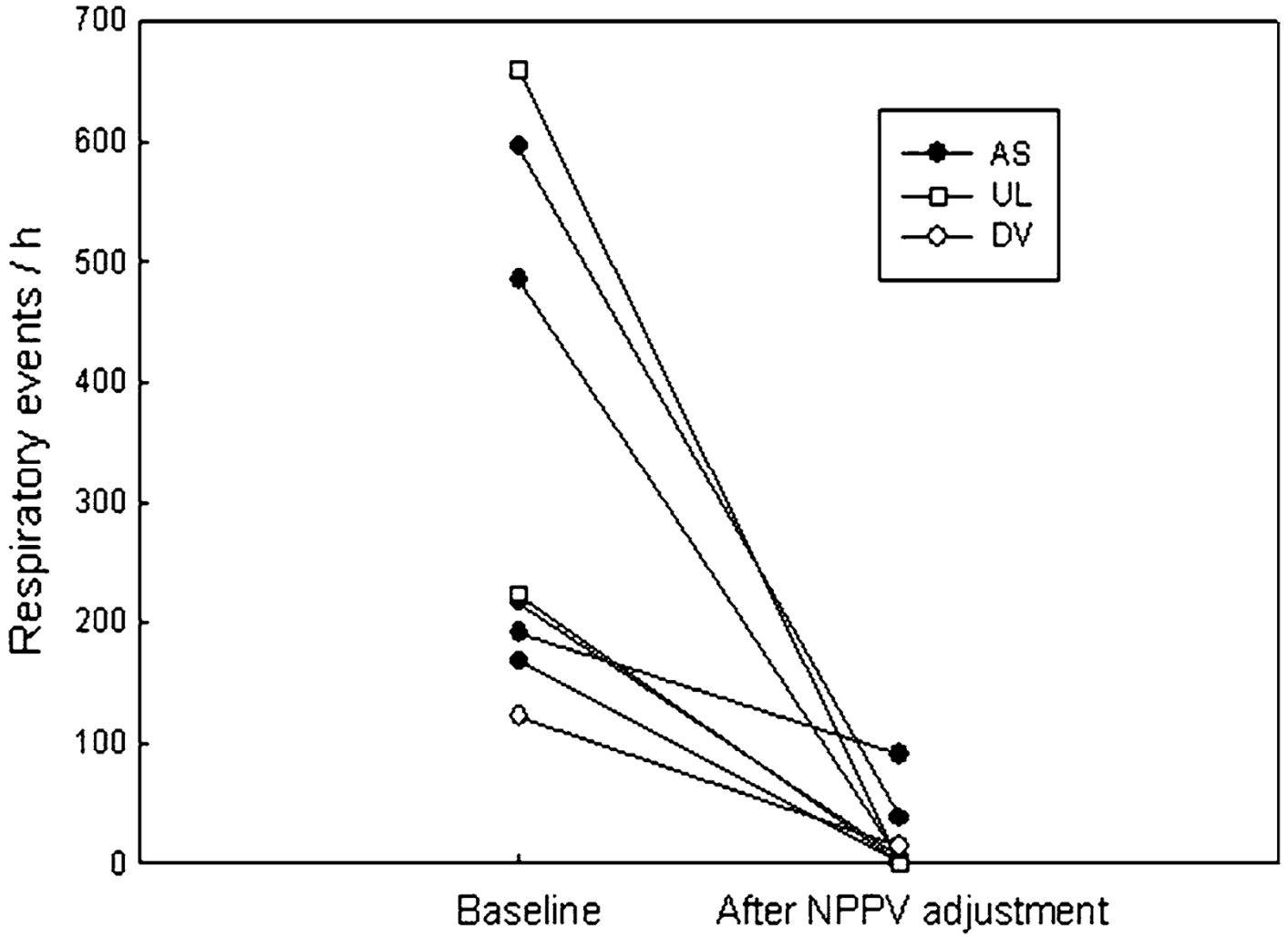
↓IPAP, ↑PEP, ↑FR, TMPI, Timax



Polygraphic respiratory events during sleep with noninvasive ventilation in children: description, prevalence, and clinical consequences

Caldarelli V et al.
Intensive Care Med 2013; 39: 739

n = 39
Neuromuscular Disease
OSA
Lung diseases



UL: unintentional leak; AS: asynchrony; DV: decrease ventilatory drive

Best Clinical Practices for the Sleep Center Adjustment of Noninvasive Positive Pressure Ventilation (NPPV) in Stable Chronic Alveolar Hypoventilation Syndromes

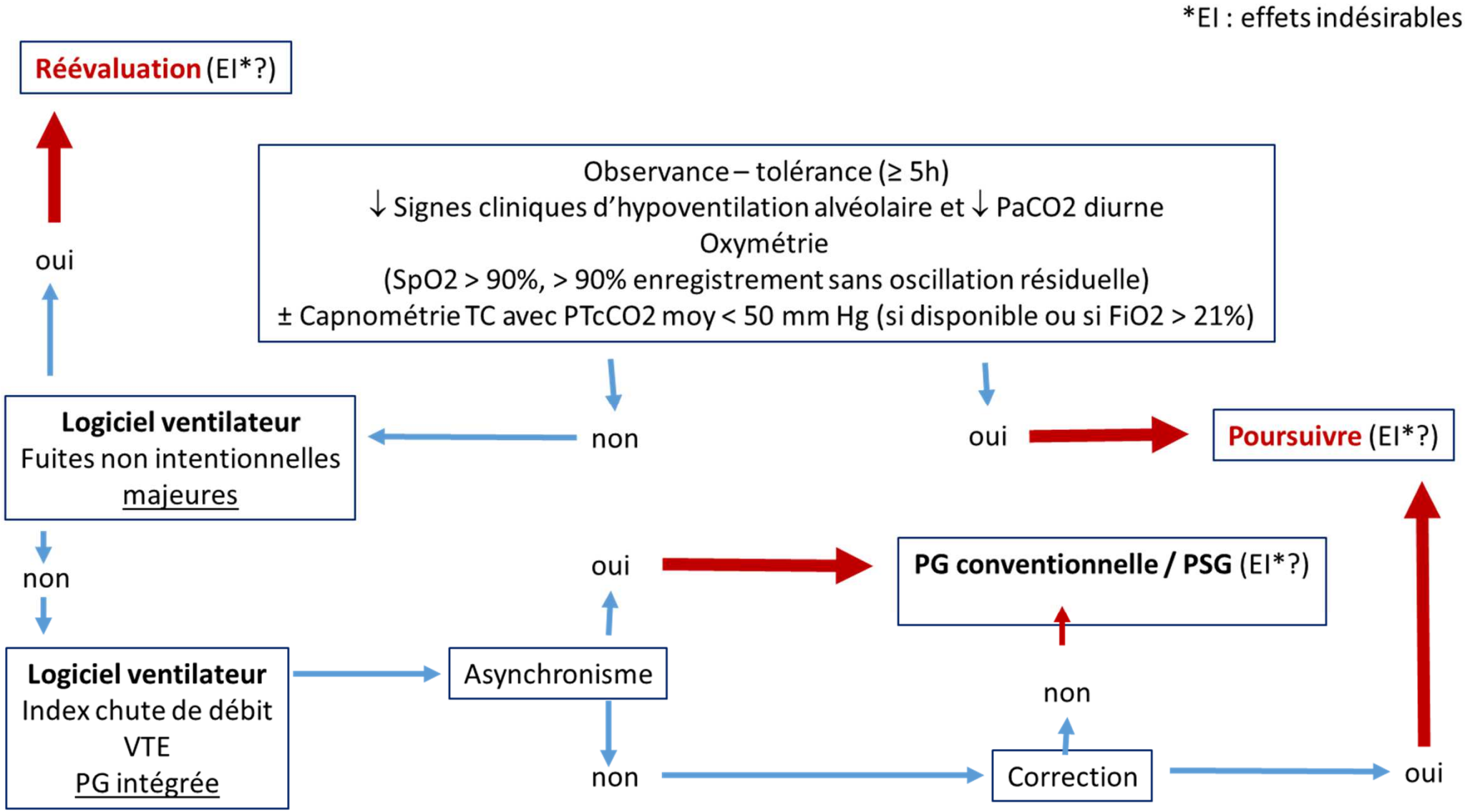
NPPV Titration Task Force of the American Academy of Sleep Medicine
Task Force Members: Richard B. Berry, M.D. (Chair)[1]; Alejandro Chediak, M.D. (Vice-Chair)[2]; Lee K. Brown, M.D.[3];
Jonathan Finder, M.D.[4]; David Gozal, M.D.[5]; Conrad Iber, M.D.[6]; Clete A. Kushida, M.D., Ph.D.[7]; Timothy Morgenthaler, M.D.[8]; James A. Rowley, M.D.[9]; Sally L. Davidson-Ward, M.D.[10]

General Recommendations:

NPPV titration with **PSG is the recommended method to determine an effective level of nocturnal ventilatory support** in patients with CAH. In circumstances in which NPPV treatment is initiated and adjusted empirically in the outpatient setting based on clinical judgment, a **PSG should be utilized if possible to confirm that the final NPPV settings** are effective or to make adjustments as necessary.

J Clin Sleep Med 2010; 6: 491-514

MONITORAGE DE LA VNI A DOMICILE



Adaptation de Janssens JP et al. Thorax 2011;66:438

POLYGRAPHIE VENTILATOIRE SOUS VNI « CONVENTIONNELLE »

Oxymétrie

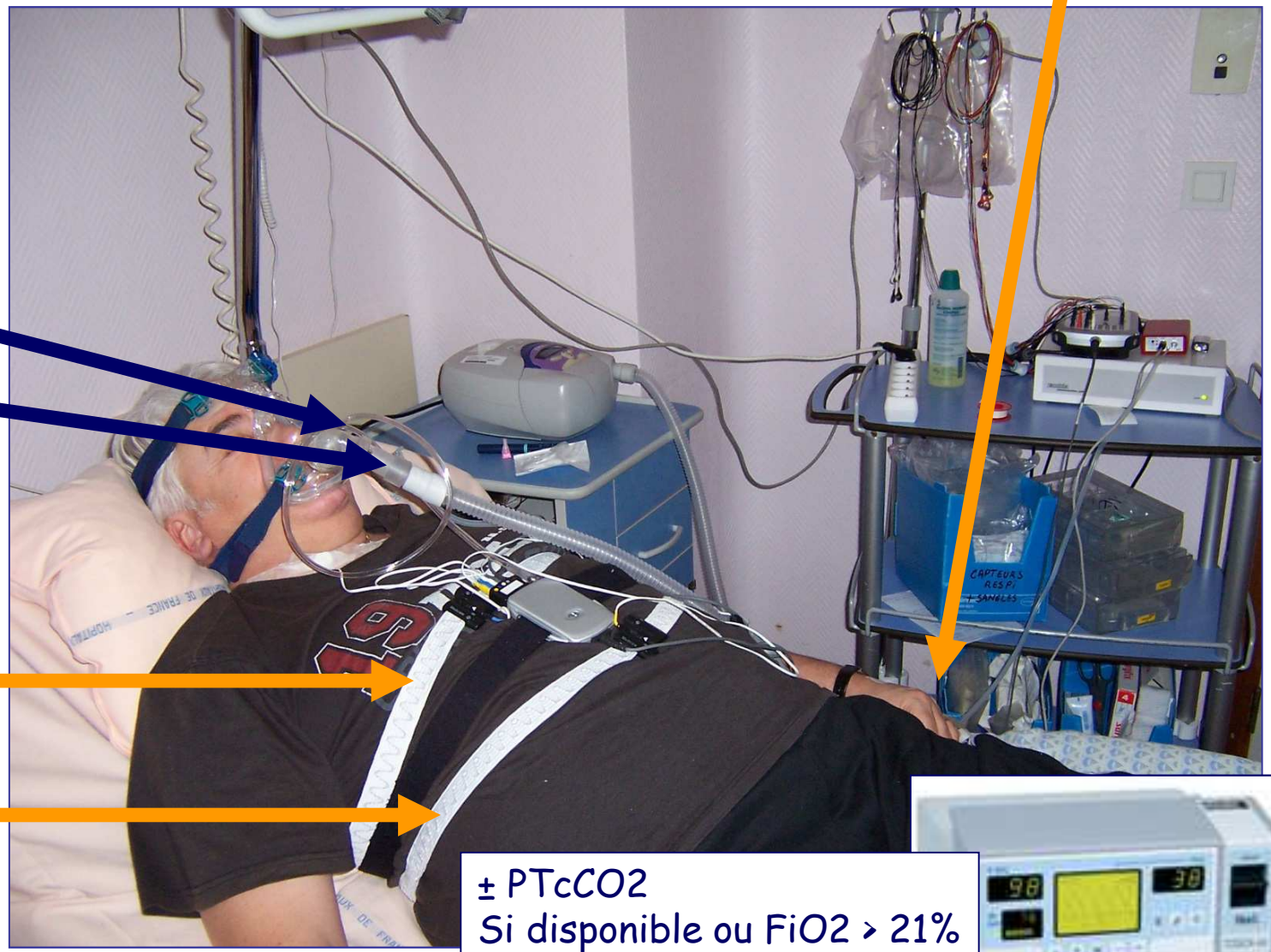
Au minimum !

Pression au masque

Débit insufflé et expiré mesuré dans le circuit à proximité du masque (pneumotachographe)

Sangle thoracique

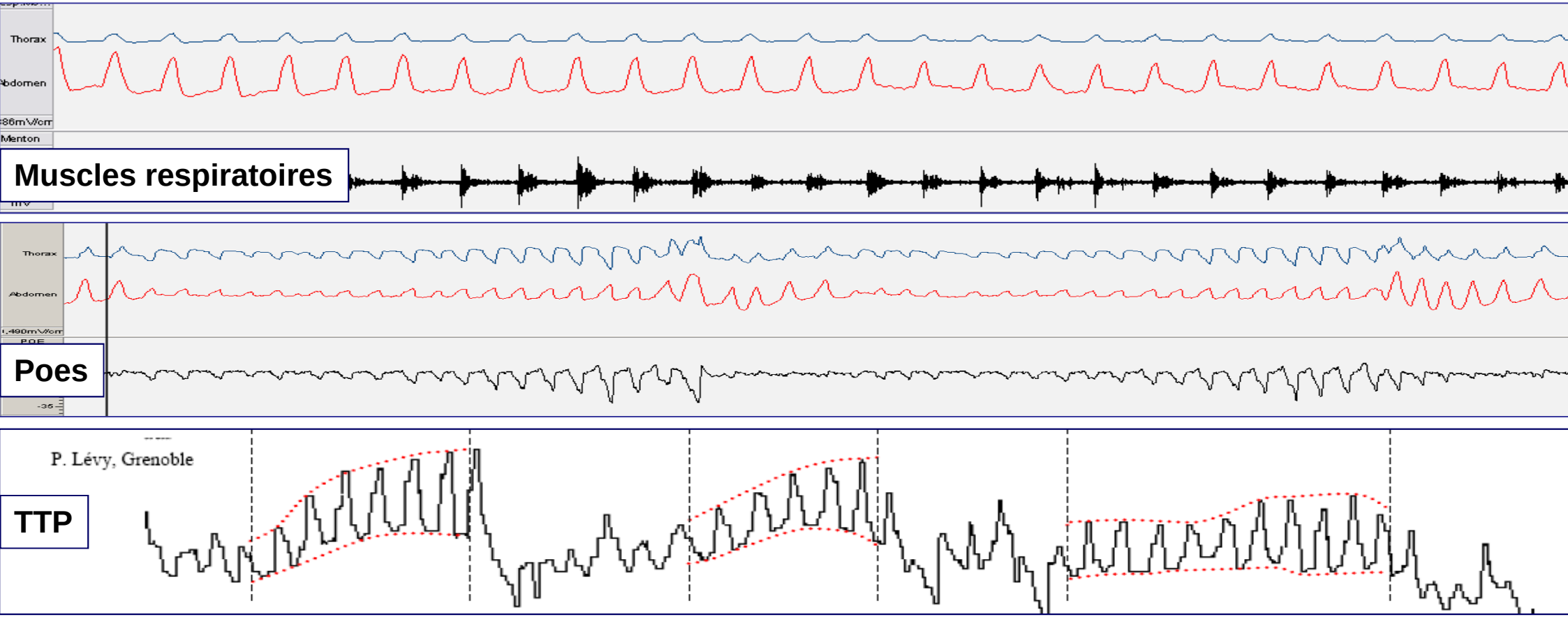
Sangle abdominale



± PTcCO2
Si disponible ou FiO2 > 21%

POLYGRAPHIE VENTILATOIRE SOUS VNI « CONVENTIONNELLE »

Monitorage des efforts inspiratoires



Parasternal electromyography to determine the relationship between patient-ventilator asynchrony and nocturnal gas exchange during home mechanical ventilation set-up

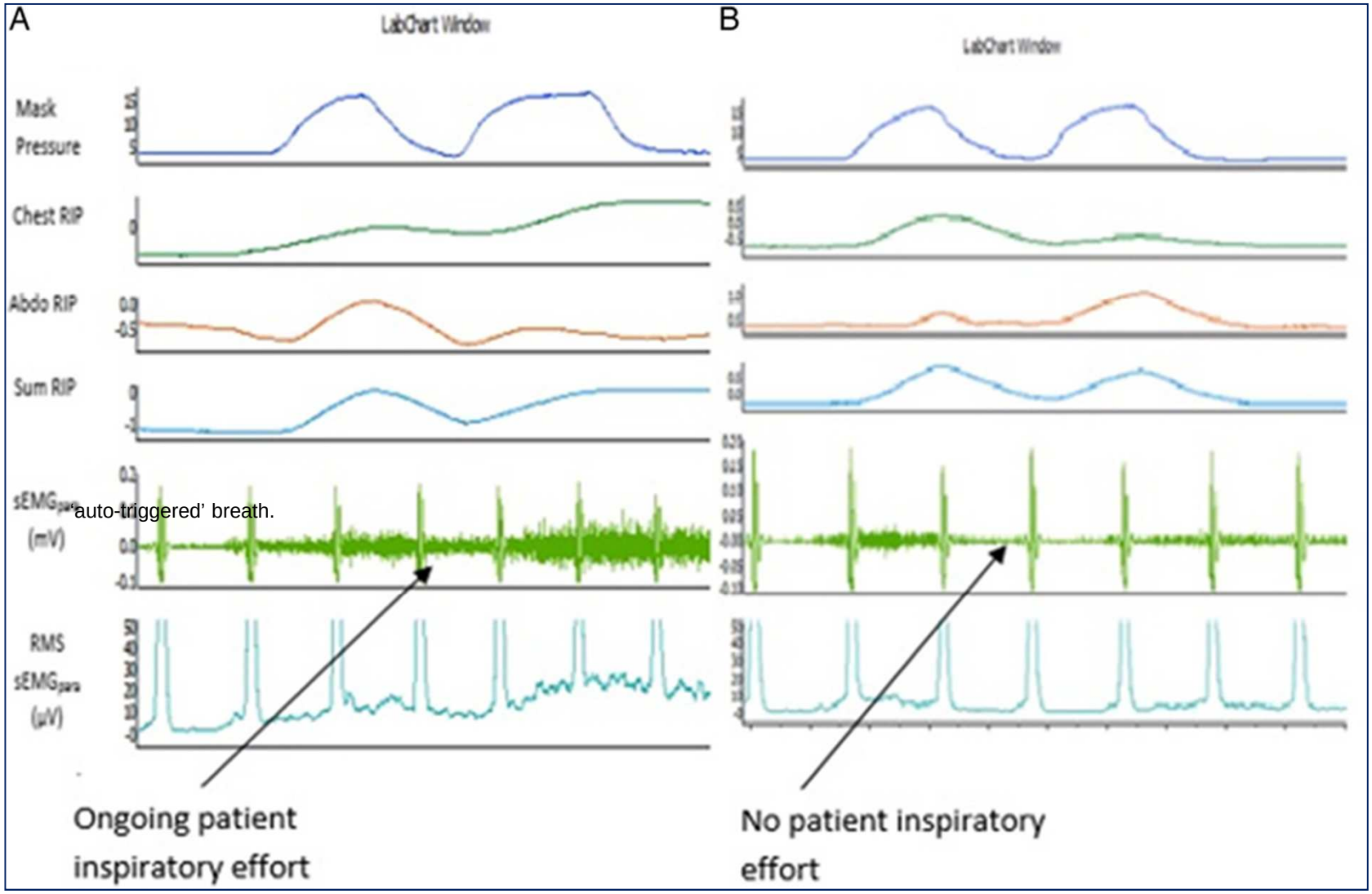
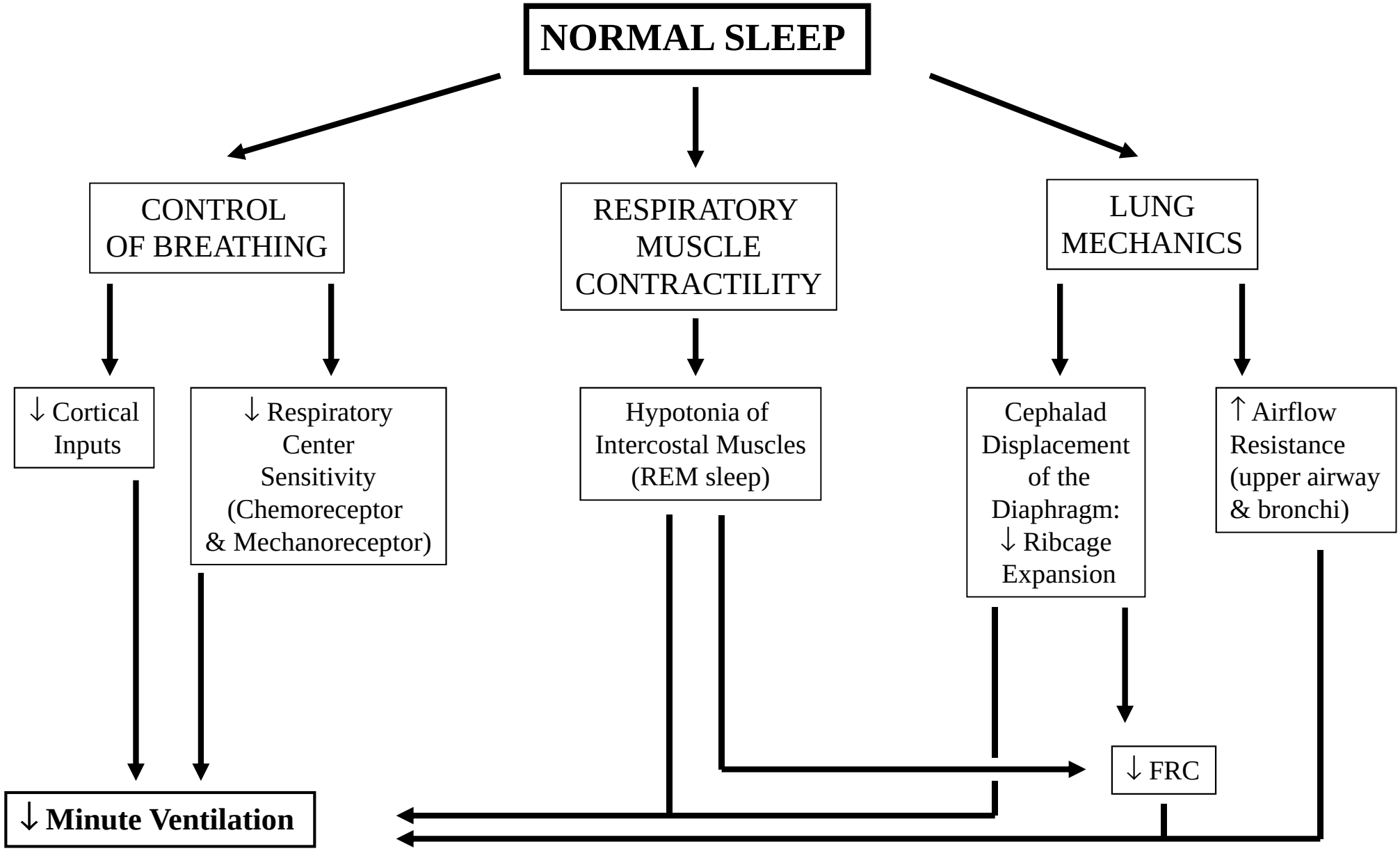


Figure 2 'Double triggering' was confirmed with the addition of second intercostal space electromyography to the mask pressure measurement and respiratory inductance plethysmography. (A) shows a prematurely cycled breath with ongoing patient inspiratory effort to trigger a second ventilator-delivered breath and (B) shows a patient-triggered breath followed by a nonpatient-triggered breath, which by definition is an

Ramsay M et al. Thorax 2015

Analyse difficile

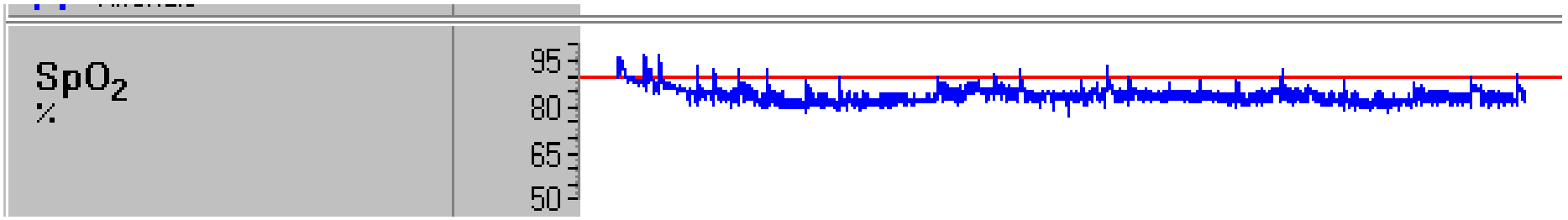
VENTILATION NON INVASIVE
Couple patient – machine
IMPACT DU PATIENT



Perrin C et al. Sem Respir Crit Care Med 2005; 26: 117

Modifications de la Ventilation avec le sommeil:

- Diminution de 5 à 15% de la ventilation externe
- Hypoventilation alvéolaire: augmentation de PCO2 (2-6 mmHg) et baisse de SaO2 (1-2%) malgré la baisse de VO2 et VCO2 (8-10%)
- Ventilation irréguliére en Stade 1-2 (respiration périodique) et plus encore en SP (phasique)
- Stade 3-4: ventilation très régulière: baisse de VT (10%), FR inchangée
- Diminution du calibre des VAS: augmentation des Résistances, plus collabables en SP


SpO2
%
95
80
65
50

Proposal for a systematic analysis of polygraphy or polysomnography for identifying and scoring abnormal events occurring during non-invasive ventilation

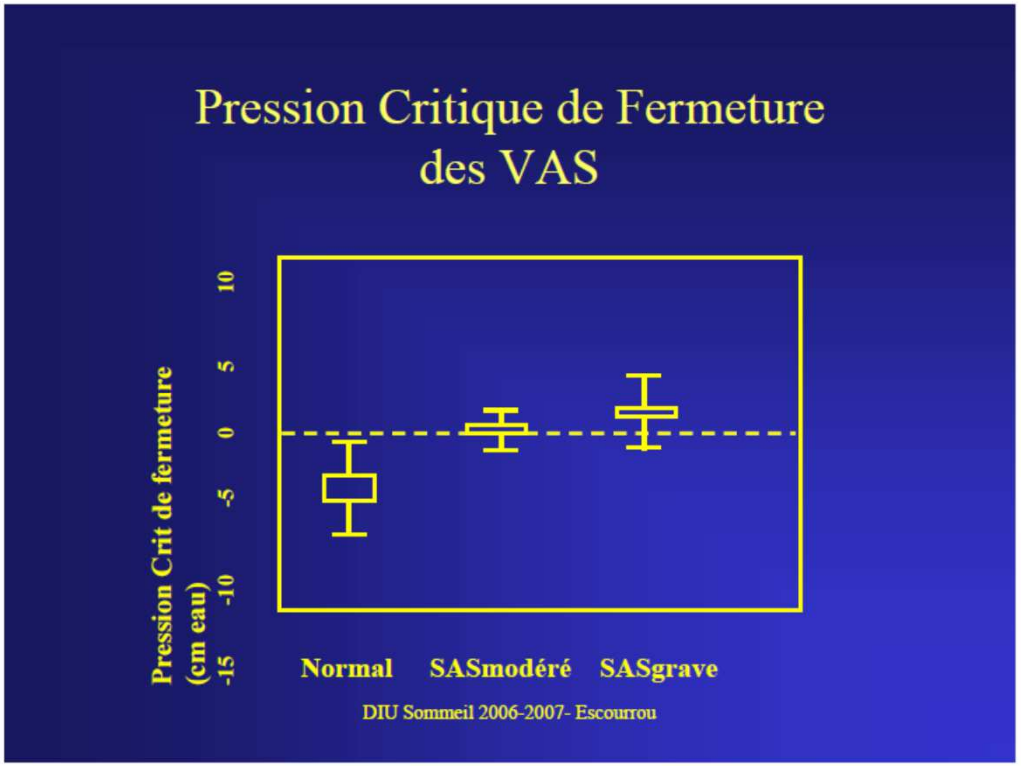
J Gonzalez-Bermejo,[1] C Perrin,[2] J P Janssens,[3] J L Pepin,[4] G Mroue,[5] P Léger,[6] B Langevin,[7] S Rouault,[8] C Rabec,[9] D Rodenstein,[10] on behalf of the SomnoNIV Group

THORAX

Thorax 2012; 67: 546-52

OBSTRUCTION PARTIELLE OU TOTALE DES VAS

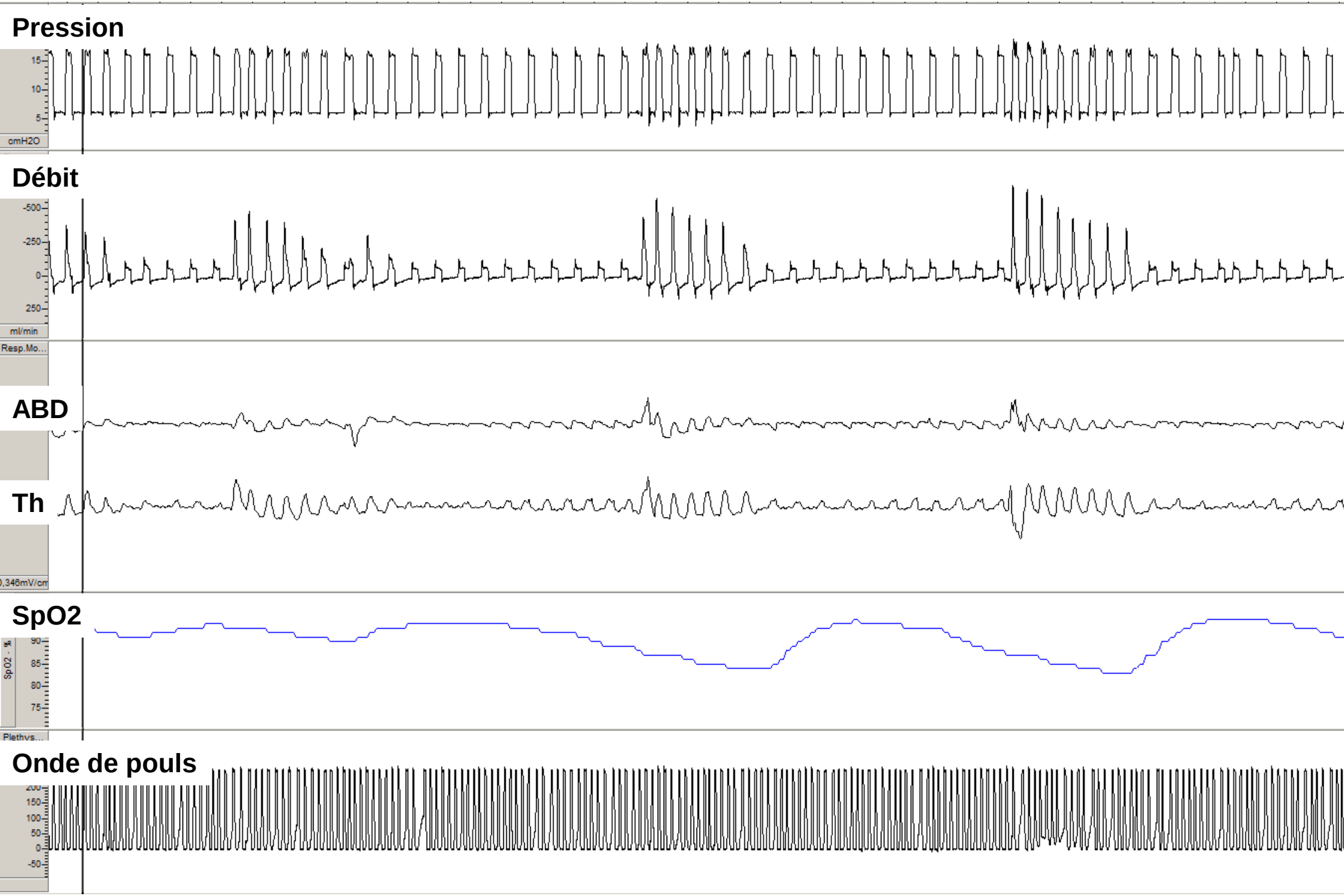
. sans diminution de la commande ventilatoire



?

Instabilité (pression critique) ou obstacle anatomique

(épiglotte ? Amygdale linguale ?....)


Pression
15
10
5
cmH2O
Débit
-500
-250
0
250
ml/min
Resp.Mo...
ABD
Th
0,346mV/cm
SpO2
90
85
80
75
SpO2 - %
Plethys...
Onde de pouls
200
150
100
50
0
-50

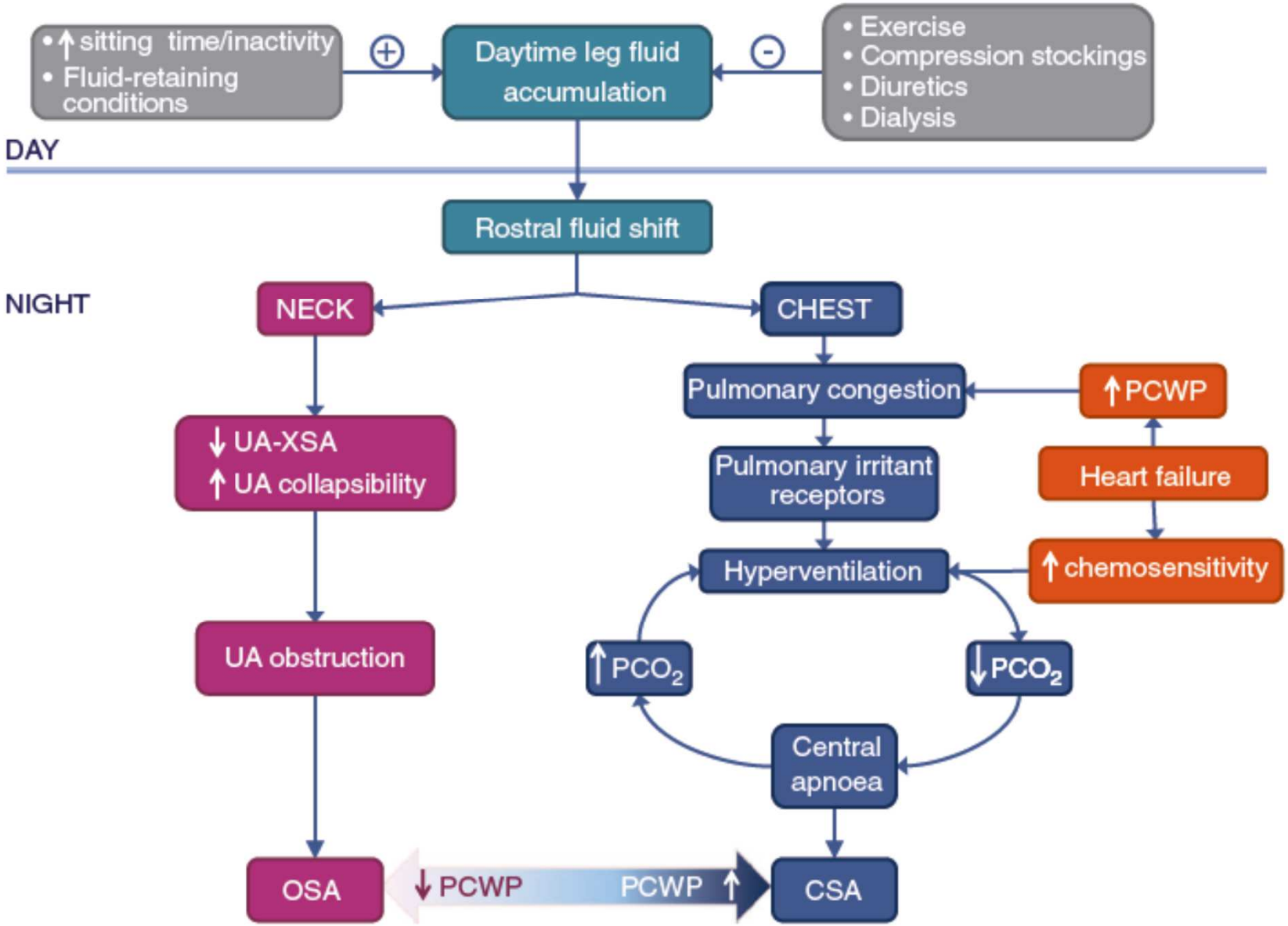


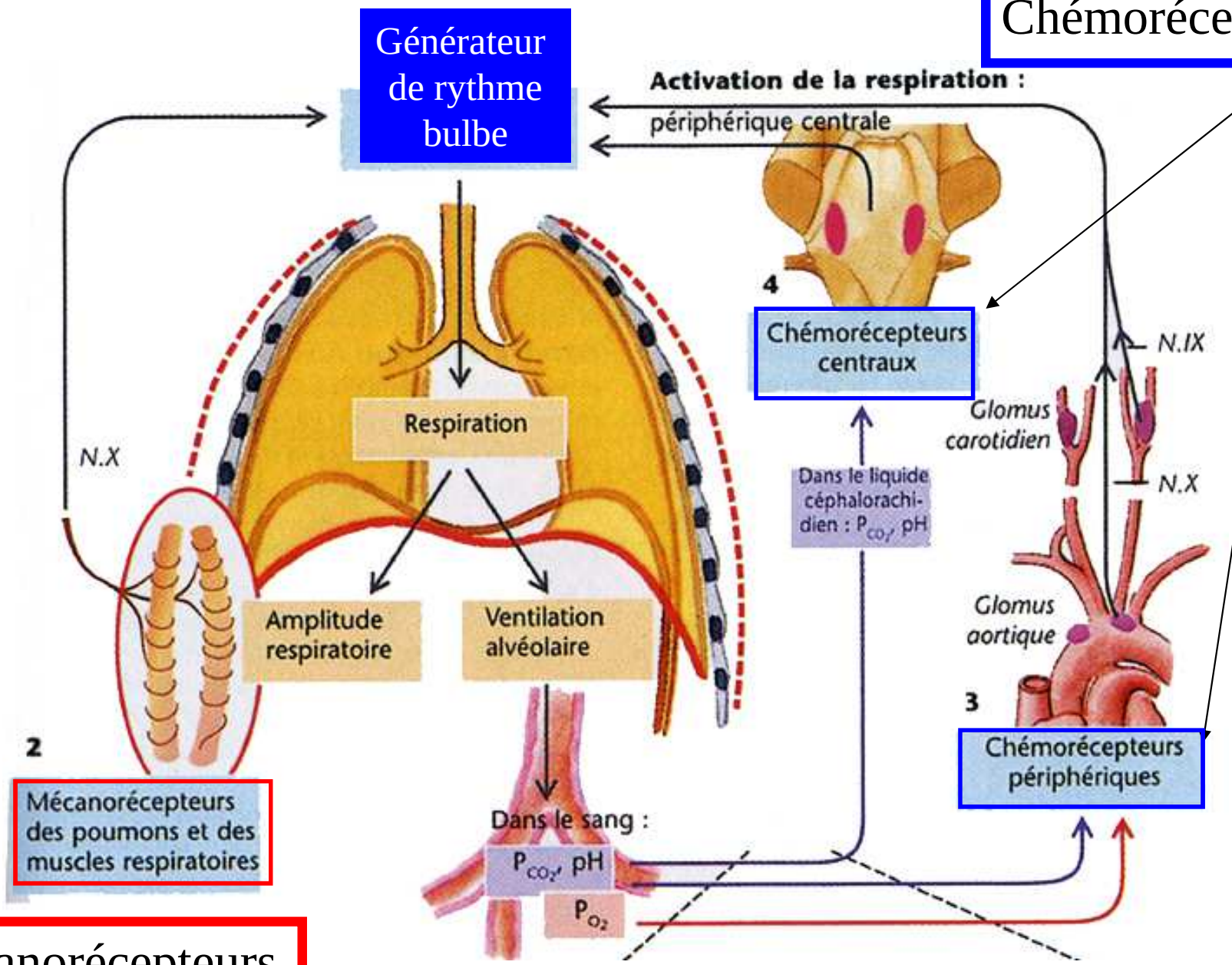
Figure 1. The role of overnight rostral fluid shift in the pathogenesis of obstructive and central sleep apnoea (OSA and CSA)

White LH, Bradley D J. Physiol 2013; 59: 1179

Analyse difficile

VENTILATION NON INVASIVE
Couple patient – machine
IMPACT DE LA TECHNIQUE

La physiologie : Régulation de la respiration



Chémorécepteurs

Mécanorécepteurs

pO_2, pCO_2 et pH

Anatomical representation of the upper airway and the important muscles controlling airway patency

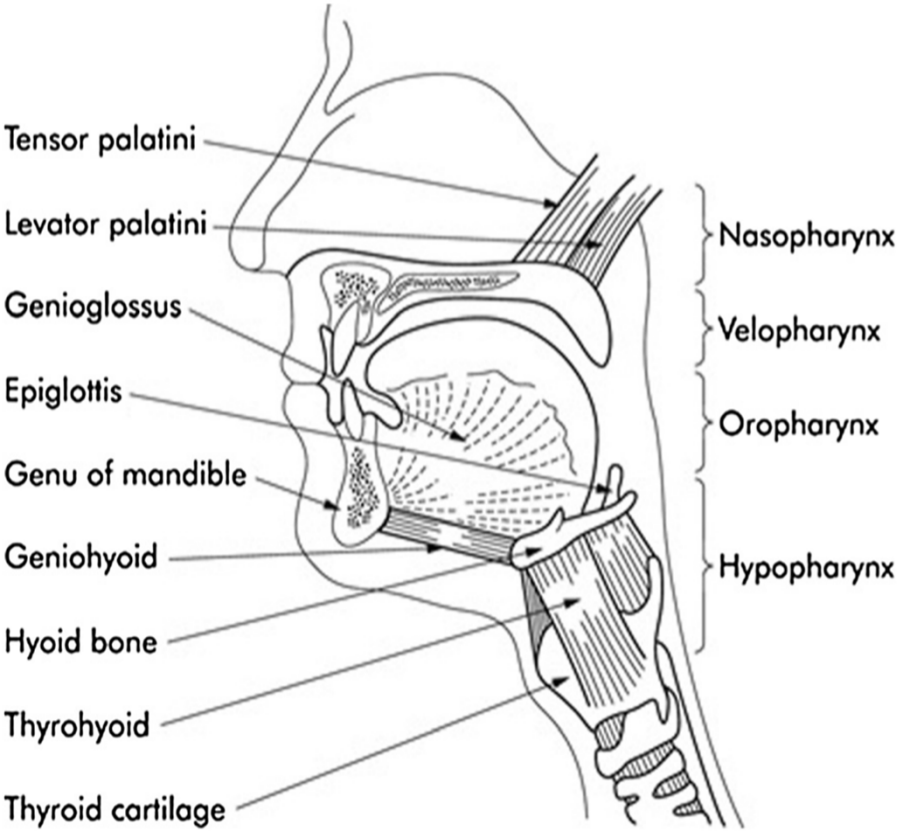


Figure 2 Anatomical representation of the upper airway and the important muscles controlling airway patency. From [26].

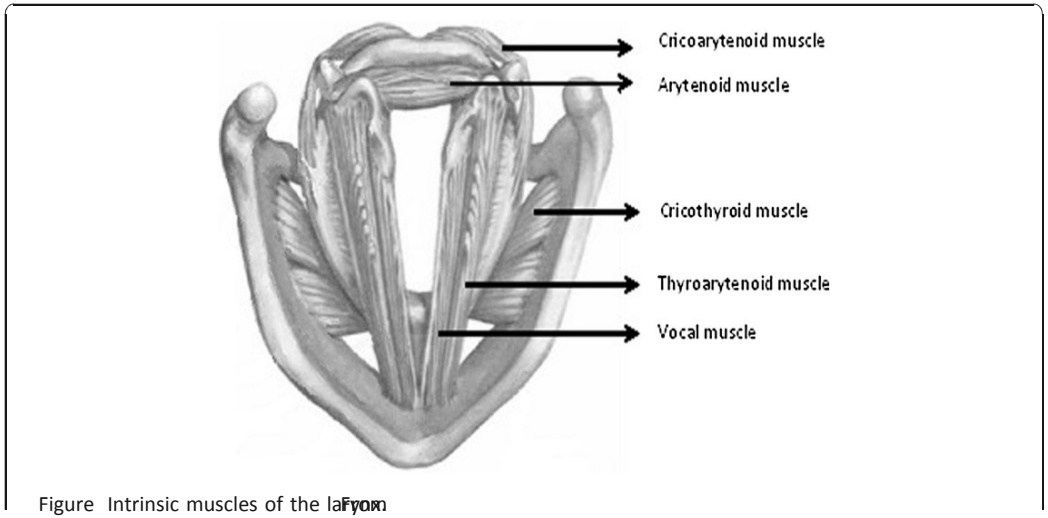
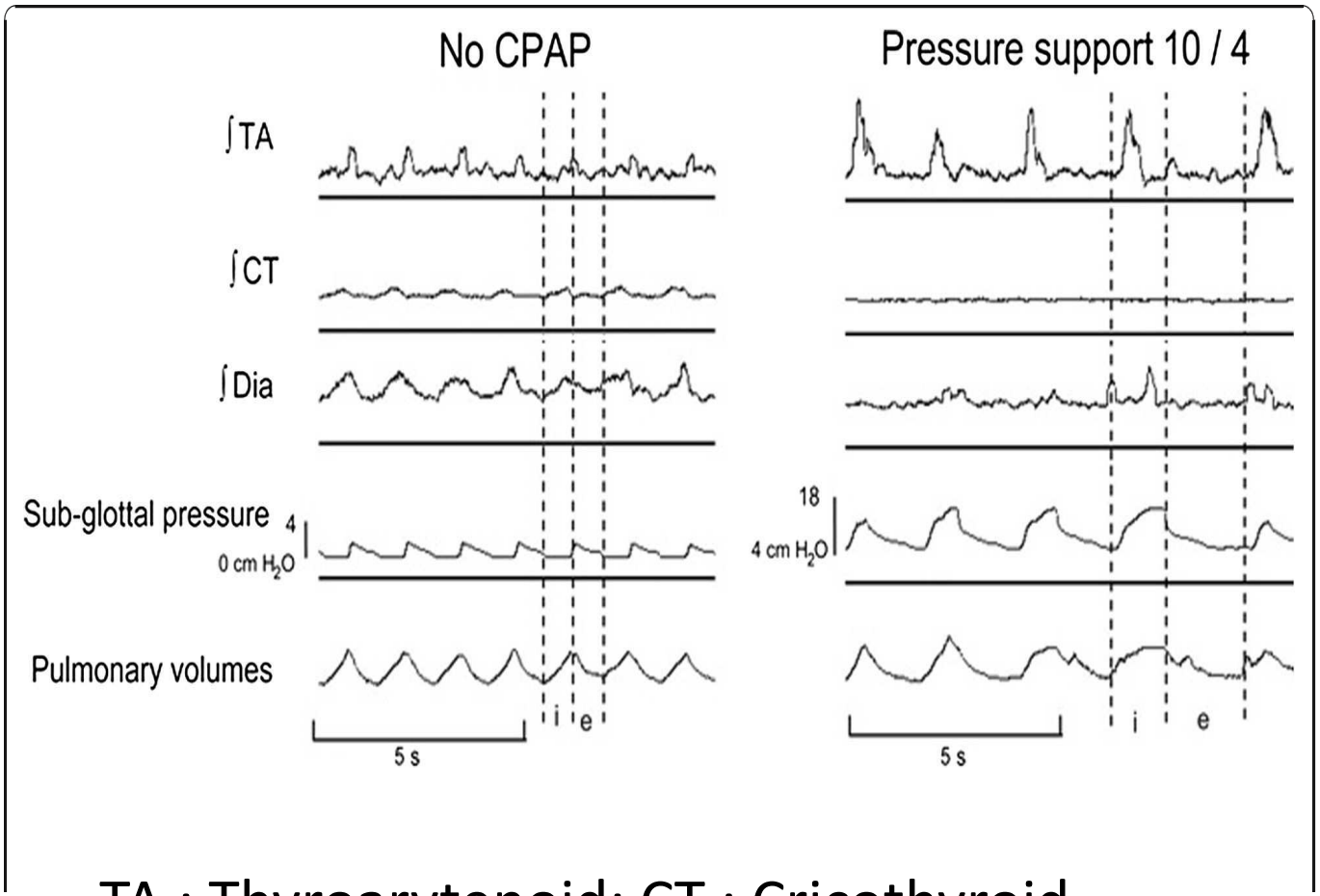


Figure 3 Intrinsic muscles of the larynx. From [27].

Oppersma E et al. Crit Care 2013; 17: 245

Moving time averaged electrical activities of muscles during noninvasive ventilation.



TA : Thyroarytenoid; CT : Cricothyroid

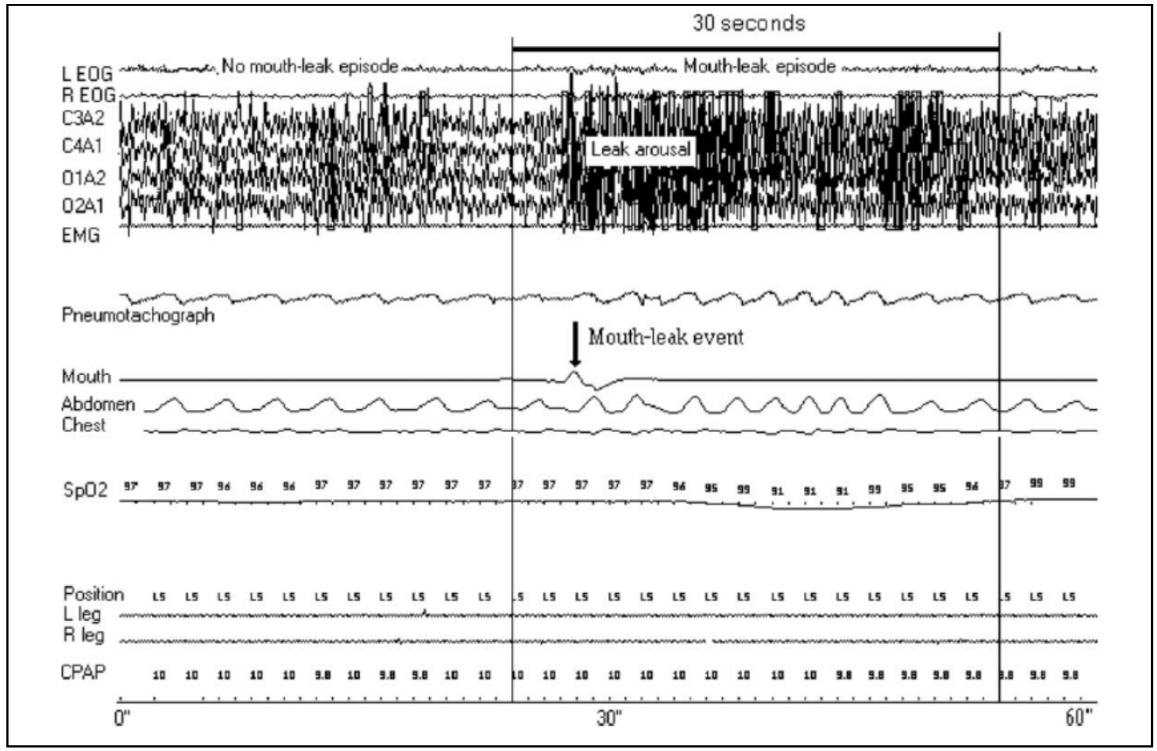
Oppersma E et al. Crit Care 2013; 17: 245

FUITES NON INTENTIONNELLES

Conséquences :

. Hypoventilation (> 50%) et altération des échanges gazeux
. Augmentation des résistances des voies aériennes supérieures
. Difficulté de cyclage (I-E) en cas de « trigger expiratoire »
. Effort inspiratoire non récompensé
. Fragmentation du sommeil
. Conjonctivite
. Lésions cutanées (par serrage excessif du harnais)

Esquinas R et al.
Crit Care 2012;16:203



Bachour A et al. Sleep Med 2004;5:261

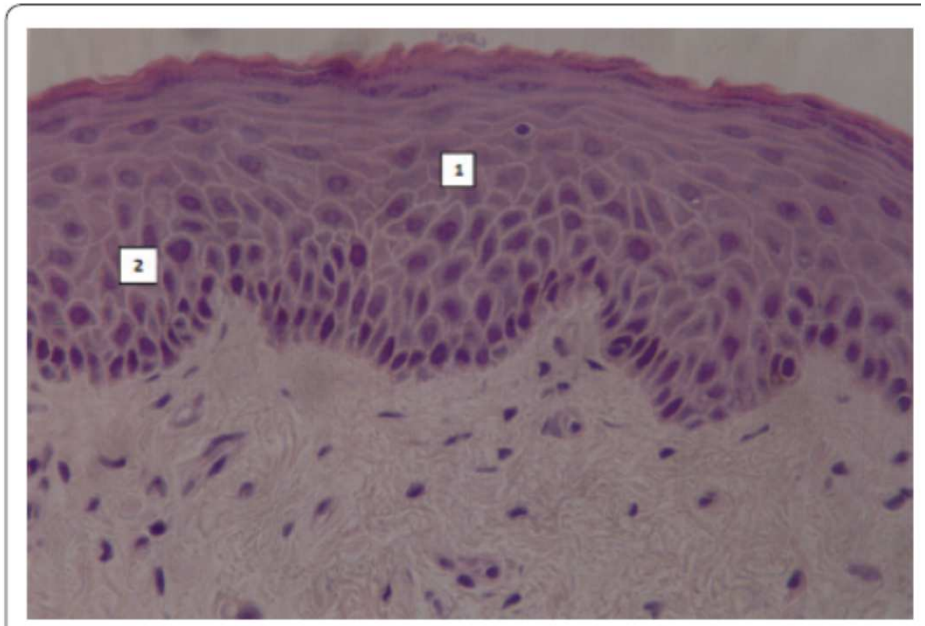
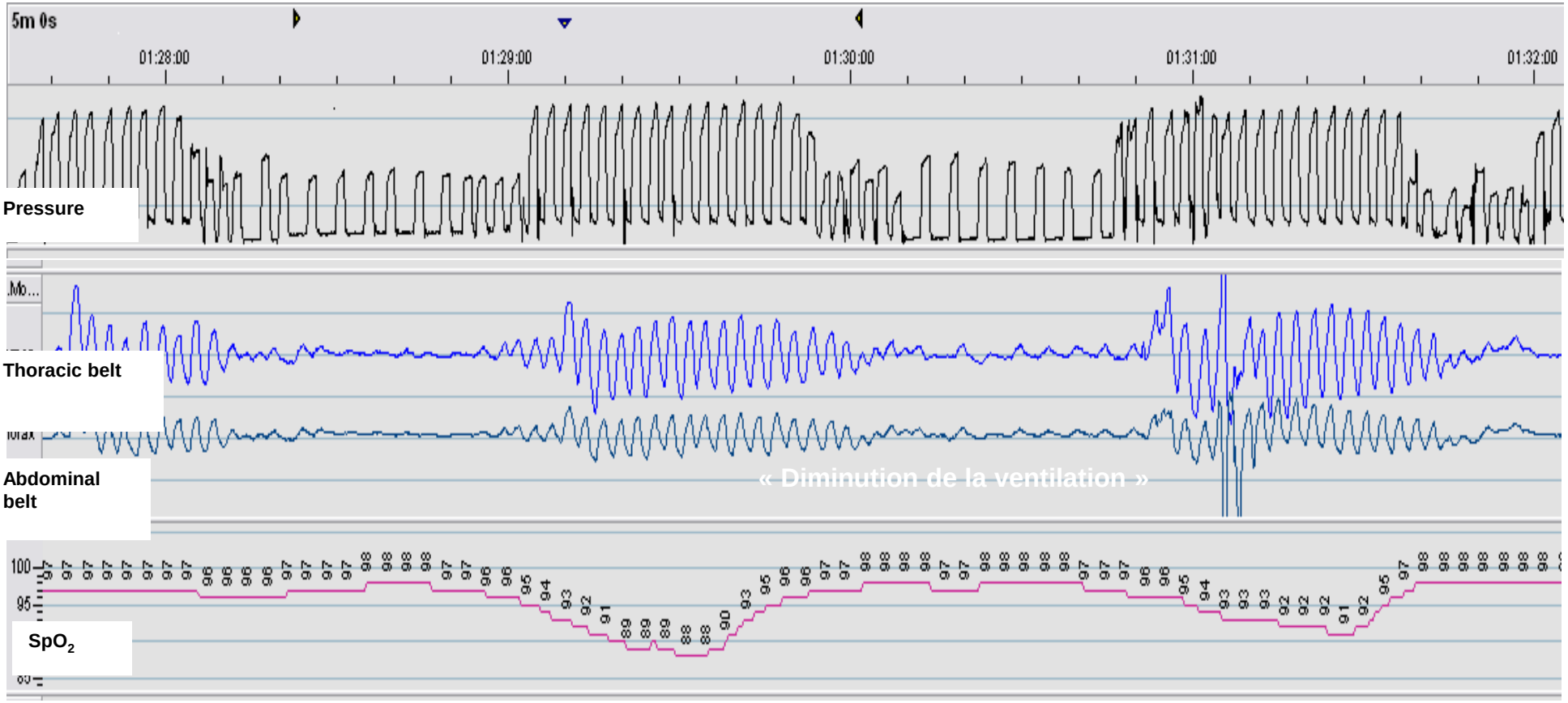
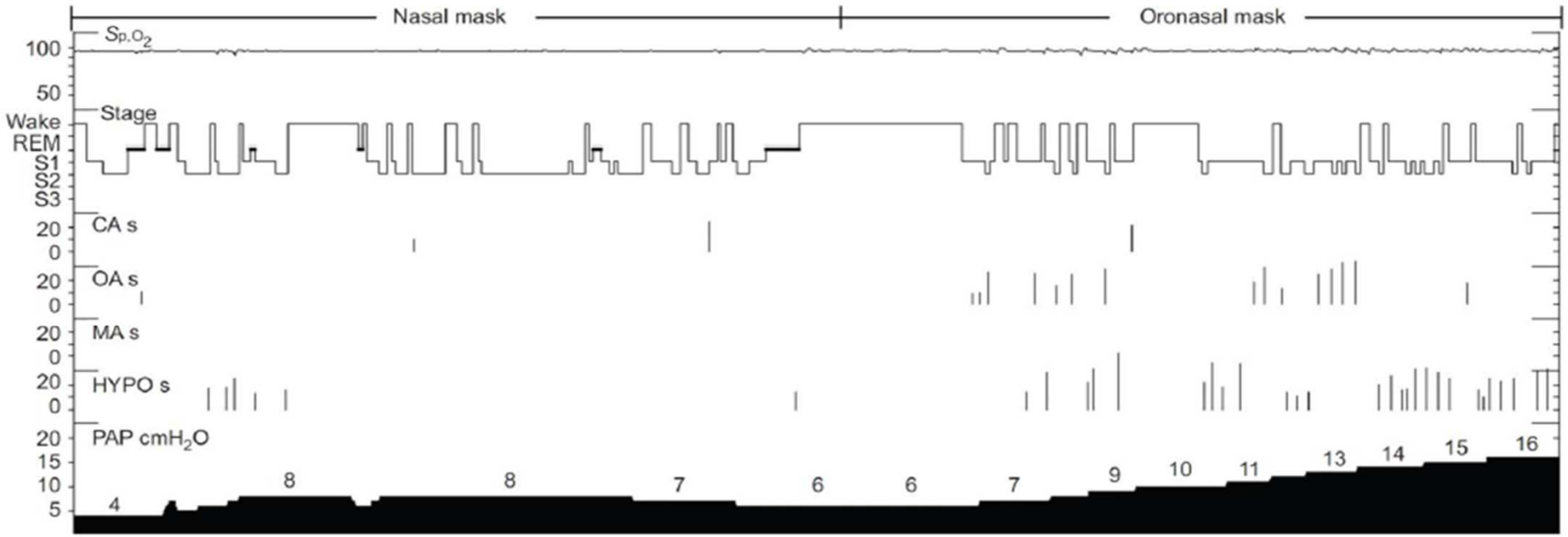
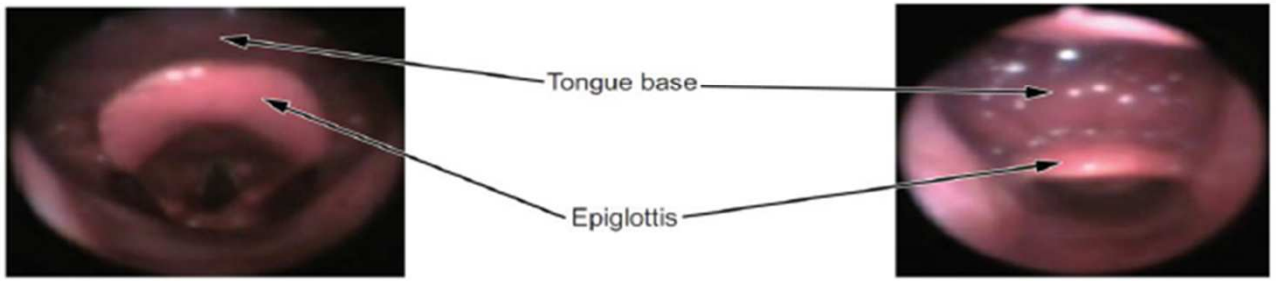


Figure 1. Biopsy of nasal mucosa. Metaplasia (1) and keratinization (2) in nasal respiratory mucosa in one patient without humidification during non-invasive ventilation.


5m 0s
01:28:00
01:29:00
01:30:00
01:31:00
01:32:00
Pressure
Thoracic belt
Abdominal belt
« Diminution de la ventilation »
100
95
SpO2

Nasal vs facial





Lorenzi-Filho G, Eur Respir J 2012

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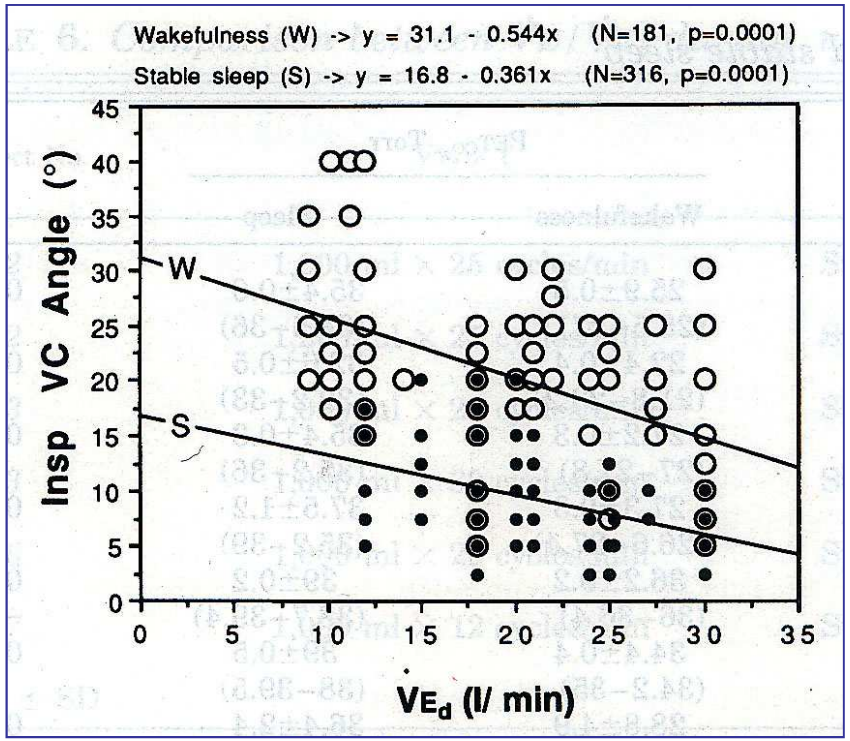
THORAX

Thorax 2012; 67: 546-52

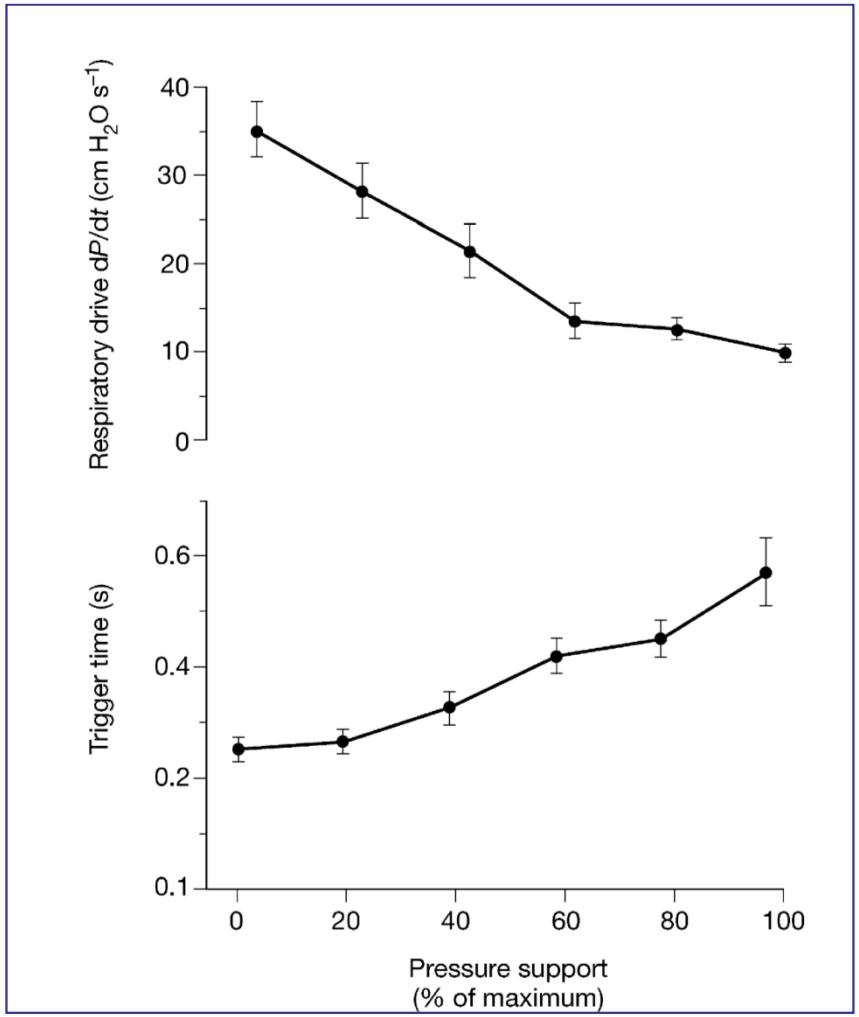
OBSTRUCTION PARTIELLE OU TOTALE DES VAS

. avec diminution de la commande ventilatoire

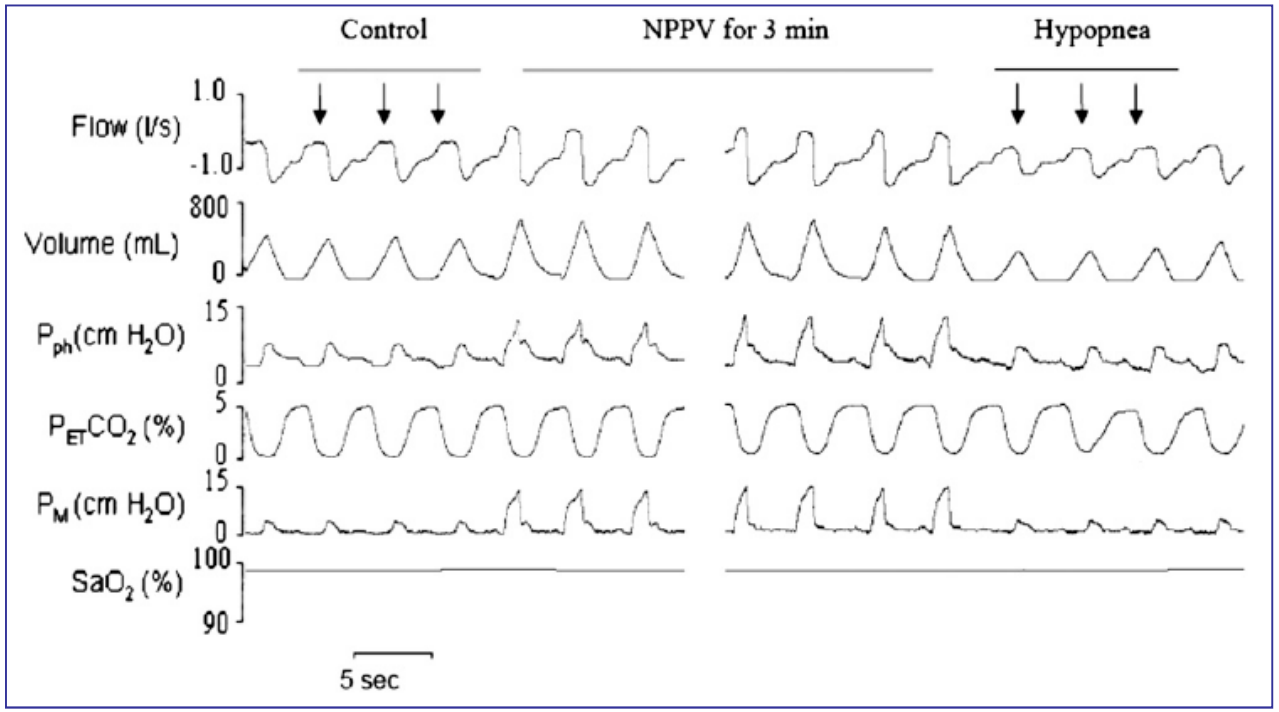


Jounieaux V et al.
J Appl Physiol 1995; 79: 186

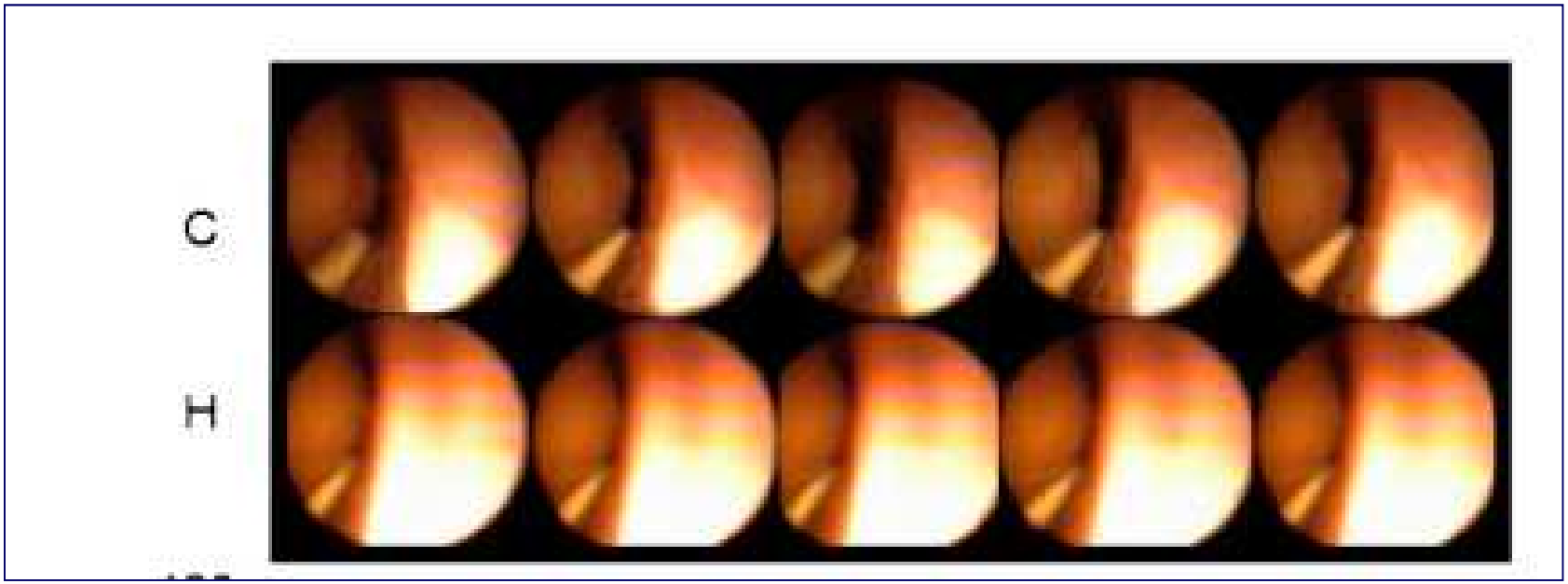
Leung et al. AJRCCM 1997; 155: 1940



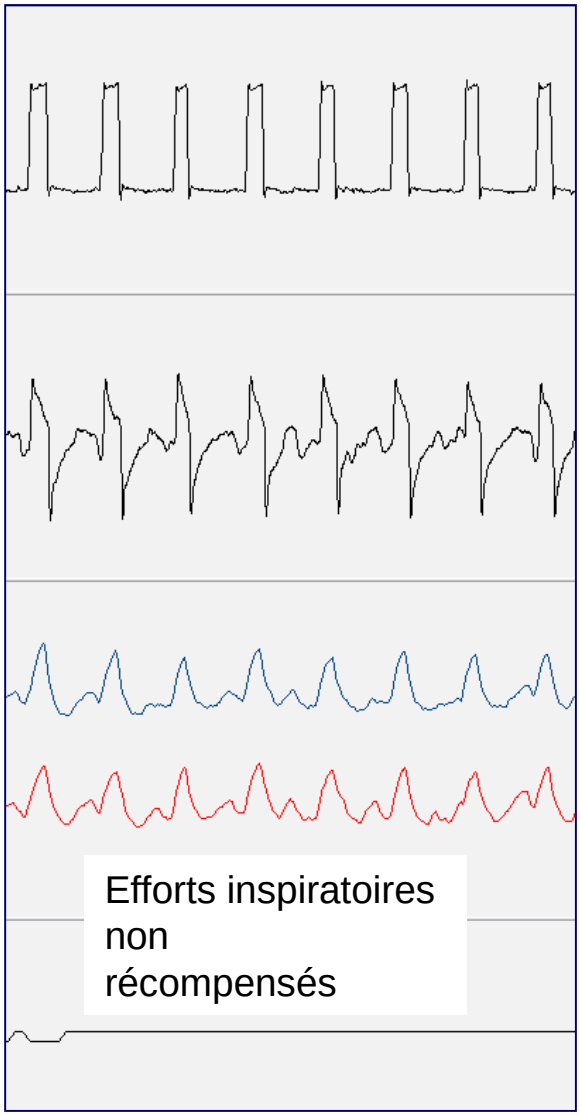
Obstruction
AVEC
diminution de la commande
Fermeture des VAS

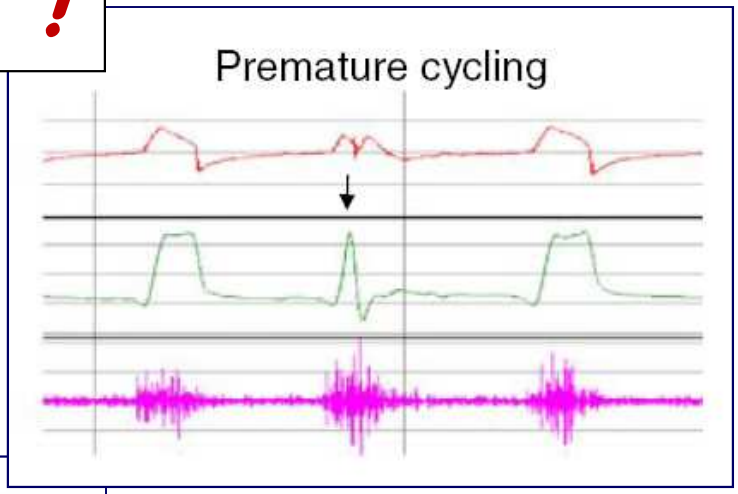


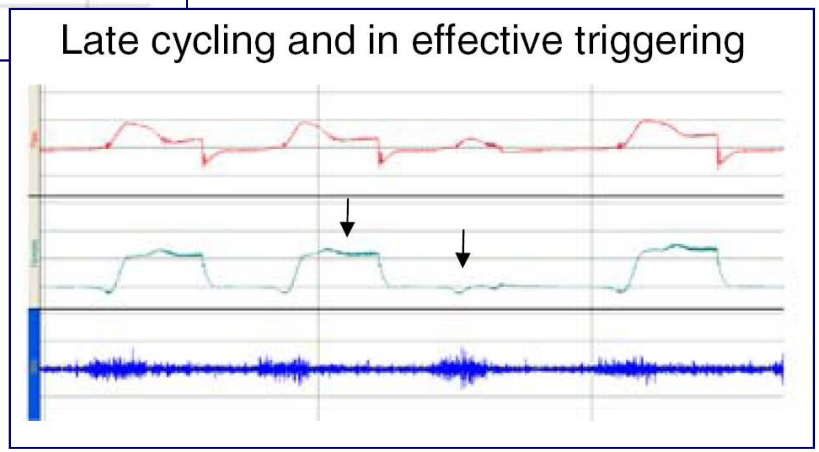
Sankri-Tarbichi AG et al.
AJRCCM 2009; 179:313

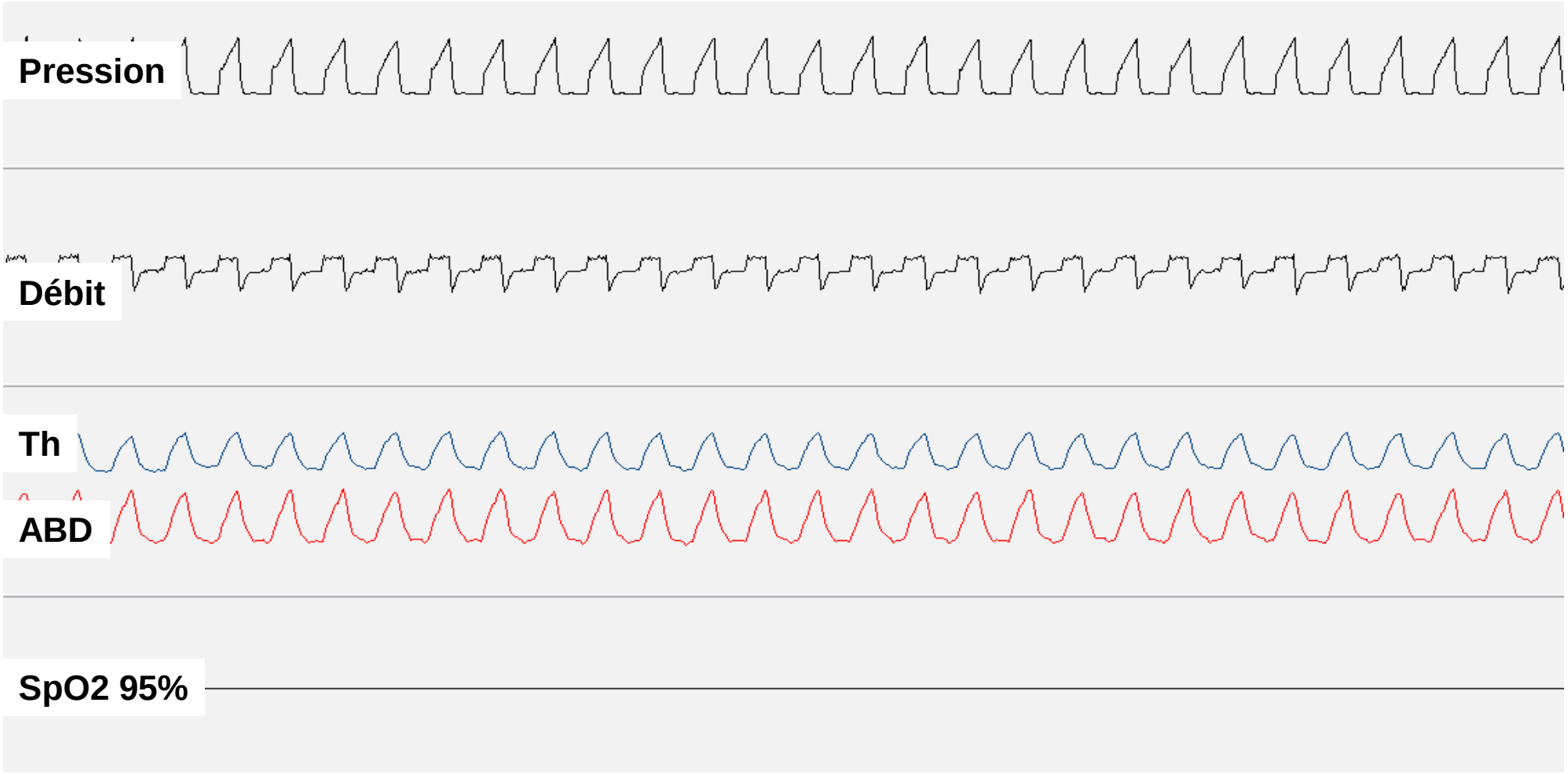


Mésentente P-M, Asynchronismes
Aussi par réglages inadéquats !









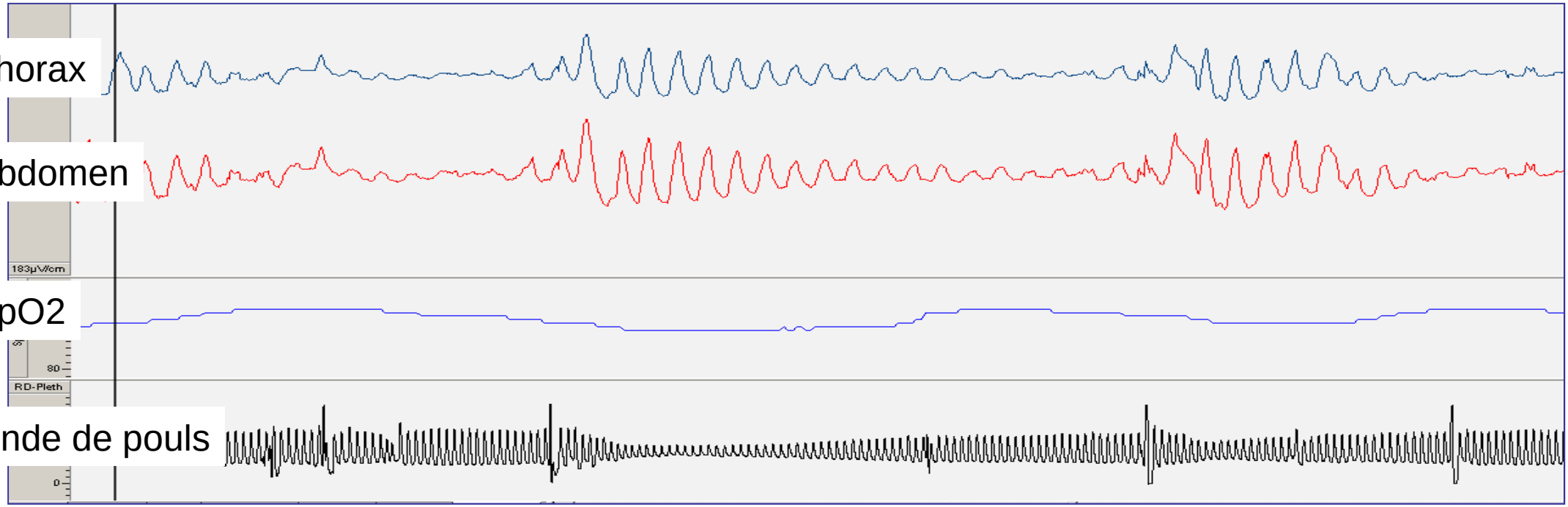
Que rechercher ?

Que rechercher ?

ANALYSE : pression et débit

EVENEMENT RESPIRATOIRE

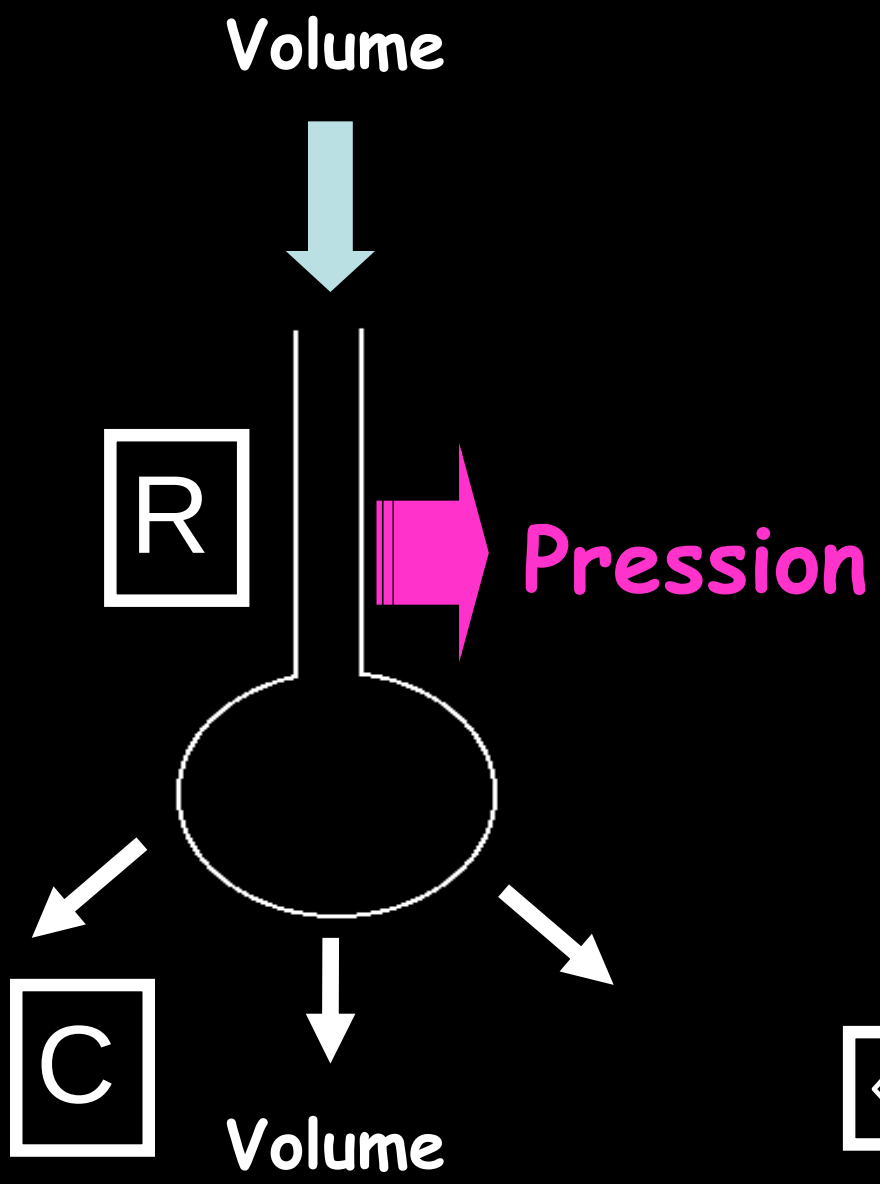
Survenue d'une rupture ventilatoire (caractérisée par la diminution de l'amplitude des sangles thoracique et abdominale ou leur instabilité) qui retentit sur la qualité des échanges gazeux et/ou du sommeil.



La sémiologie des courbes de pression et débit dépend :

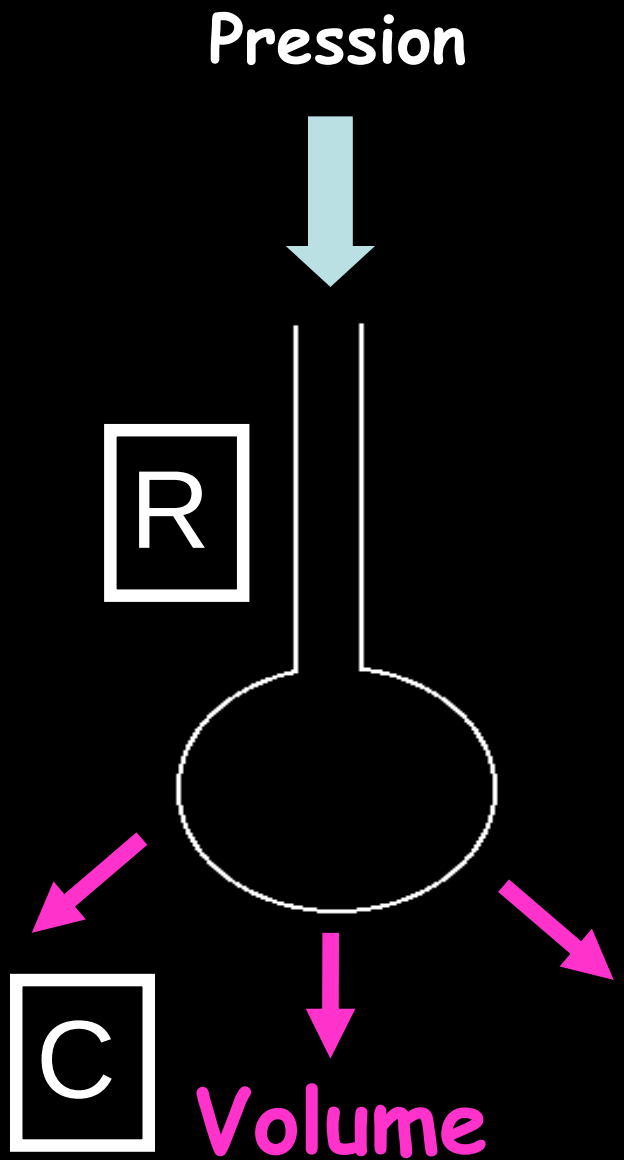
du type
ou
mode de fonctionnement du ventilateur

Ventilateur à régulation de volume



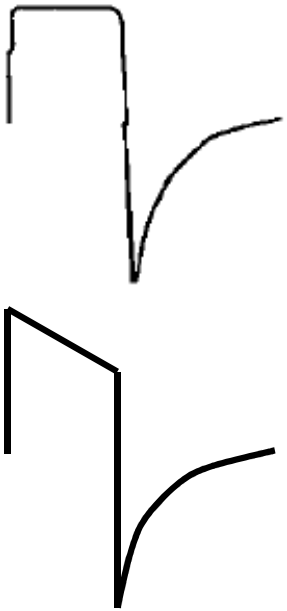
« Quid » en cas d' obstacle, ou de fuite ?

Ventilateur à régulation de pression



« Quid » en cas d' obstacle, ou de fuite ?

Table 1 Comparison between pressure and volume-targeted ventilators

	Volume-targeted	Pressure-targeted
Pressure curve pattern		
Flow curve pattern		

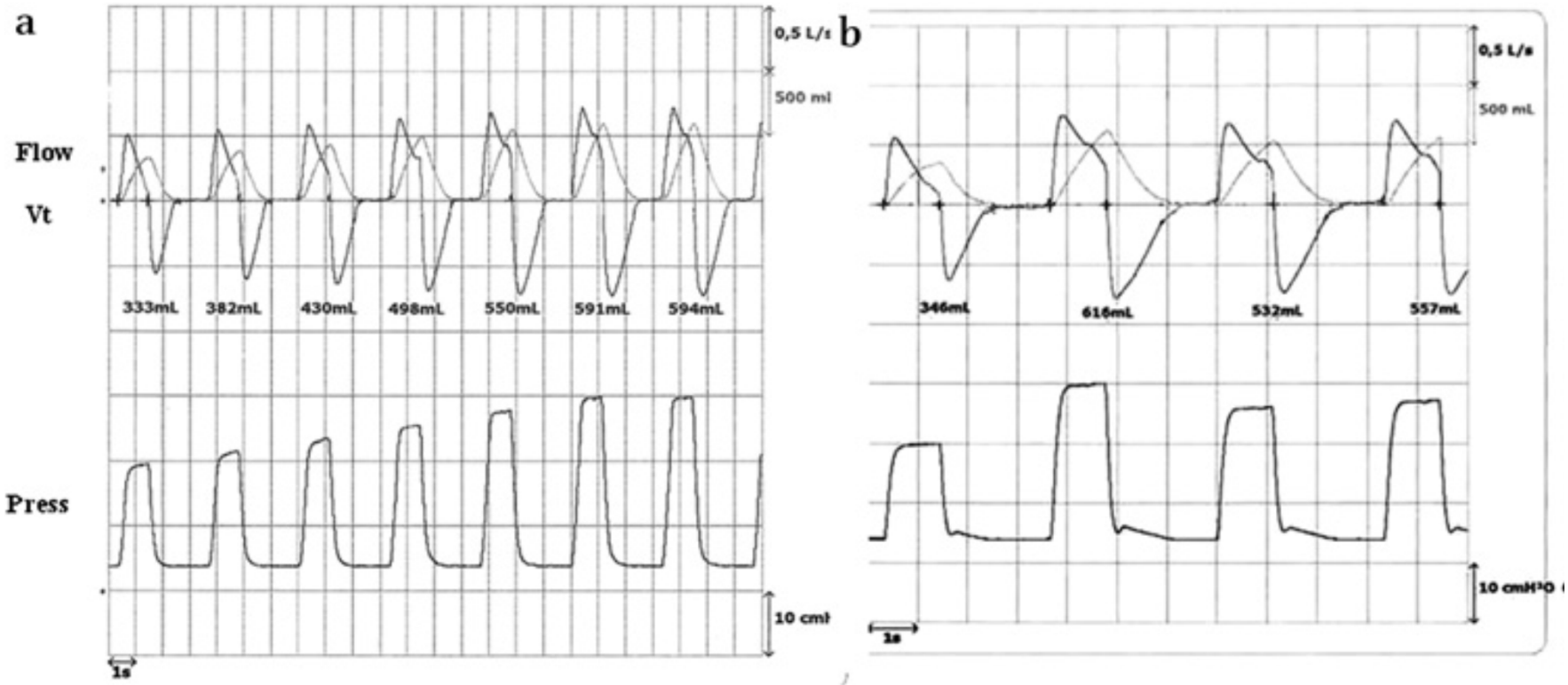
	OBSTACLE		
	Pression	VTi/débit	VTe
VENTILATEUR BAROMETRIQUE	constante	↓	↓
VENTILATEUR VOLUMETRIQUE	↑	Constant	↓

FUITES NON INTENTIONNELLES

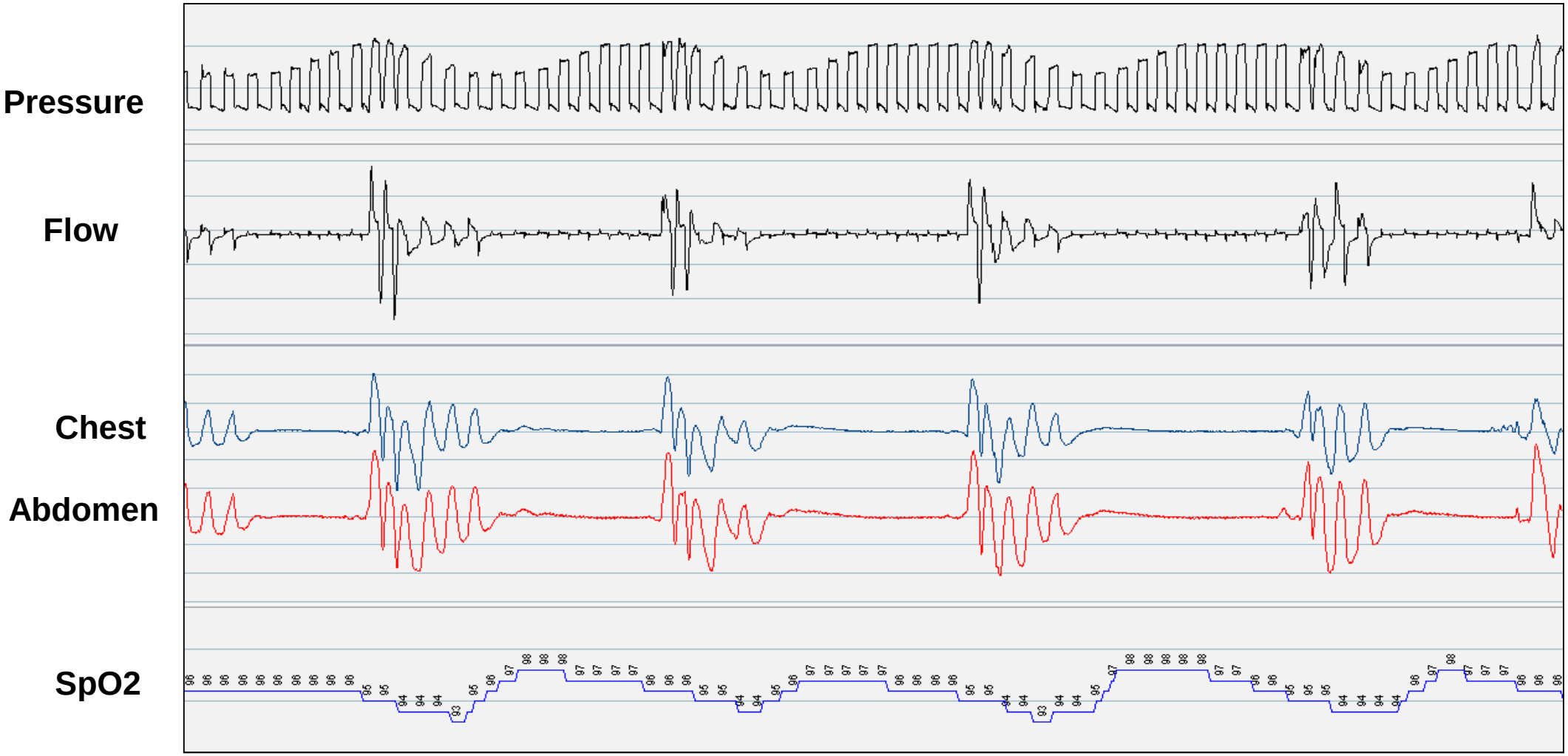
	Pression	VTi/débit	VTe
VENTILATEUR BAROMETRIQUE	peut ↓	↑	↓
VENTILATEUR VOLUMETRIQUE	↓	Constant	↓

	EFFORTS INSPIRATOIRES	
	Pression	**VTi/débit**
VENTILATEUR BAROMETRIQUE	*constante*	↑
VENTILATEUR VOLUMETRIQUE	↓	*Constant*

Ventilation à régulation de pression avec volume cible



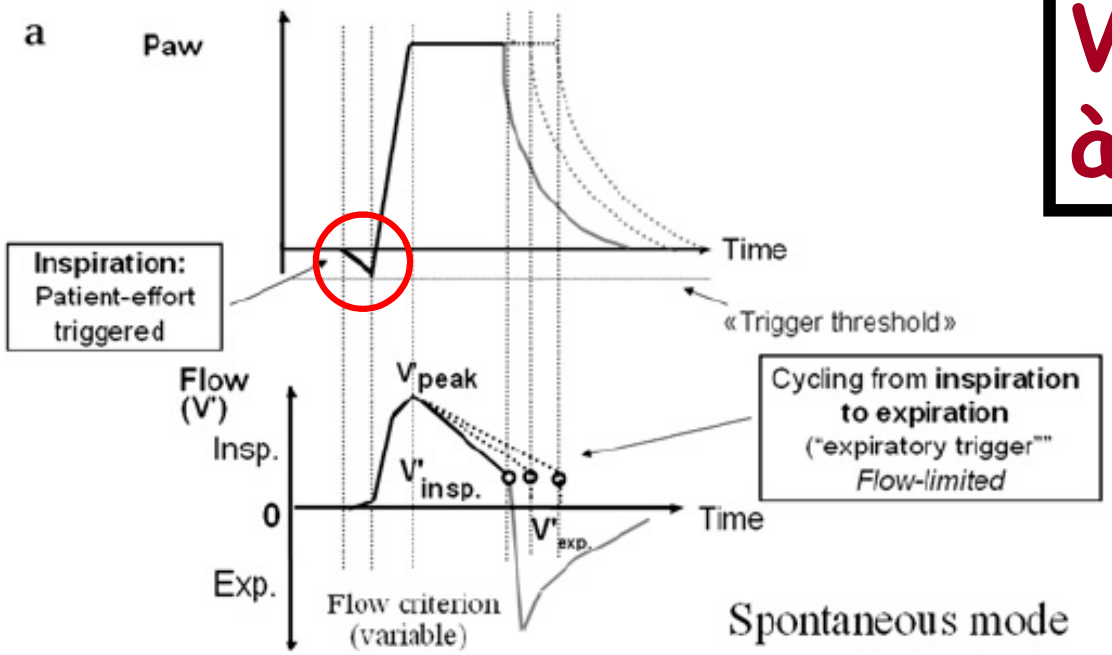
Ici, le paramètre le plus variable définit le ventilateur



La sémiologie des courbes de pression et débit dépend :

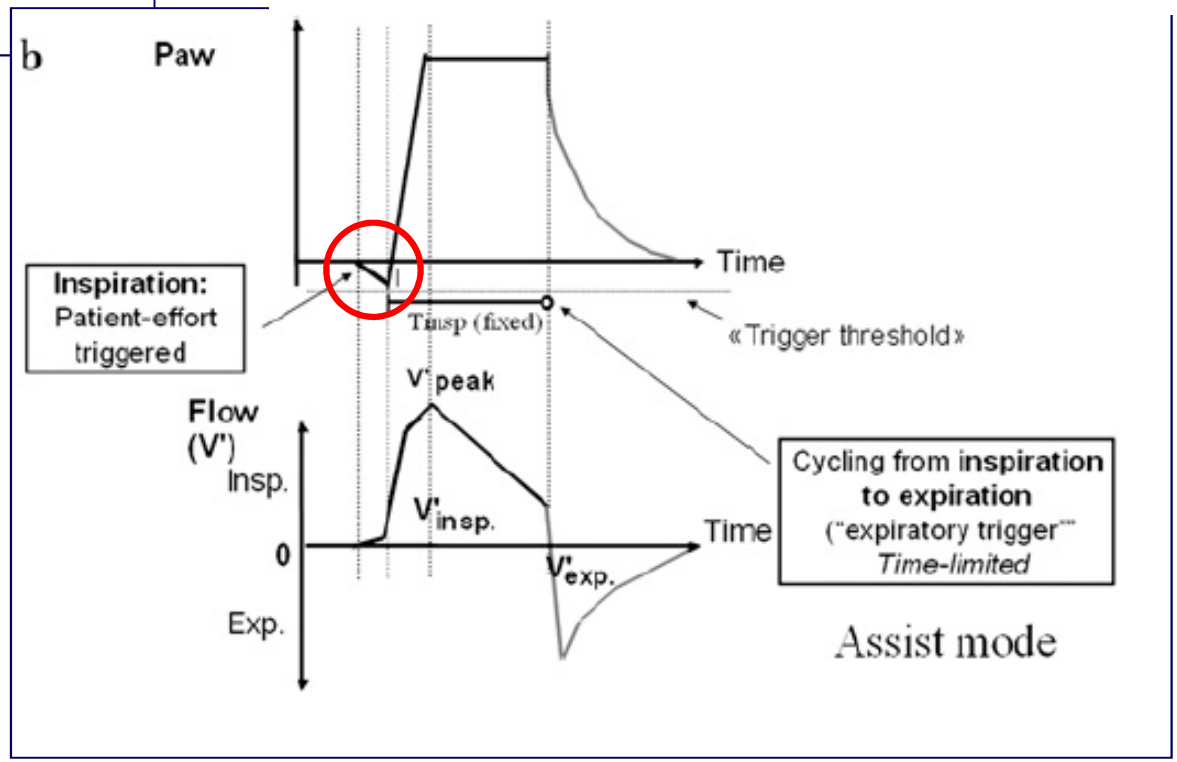
du mode de ventilation

Ventilateur à régulation de pression



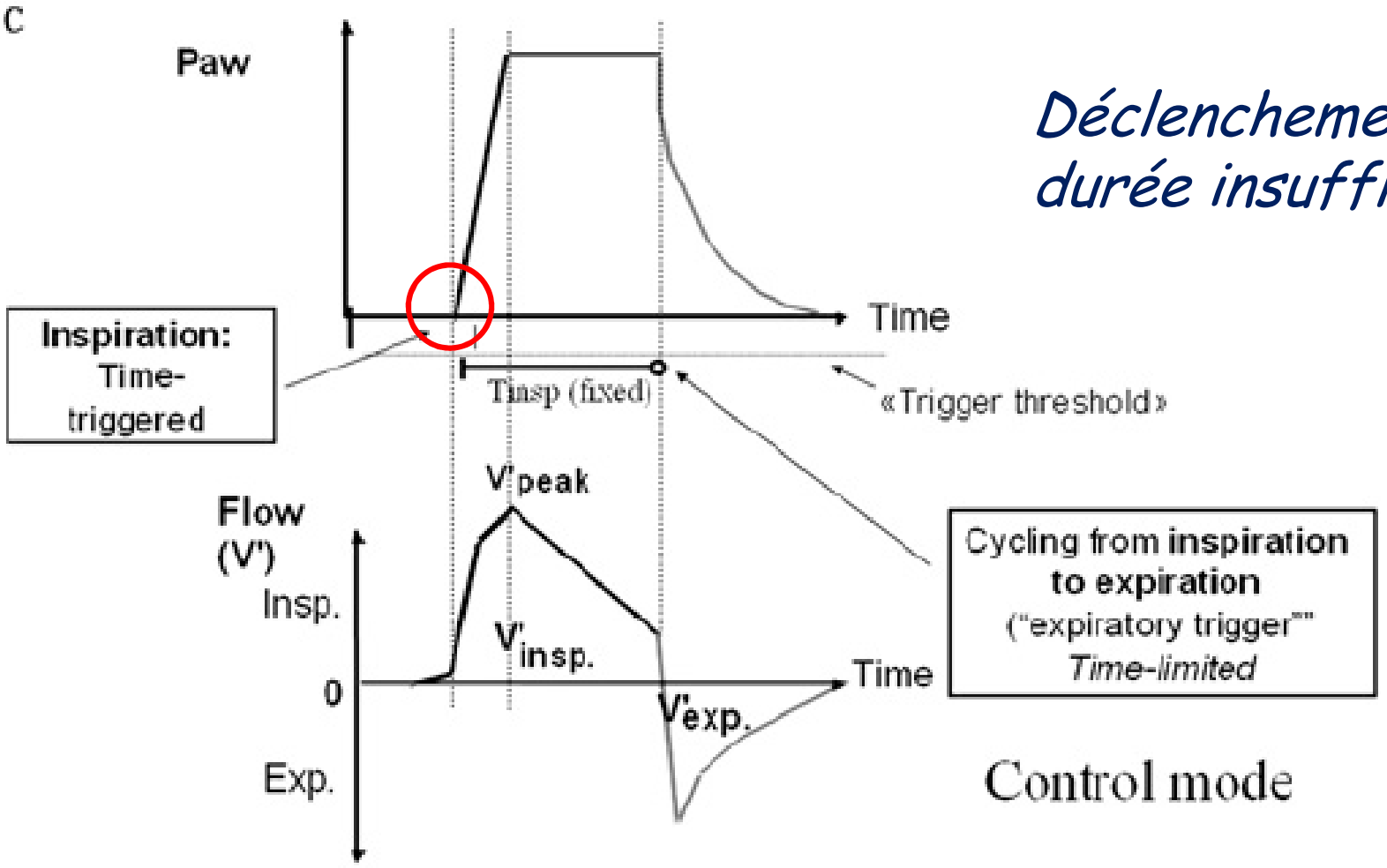
Déclenchement patient, durée insufflation variable

Déclenchement patient, durée insufflation constante



Rabec C et al.
Thorax. 2011; 66:170-178

Ventilateur à régulation de pression



Déclenchement « machine », durée insufflation constante

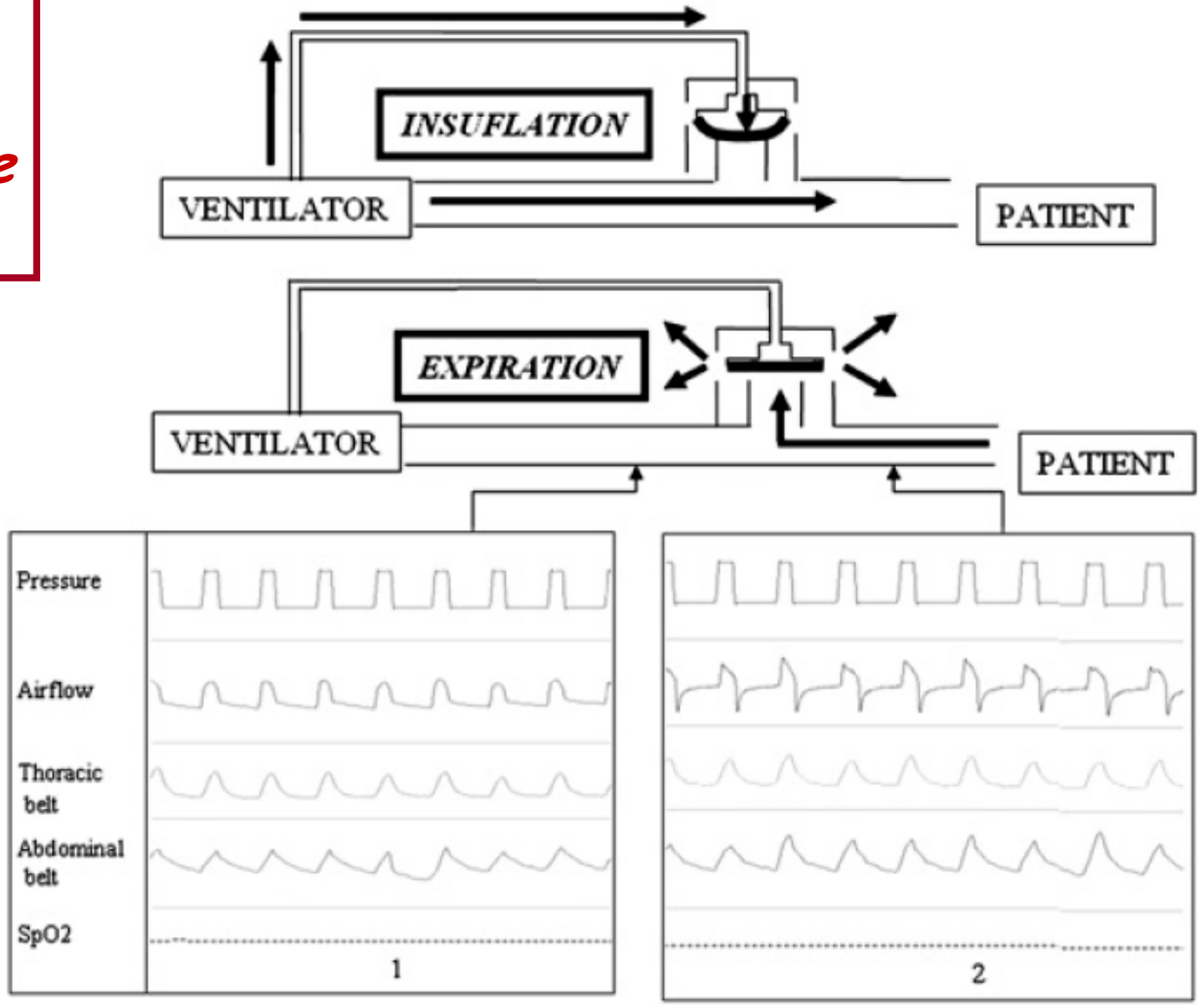
Rabec C et al. Thorax. 2011; 66:170-178.

La sémiologie des courbes de pression et débit dépend :

. position pneumotachographe / système expiratoire

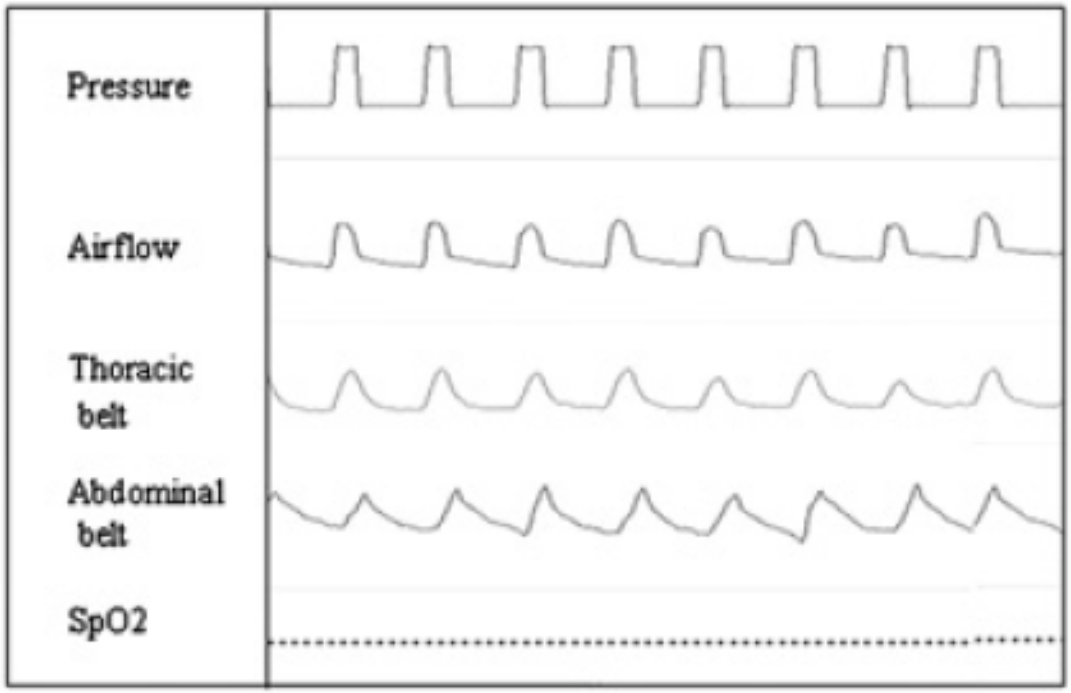
. type de masque

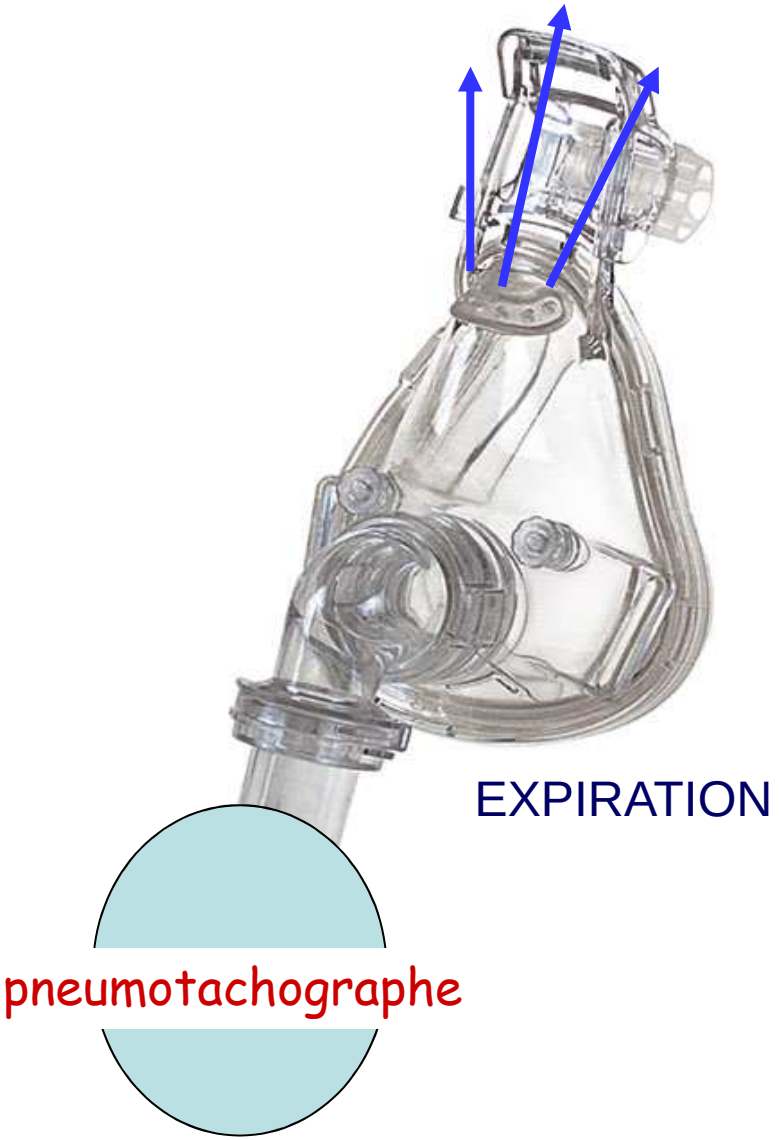
Position du pneumotachographe par rapport au système expiratoire



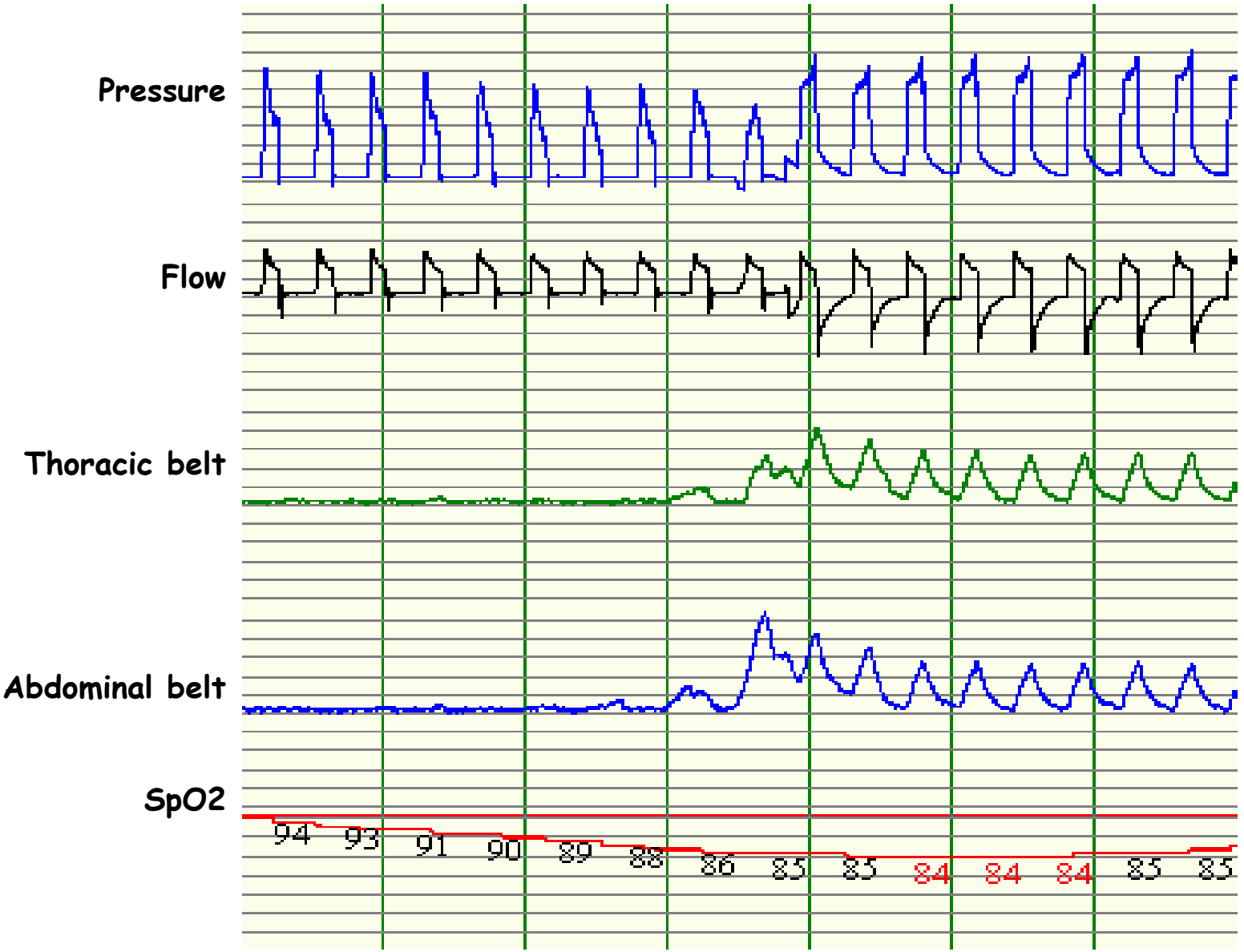
Perrin C et al. Rev Mal Respir 2004; 21:556
Rabec C et al. Thorax. 2011; 66:170

Position du pneumotachographe par rapport au système expiratoire



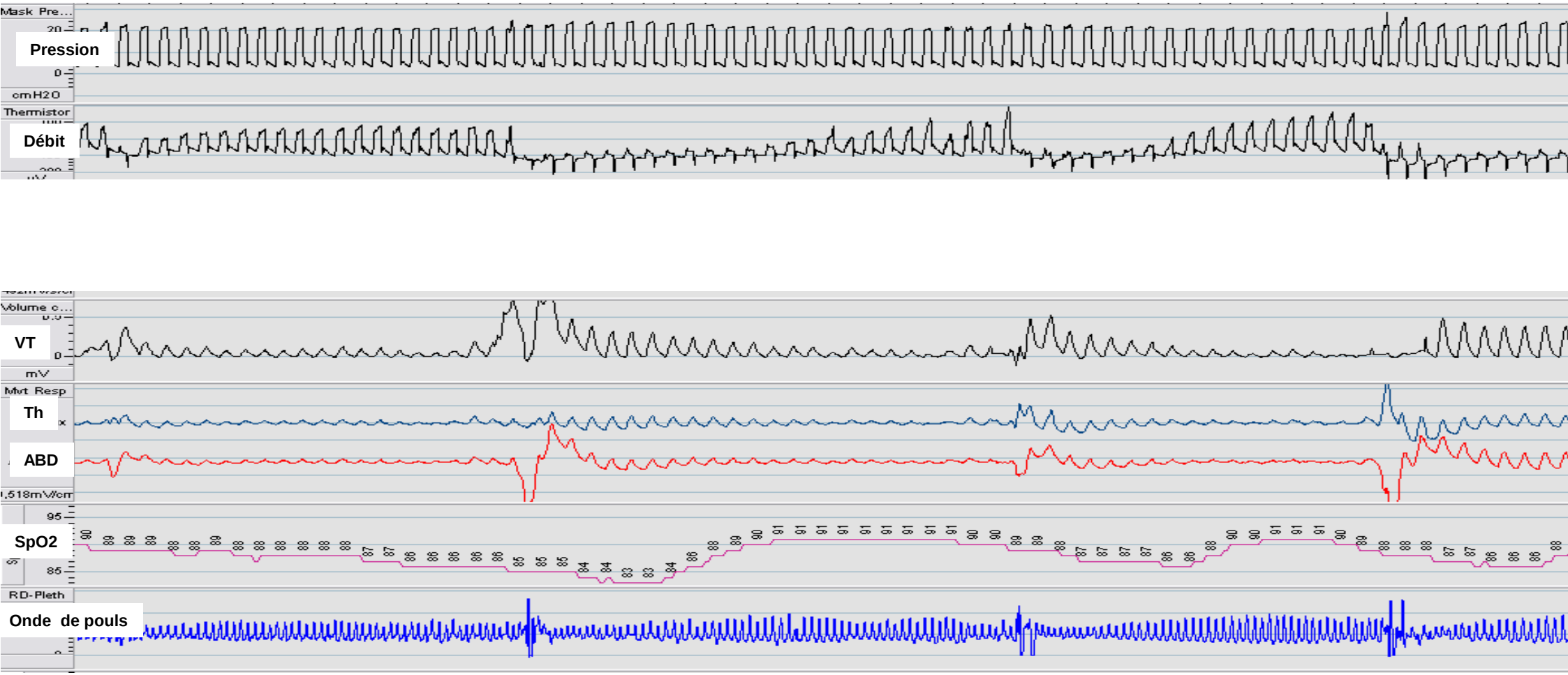


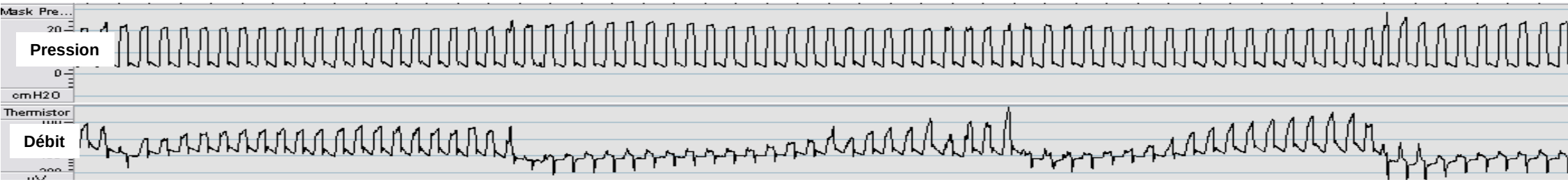
Type de masque



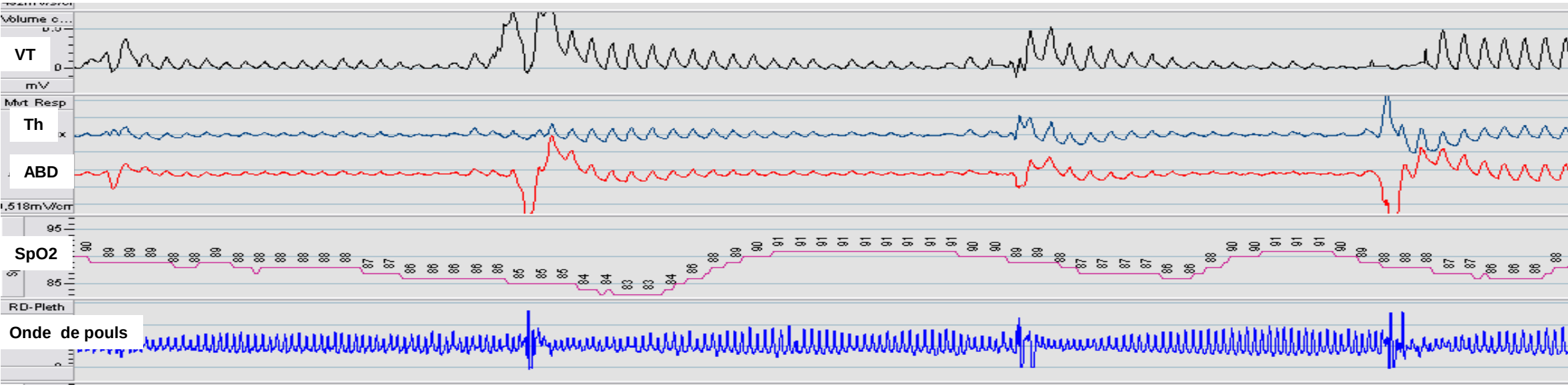
La sémiologie des tracés dépend :

de différents problèmes !!!!

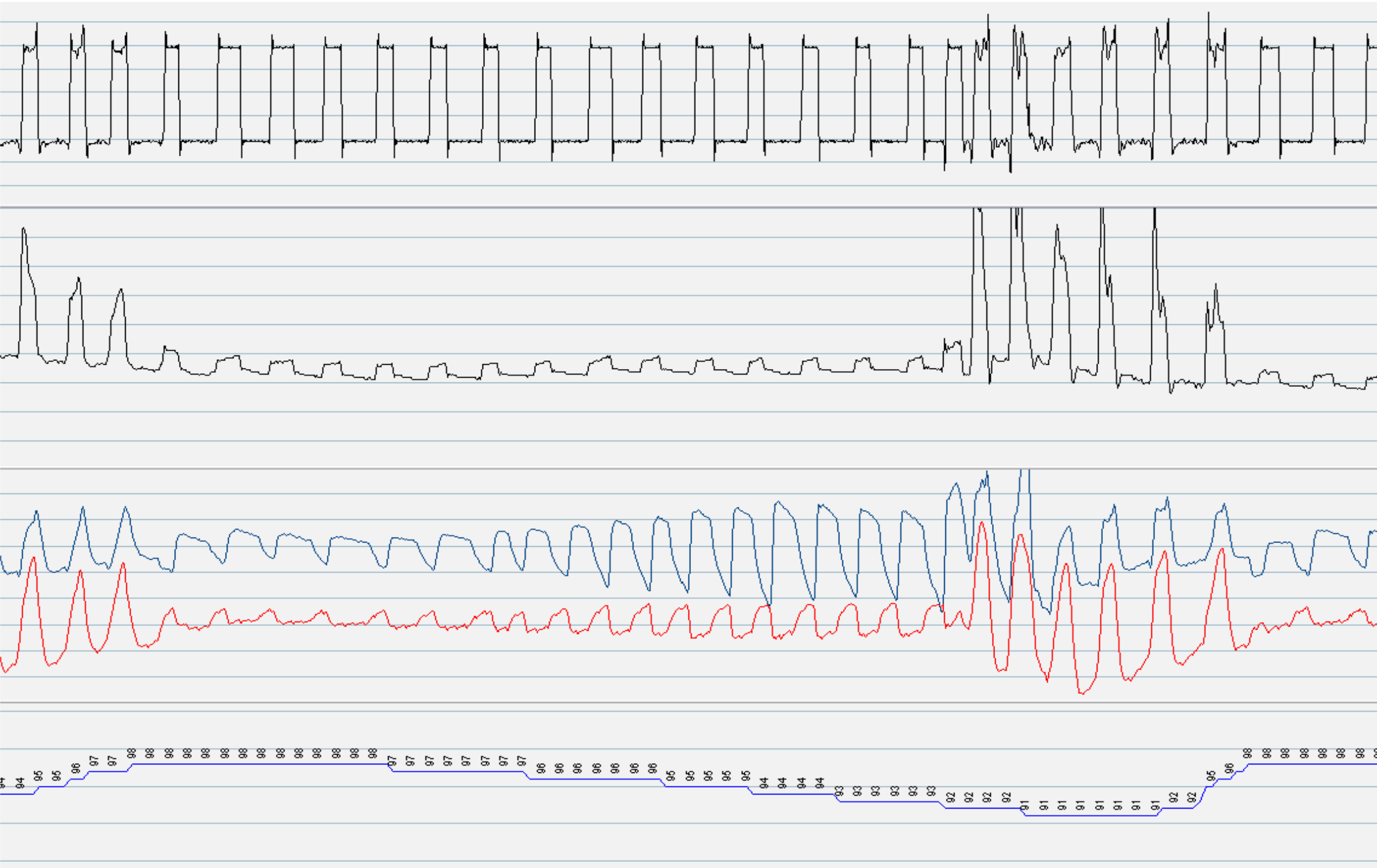

Mask Pre...
Pression
cmH2O
Thermistor
Débit
Volume c...
VT
mV
Mvt Resp
Th
ABD
SpO2
RD-Pleth
Onde de pouls

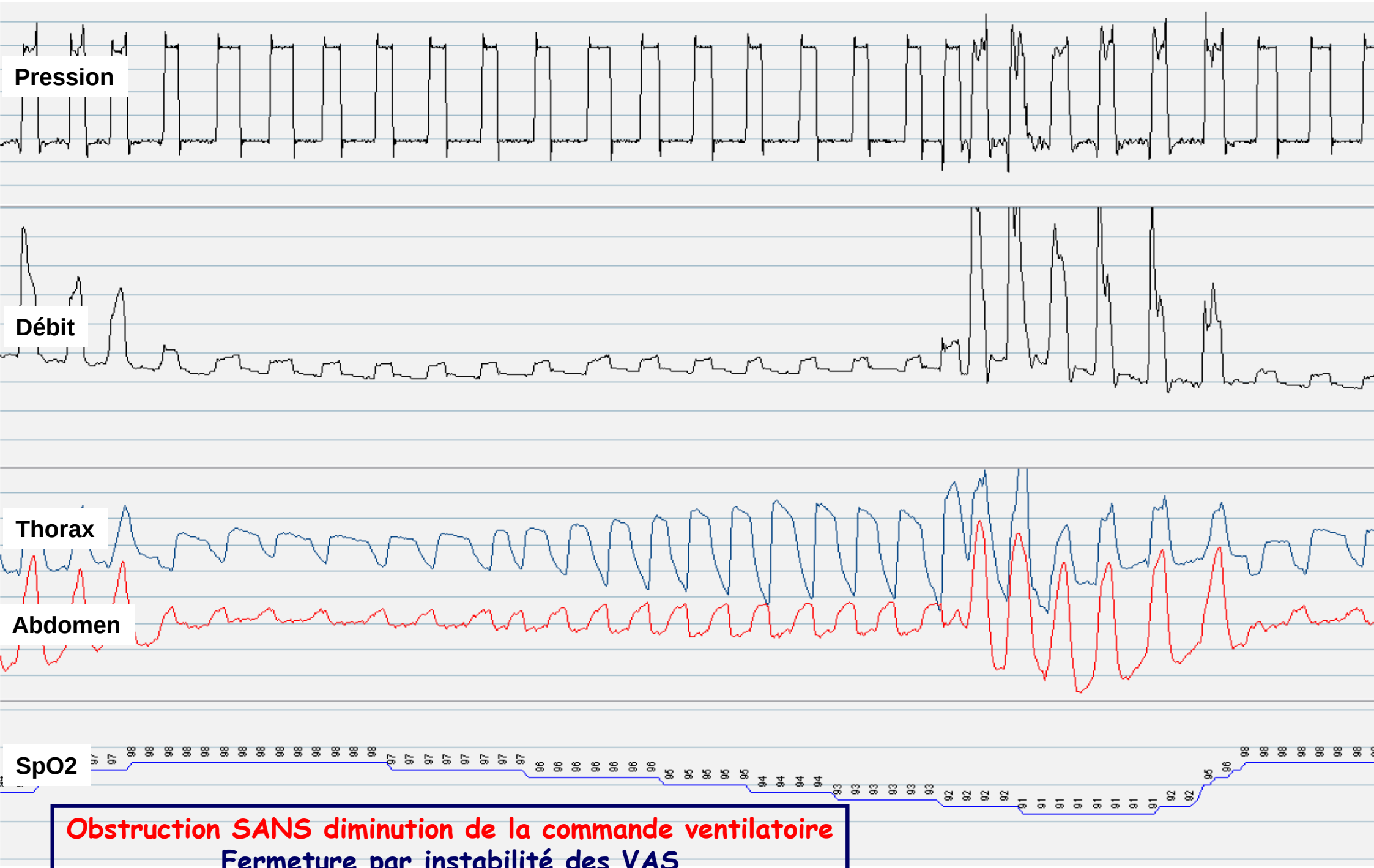


Fuites non intentionnelles buccales MAJEURES (masque nasal)

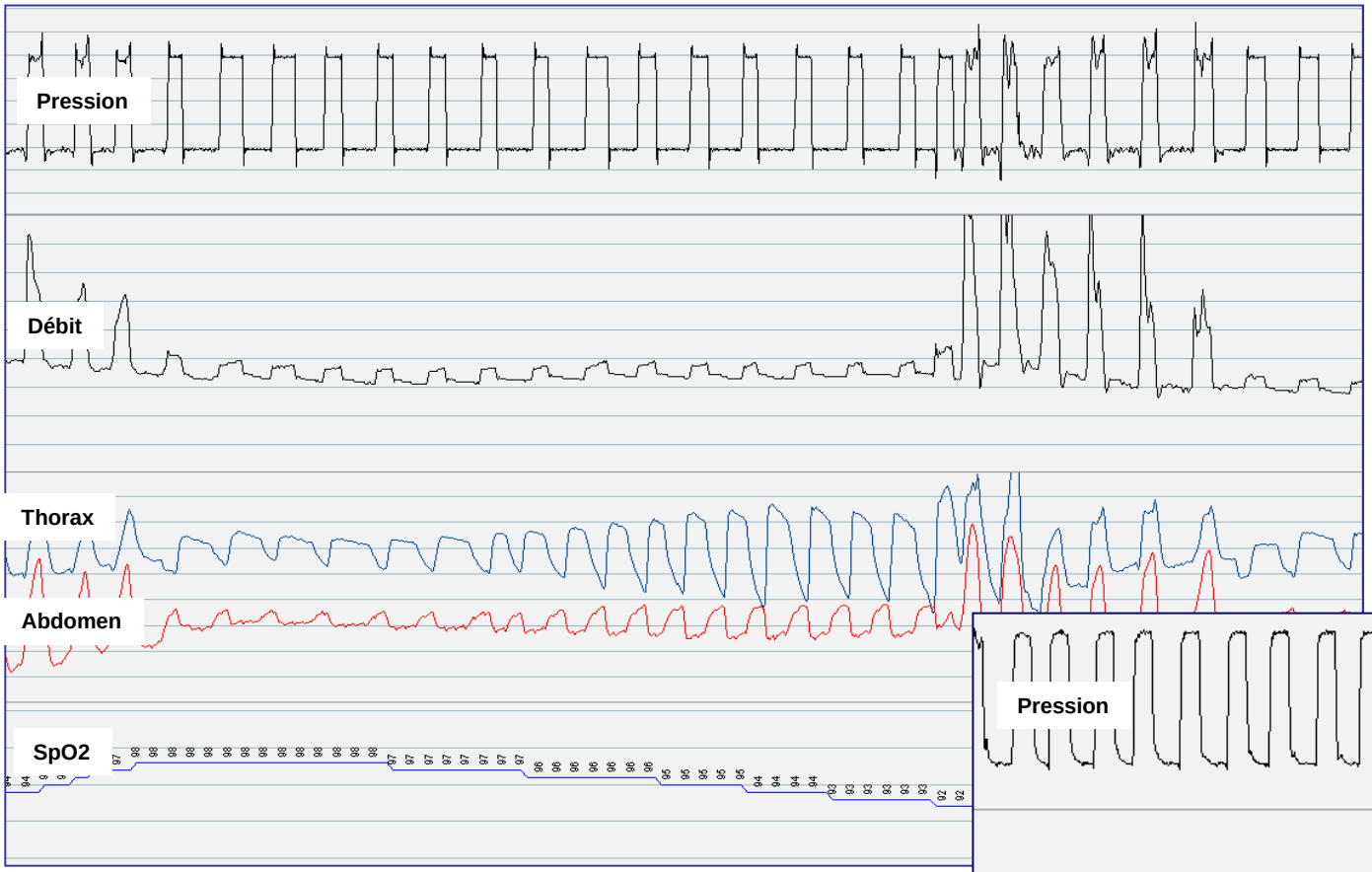


BAROMETRIQUE



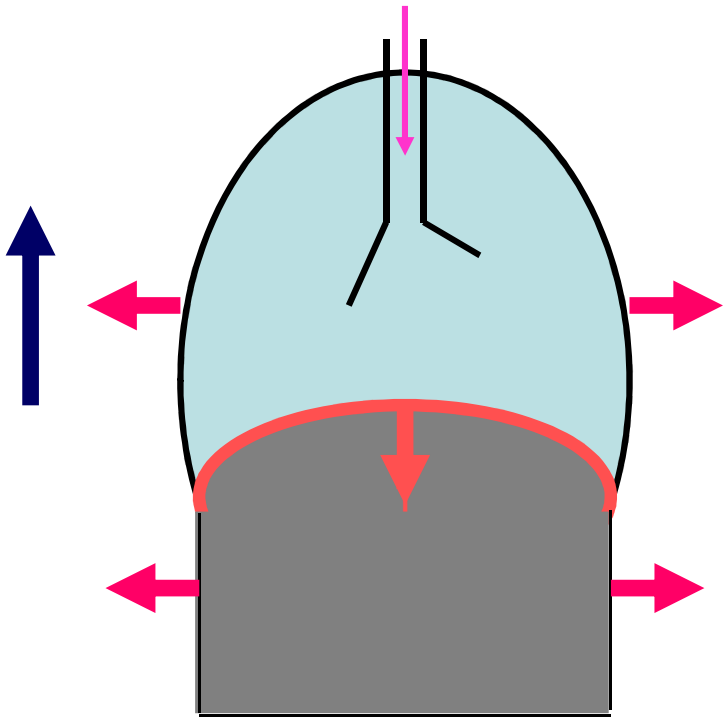


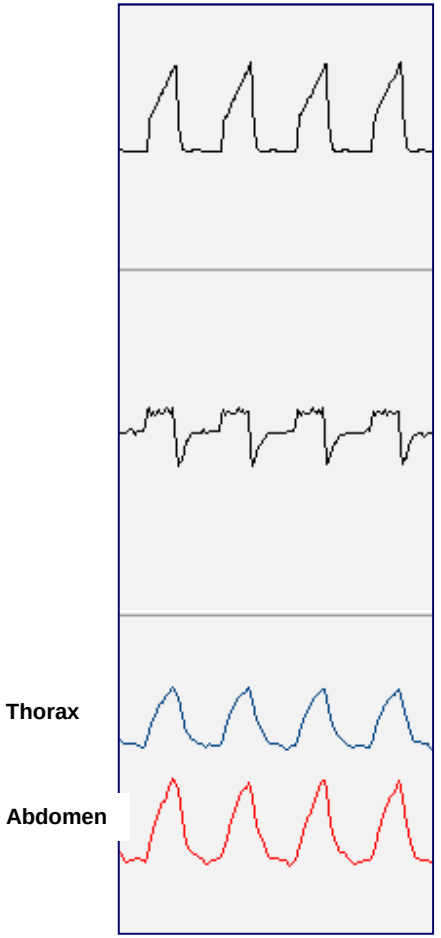
Obstruction SANS diminution de la commande ventilatoire
Fermeture par instabilité des VAS


Pression
Débit
Thorax
Abdomen
SpO2

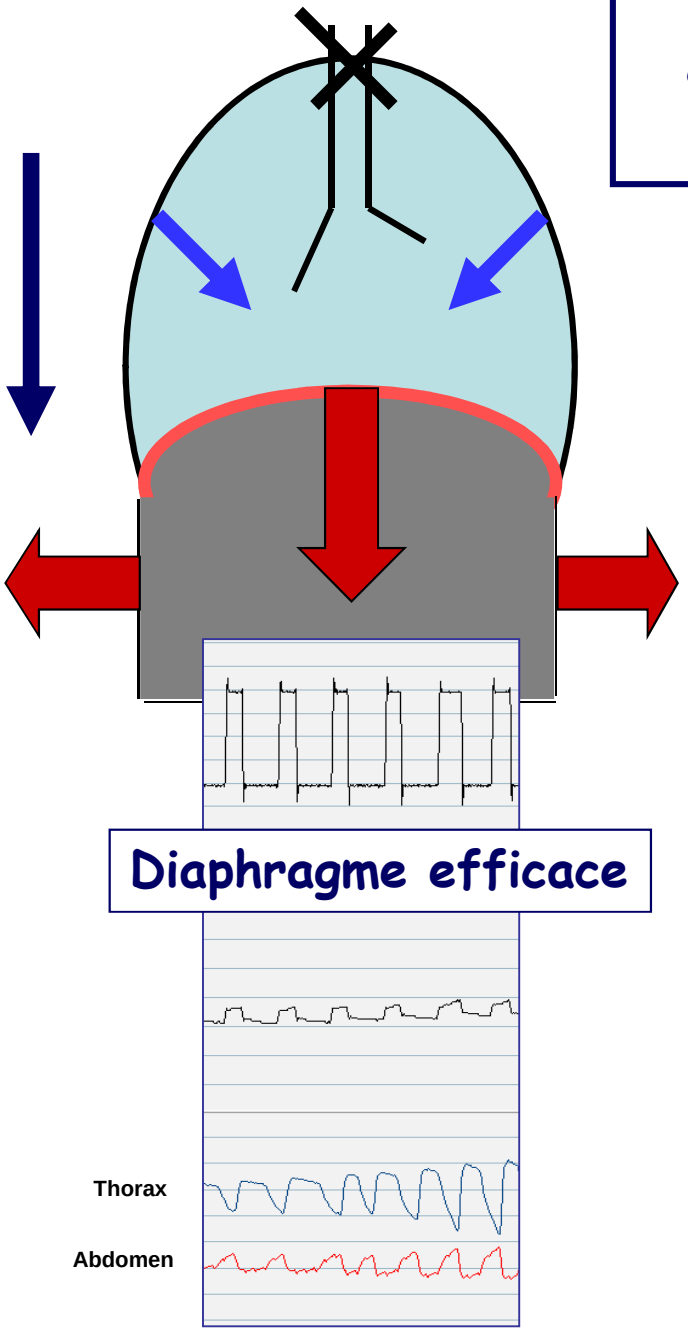

Pression
Débit
Abdomen
Thorax
SpO2

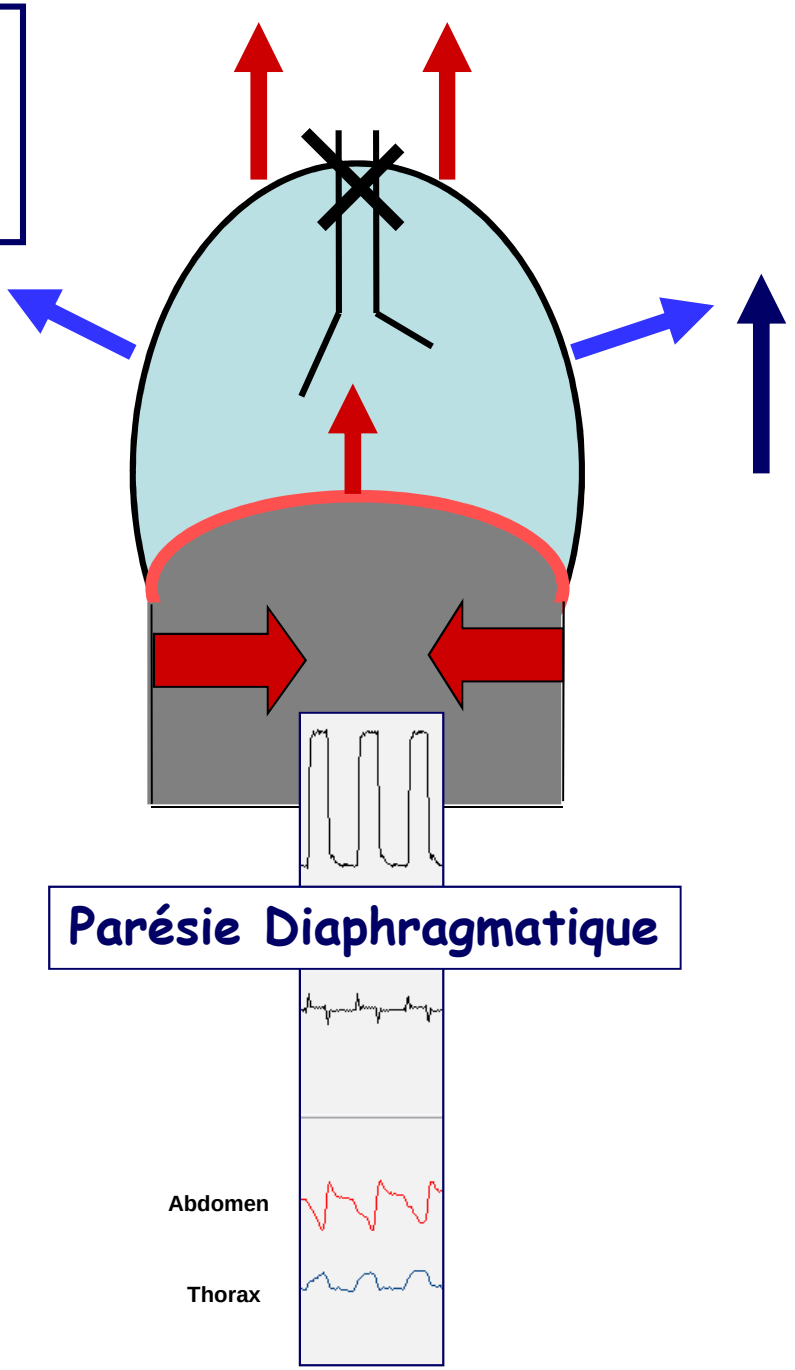
Inspiration / Insufflation

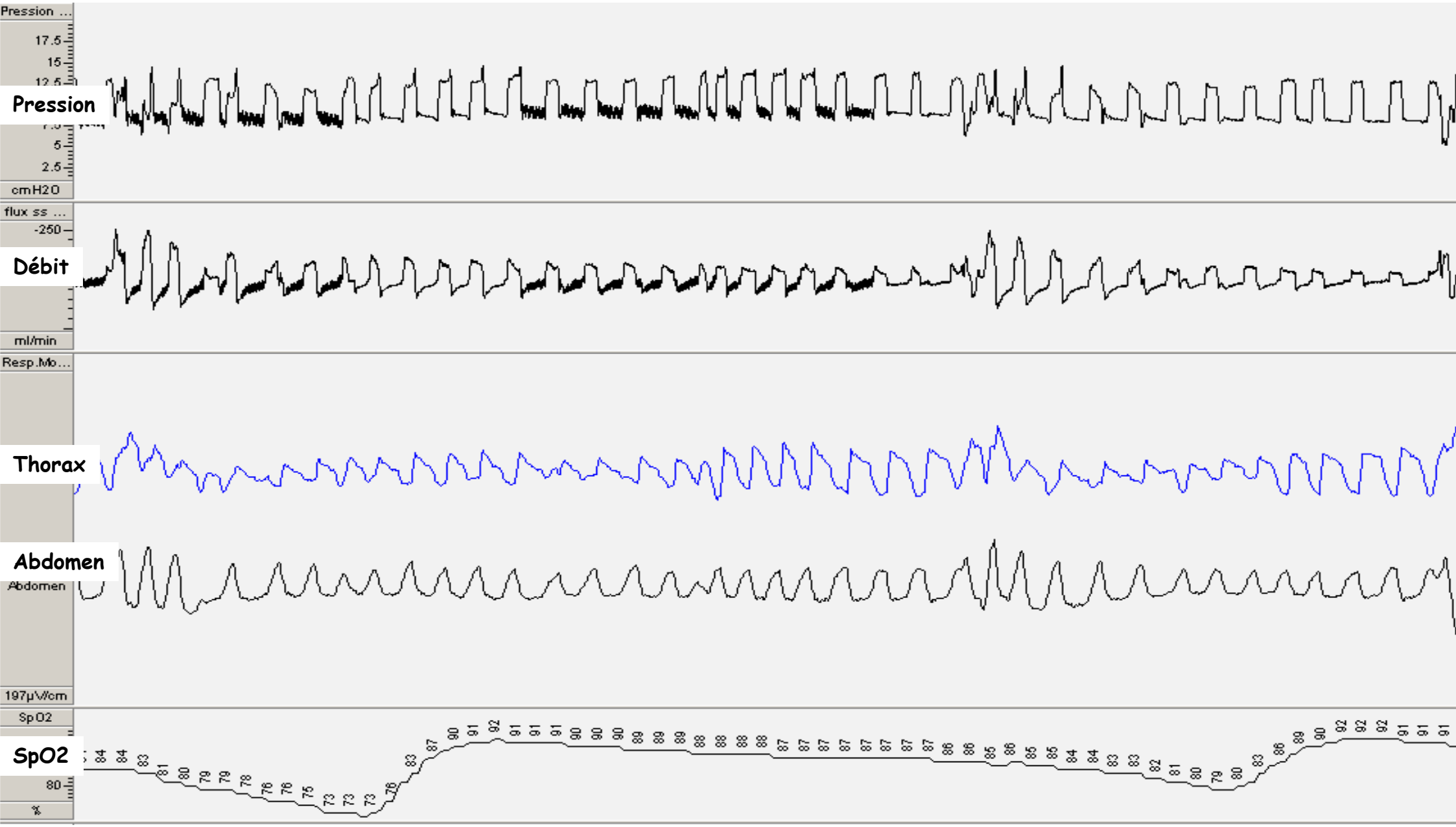


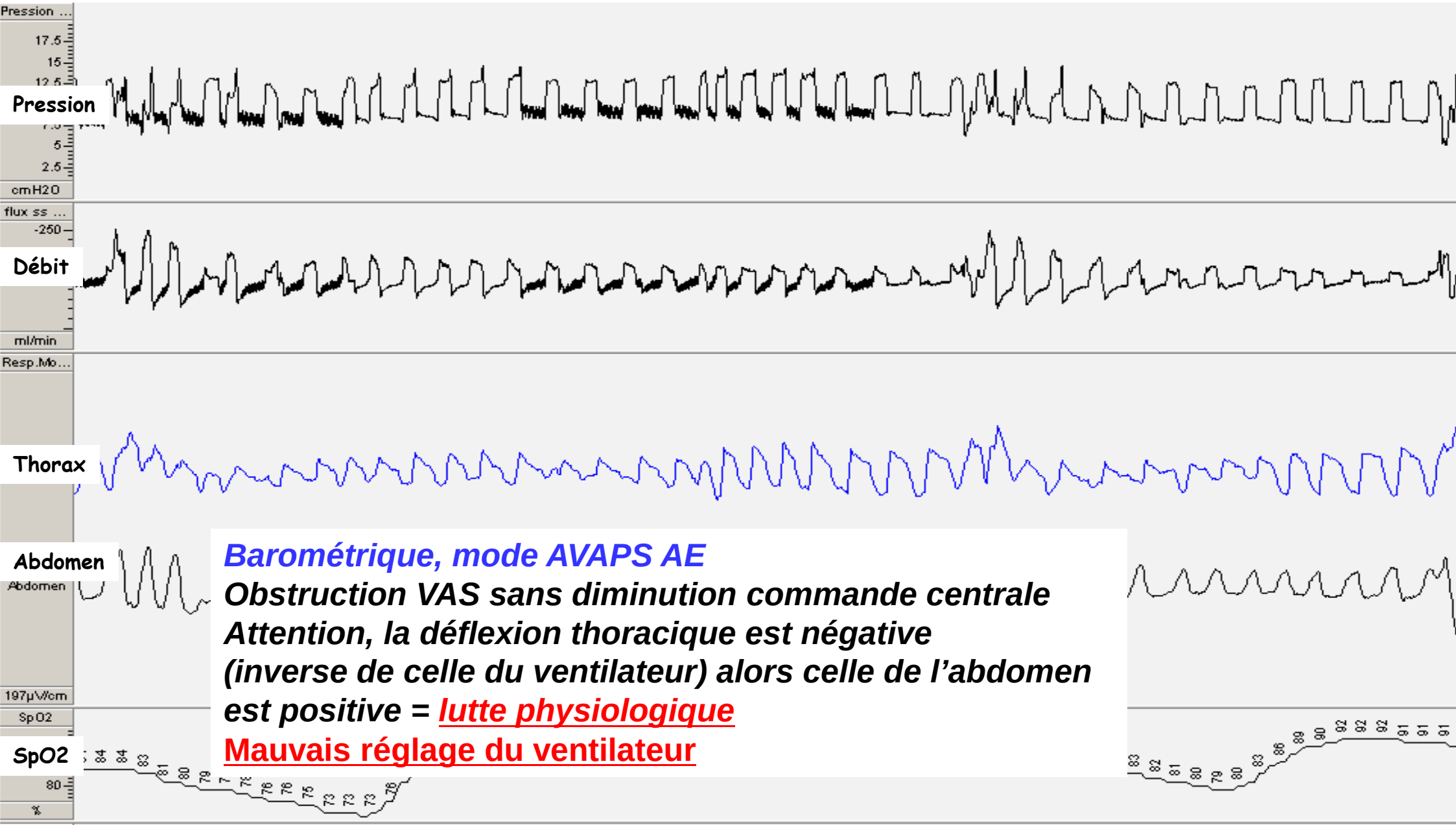


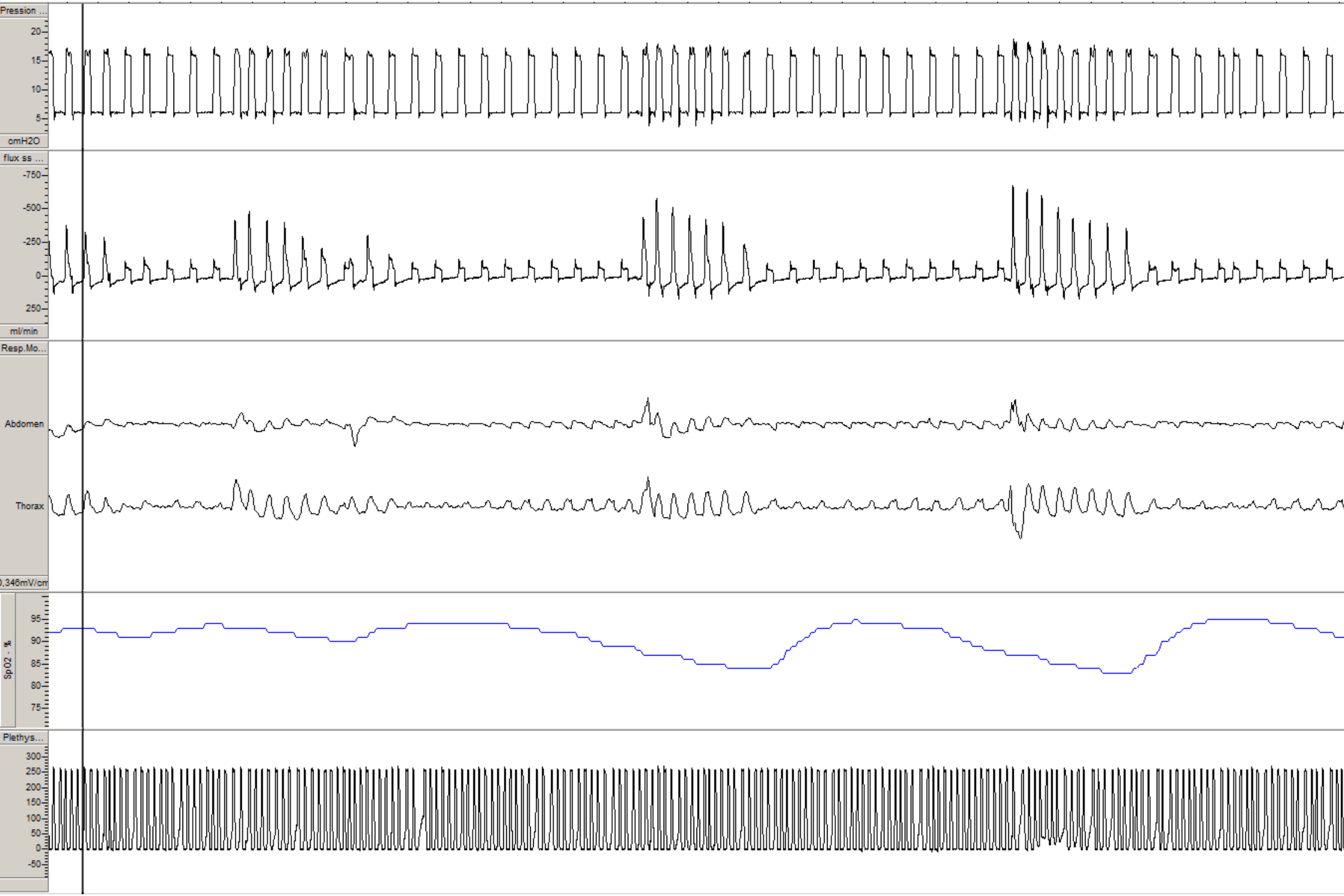
Fermeture complète des VAS

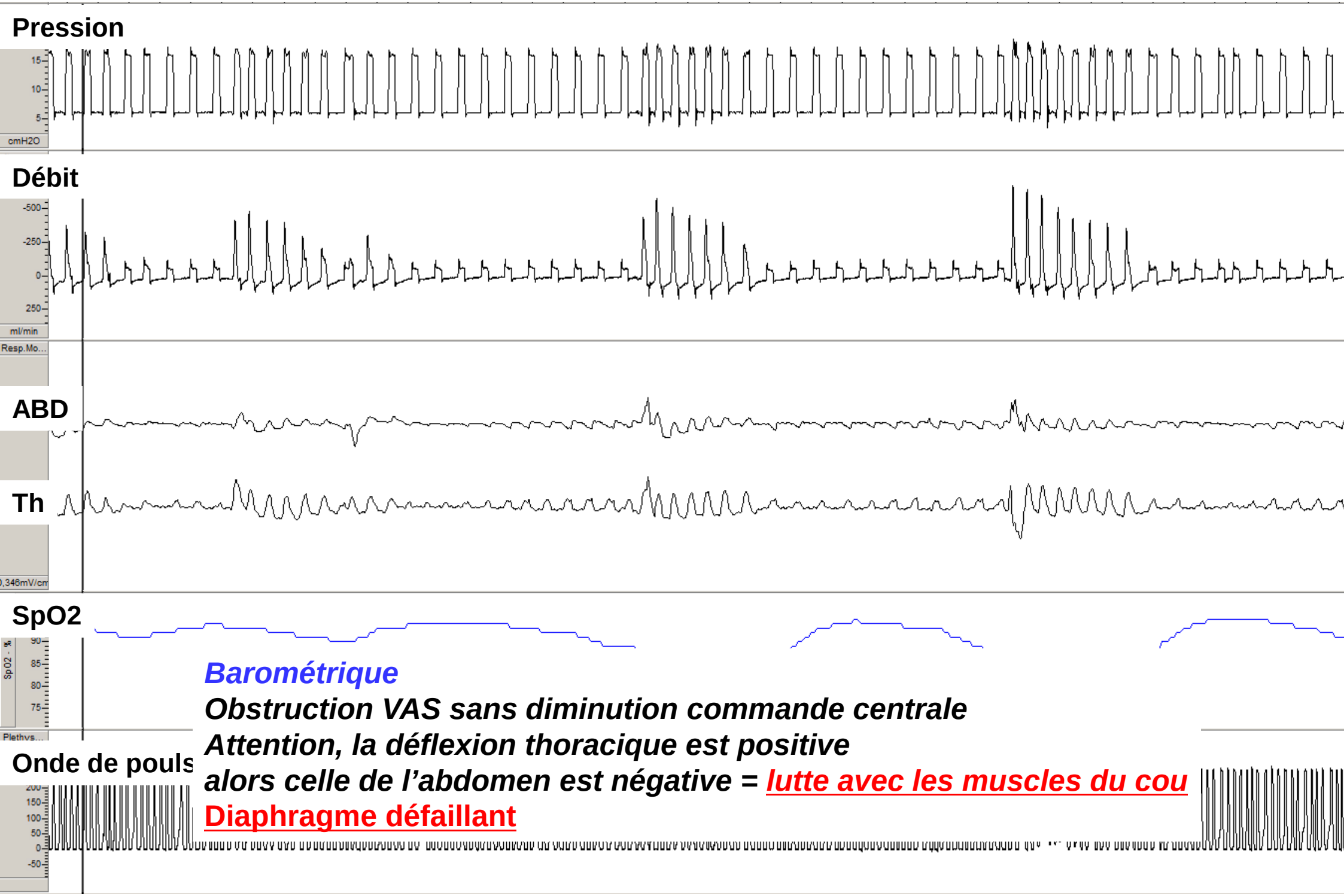


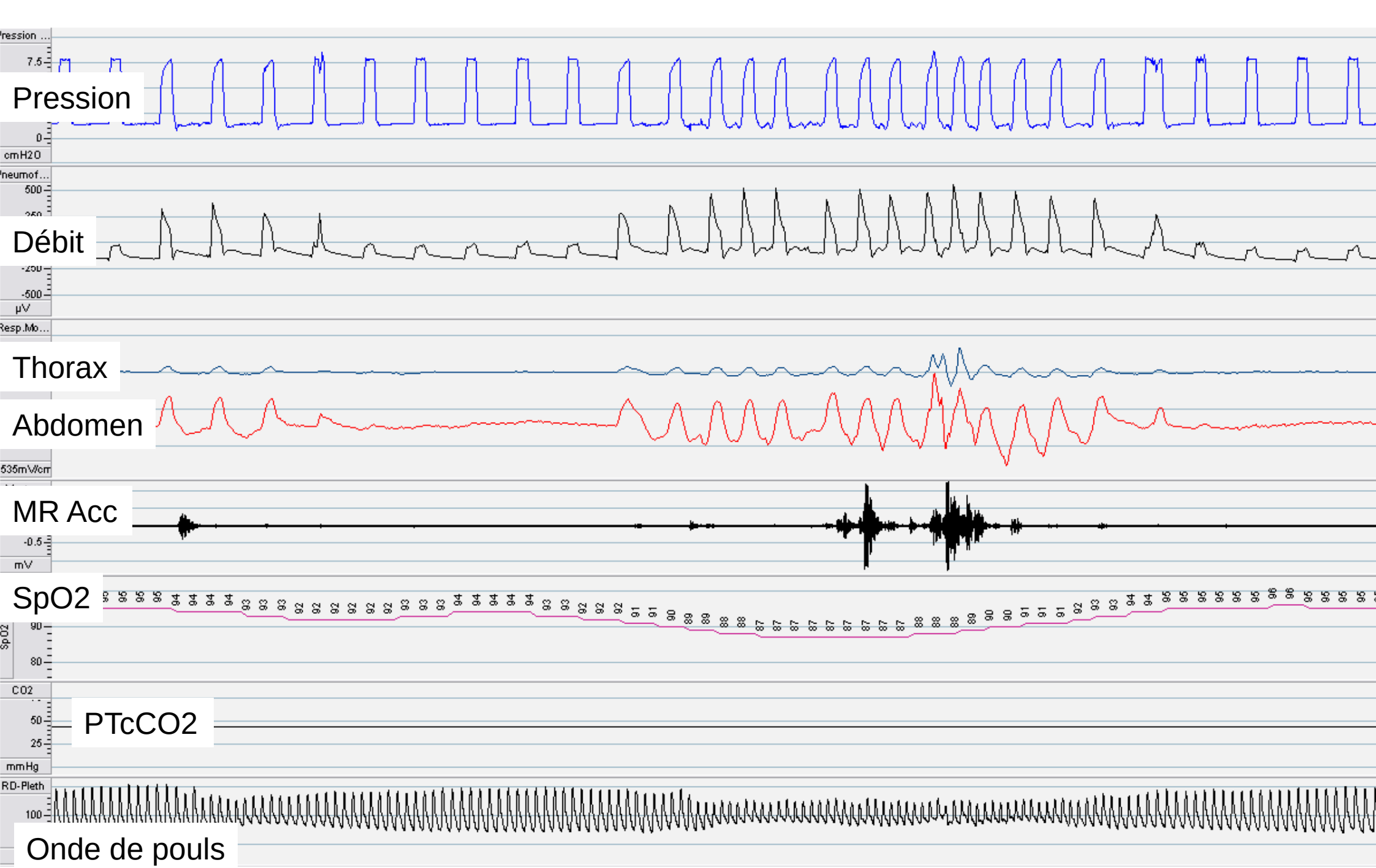


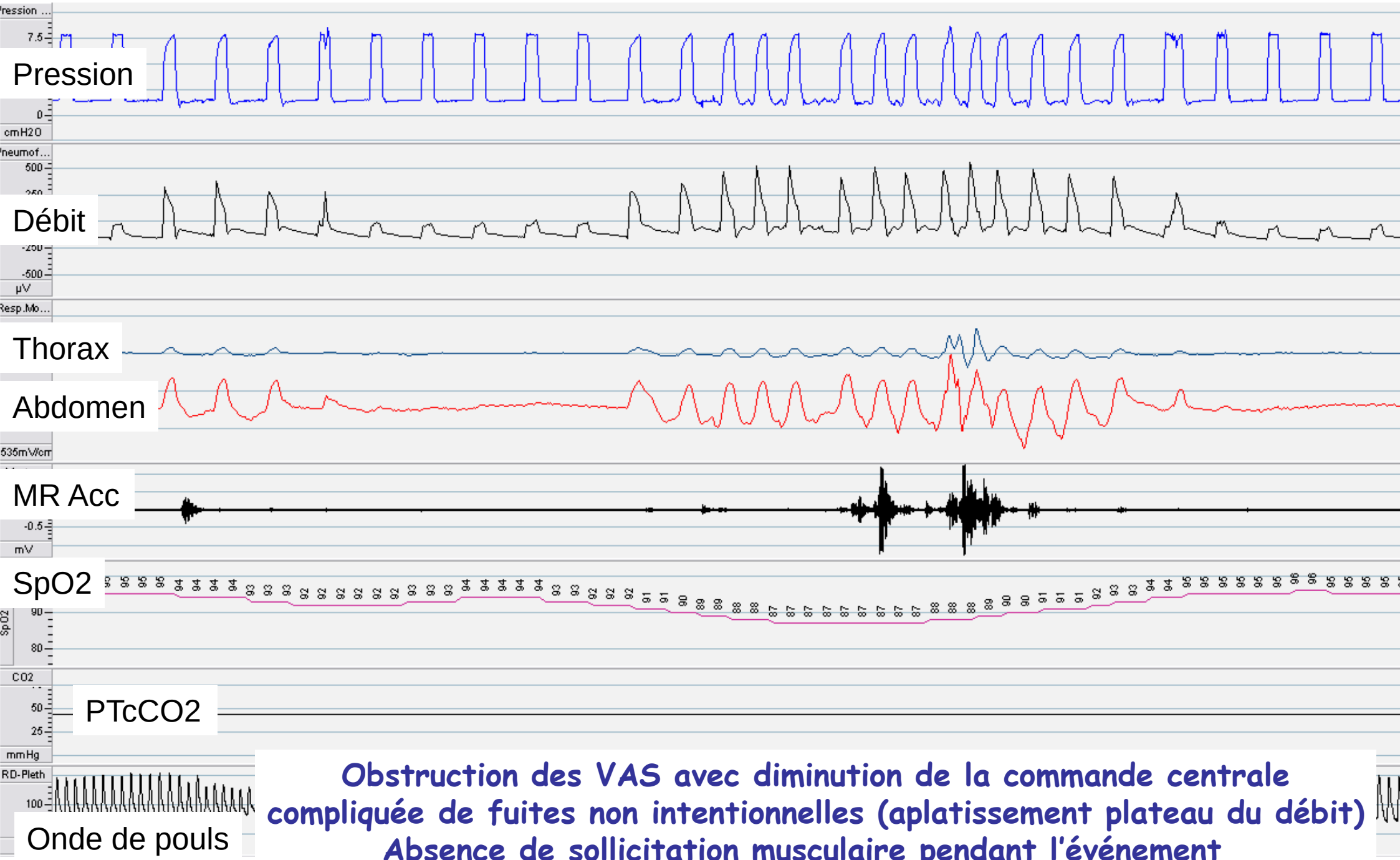

Pression
Débit
Thorax
Abdomen
SpO2
Pression ...
17.5
15
5
2.5
cmH2O
flux ss ...
-250
ml/min
Resp.Mo...
Abdomen
197µV/cm
SpO2
80
%
84 84 83 81 80 79 79 78 76 76 75 73 73 73 76 83 87 90 91 92 91 91 91 90 90 90 89 89 89 88 88 88 88 87 87 87 87 87 87 87 86 86 85 86 85 85 84 84 83 83 82 81 80 79 80 83 86 89 90 92 92 92 91 91 91


Pression
Débit
Thorax
Abdomen
SpO2
Baromètrique, mode AVAPS AE
Obstruction VAS sans diminution commande centrale
Attention, la déflexion thoracique est négative
(inverse de celle du ventilateur) alors celle de l'abdomen
est positive = lutte physiologique
Mauvais réglage du ventilateur

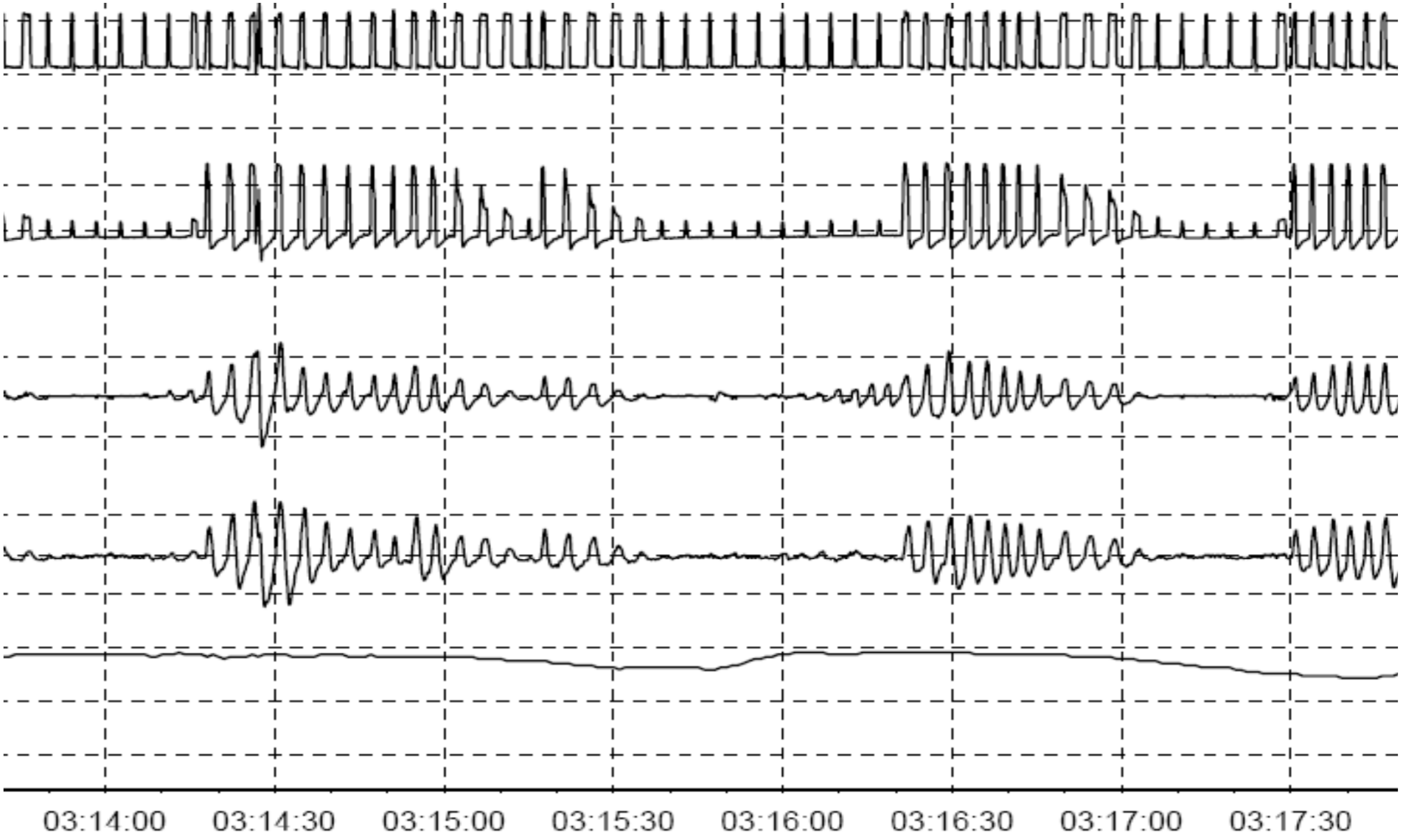

Pression ...
20
15
10
5
cmH2O
flux ss ...
-750
-500
-250
0
250
ml/min
Resp.Mo...
Abdomen
Thorax
0,346mV/cm
Sp02 - %
95
90
85
80
75
Plethys...
300
250
200
150
100
50
0
-50

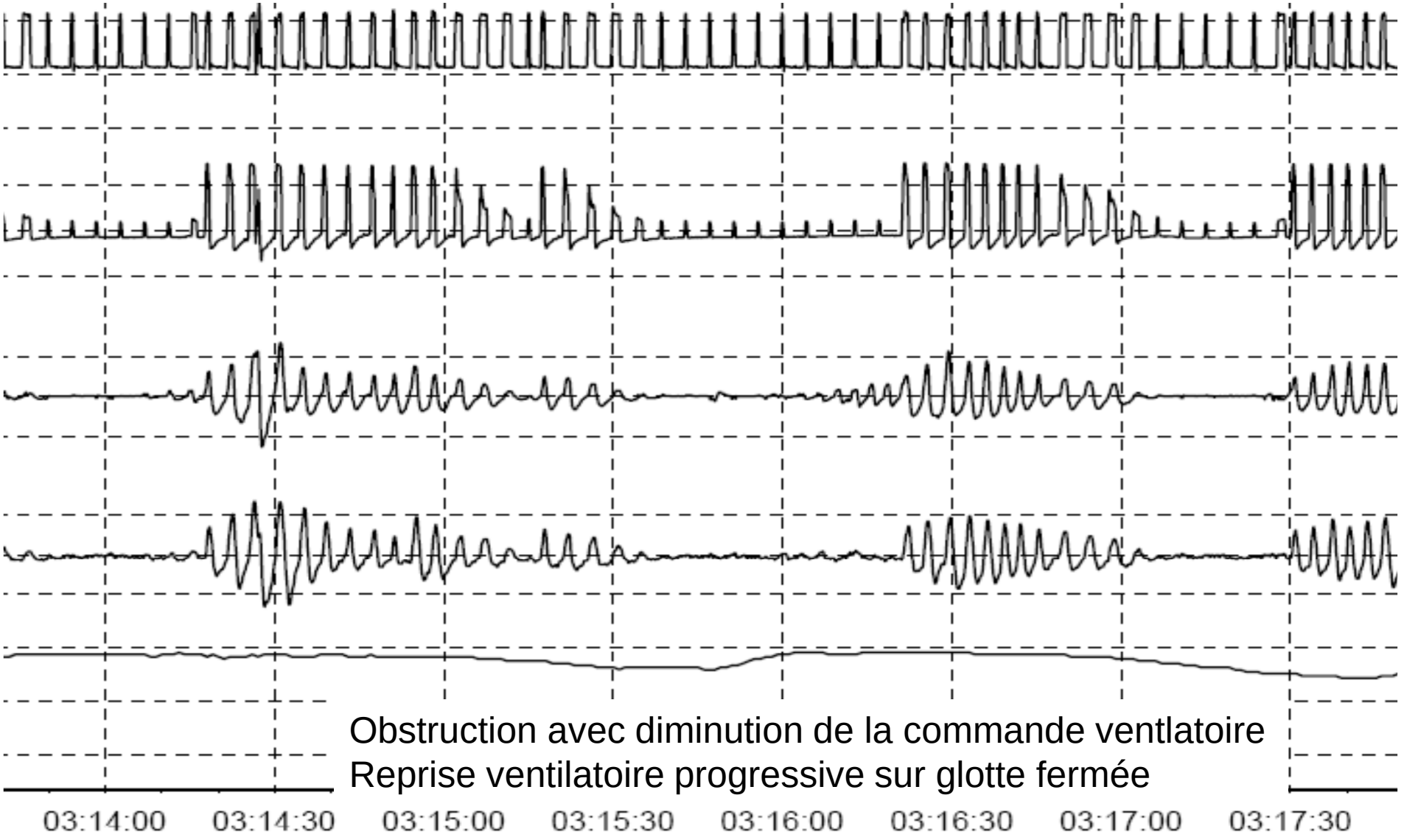

Pression
15
10
5
cmH2O
Débit
-500
-250
0
250
ml/min
Resp.Mo...
ABD
Th
0,346mV/cm
SpO2
90
85
80
75
SpO2 - %
Plethys...
Onde de pouls
200
150
100
50
0
-50
Barométrique
Obstruction VAS sans diminution commande centrale
Attention, la déflexion thoracique est positive
alors celle de l'abdomen est négative = lutte avec les muscles du cou
Diaphragme défaillant

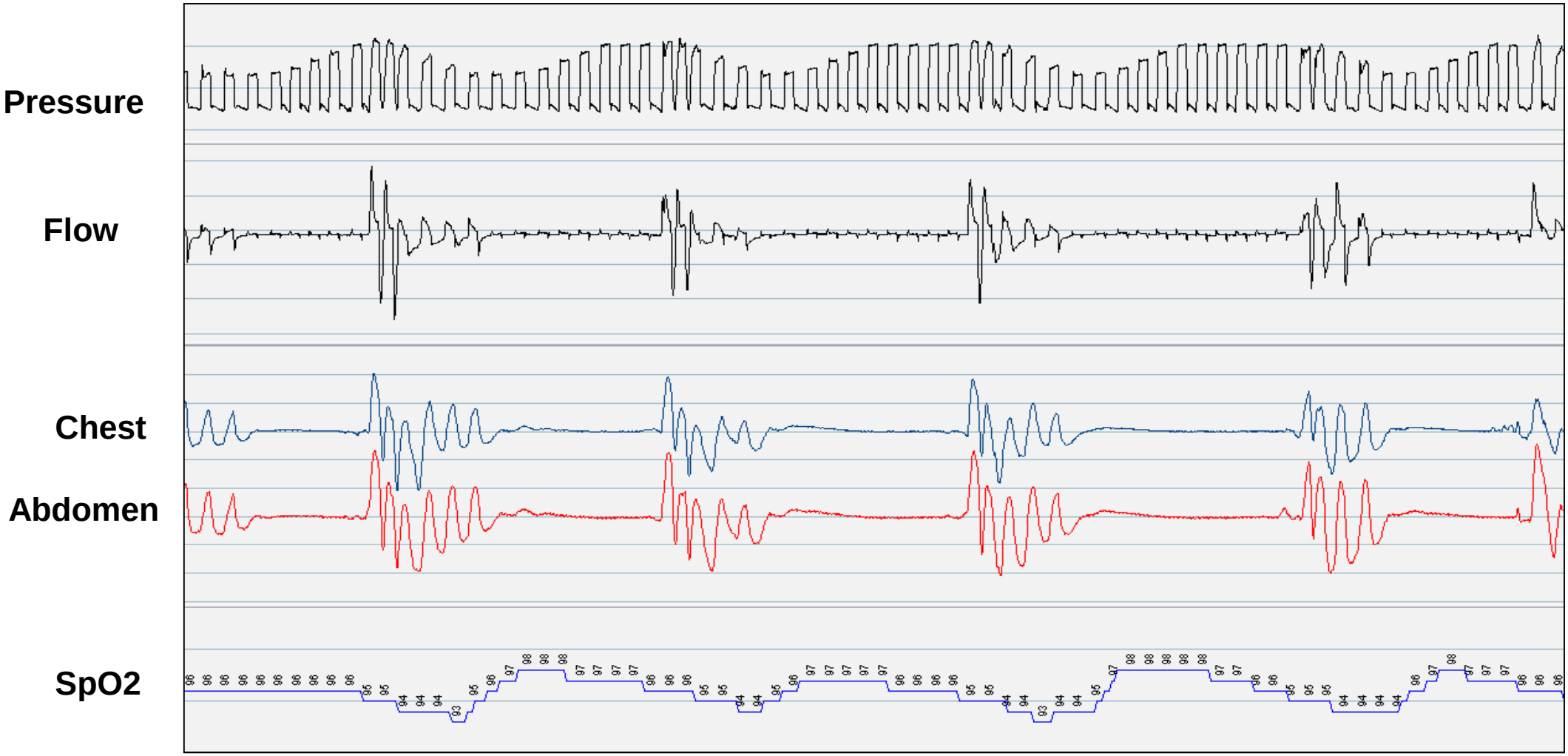

Pression
Débit
Thorax
Abdomen
MR Acc
SpO2
PTcCO2
Onde de pouls



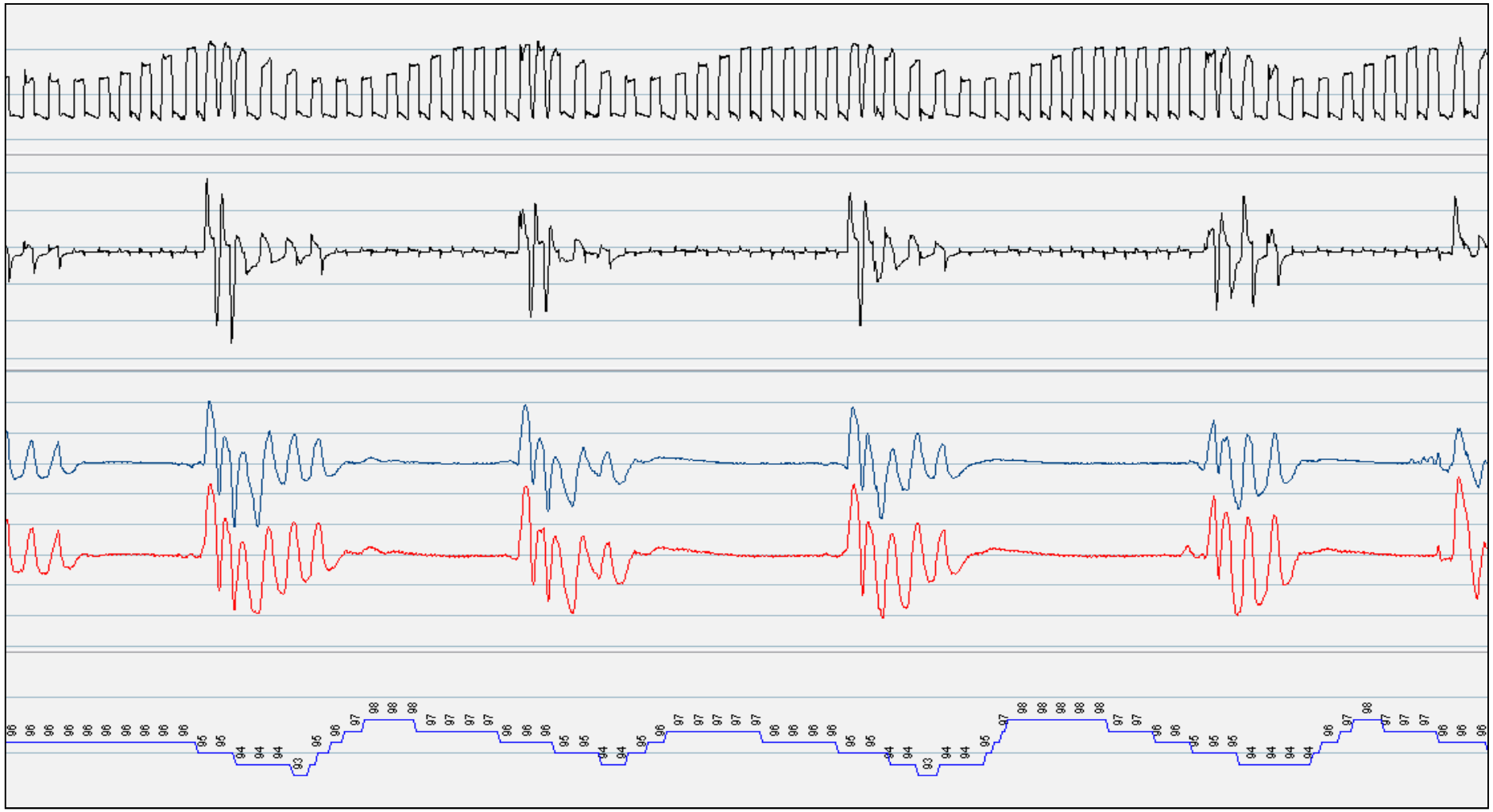
Obstruction des VAS avec diminution de la commande centrale compliquée de fuites non intentionnelles (aplatissement plateau du débit)
Absence de sollicitation musculaire pendant l'événement


03:14:00
03:14:30
03:15:00
03:15:30
03:16:00
03:16:30
03:17:00
03:17:30


Obstruction avec diminution de la commande ventlatoire
Reprise ventilatoire progressive sur glotte fermée
03:14:00
03:14:30
03:15:00
03:15:30
03:16:00
03:16:30
03:17:00
03:17:30


Pressure
Flow
Chest
Abdomen
SpO2

Ventilateur barométrique + Volume cible

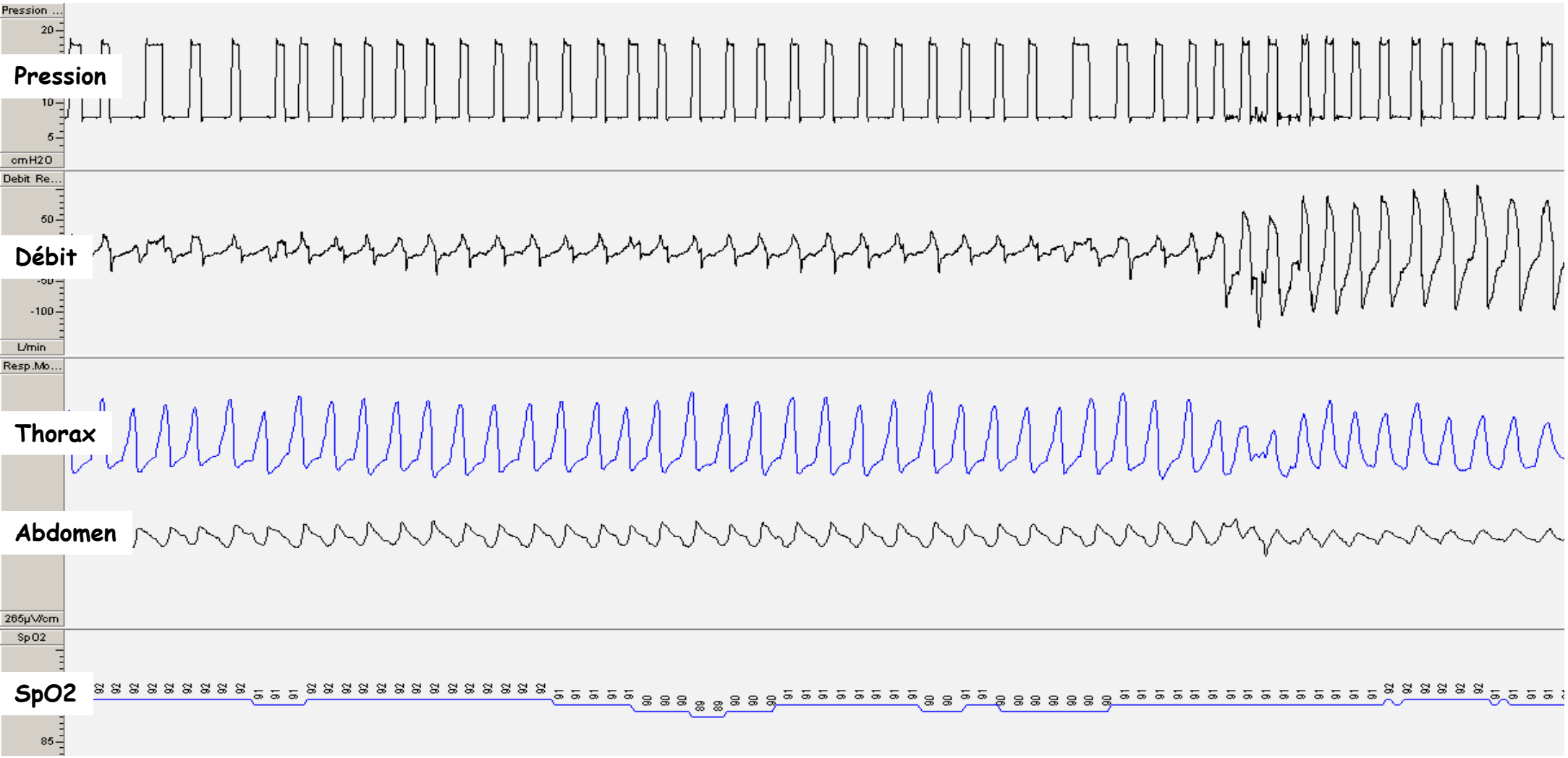


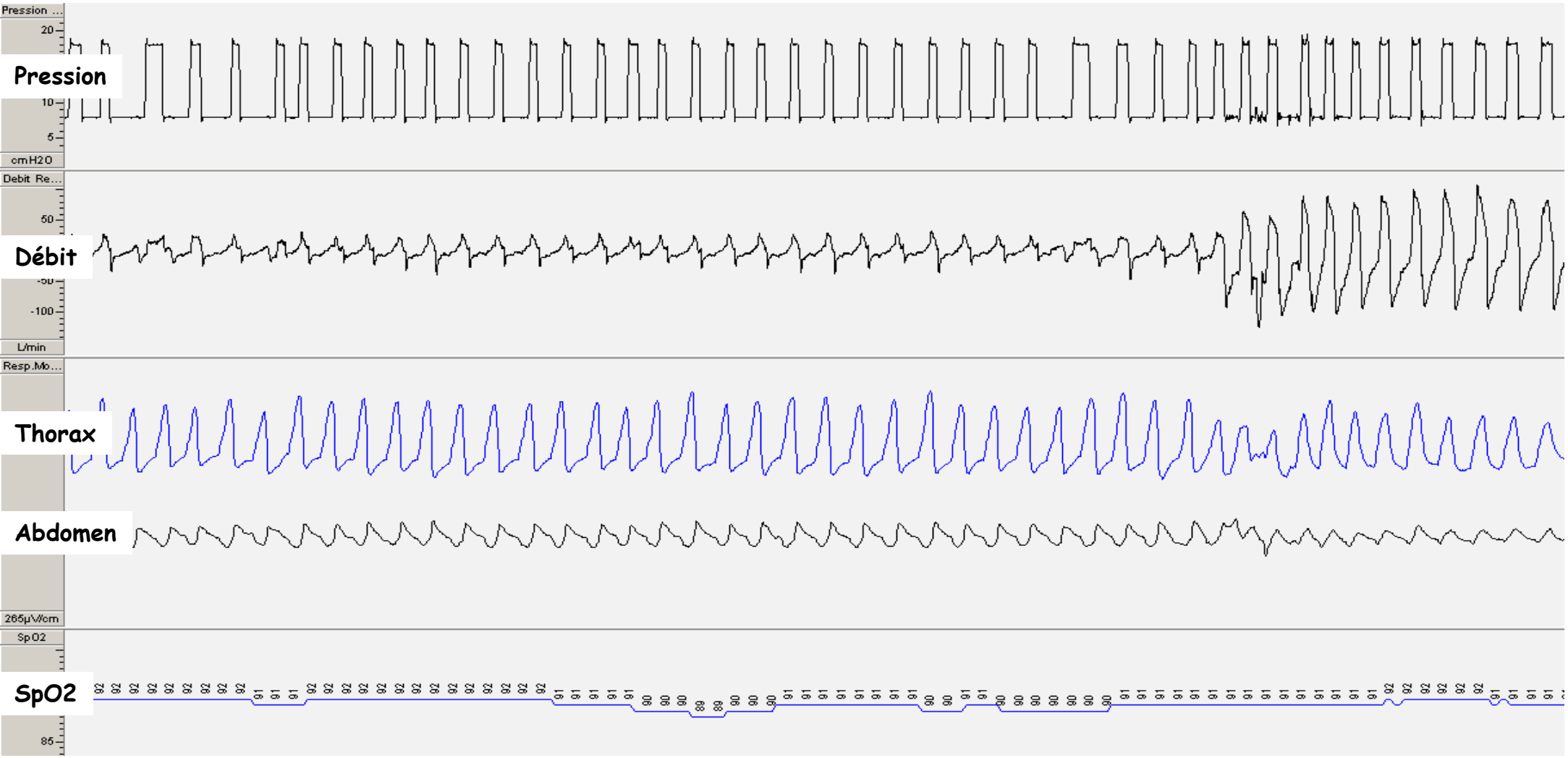
Obstruction complète VAS avec diminution de commande centrale
Induite par le volume cible

?

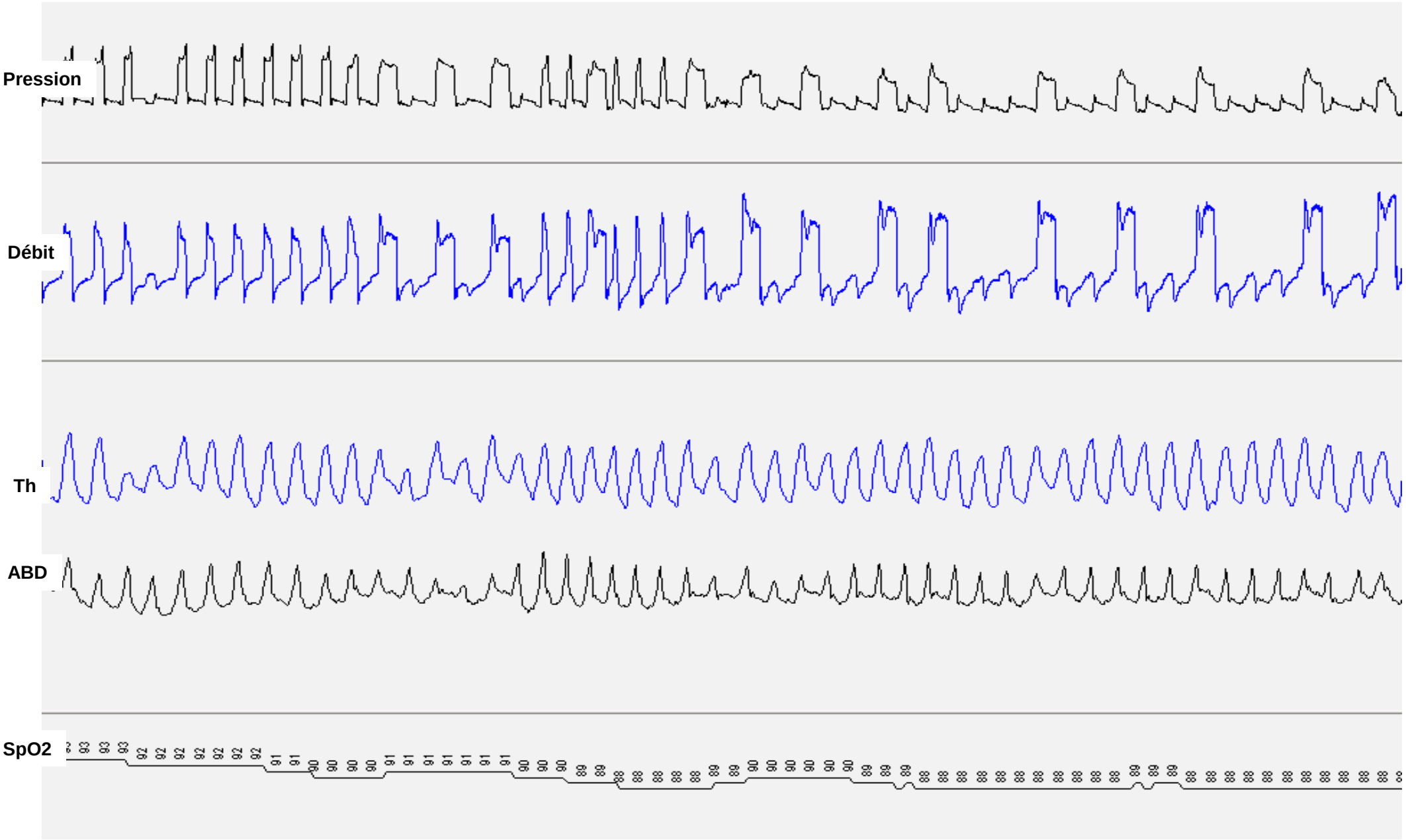

Pression
Débit
Thorax
Abdomen
SpO2

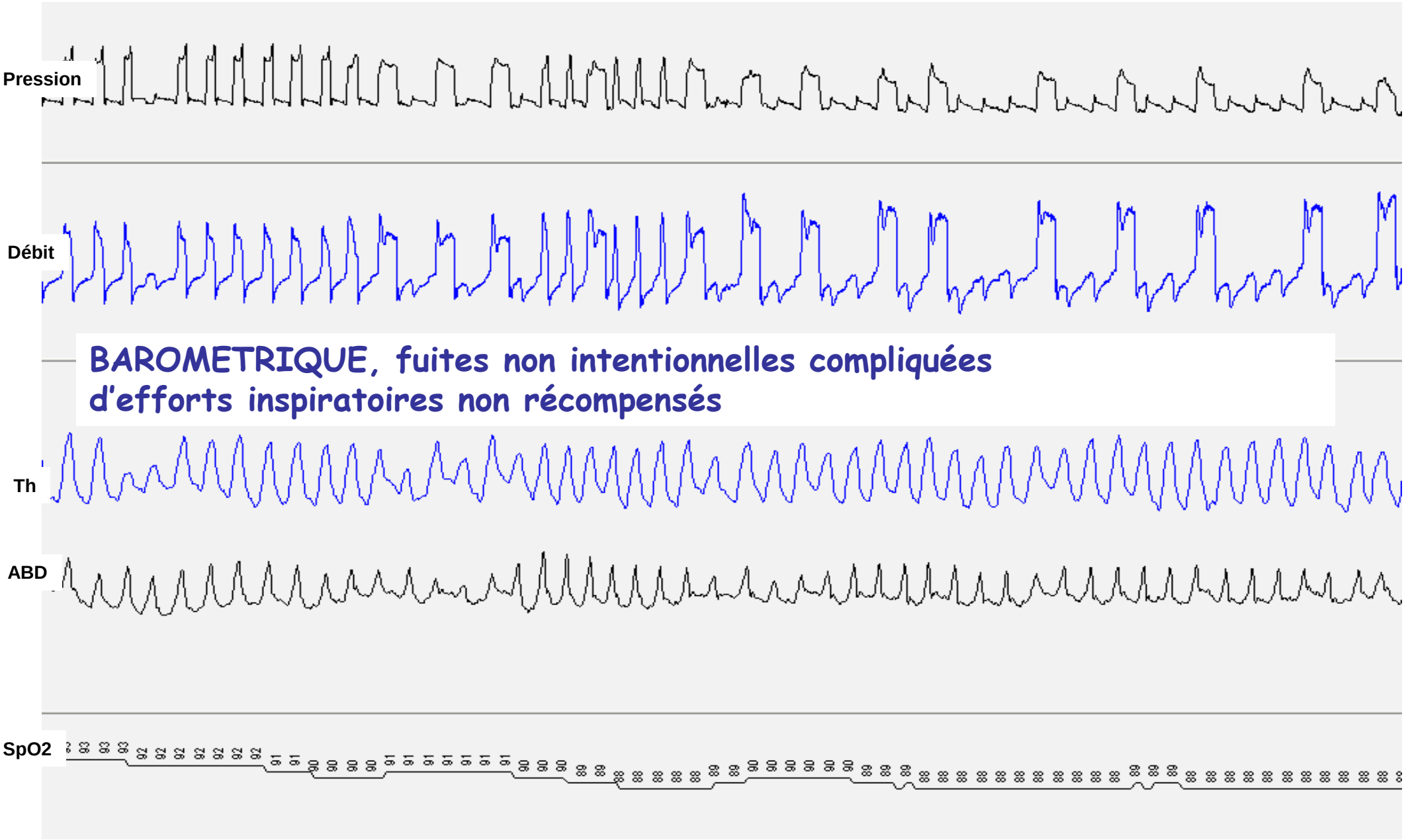
Obstruction
VAS
progressive

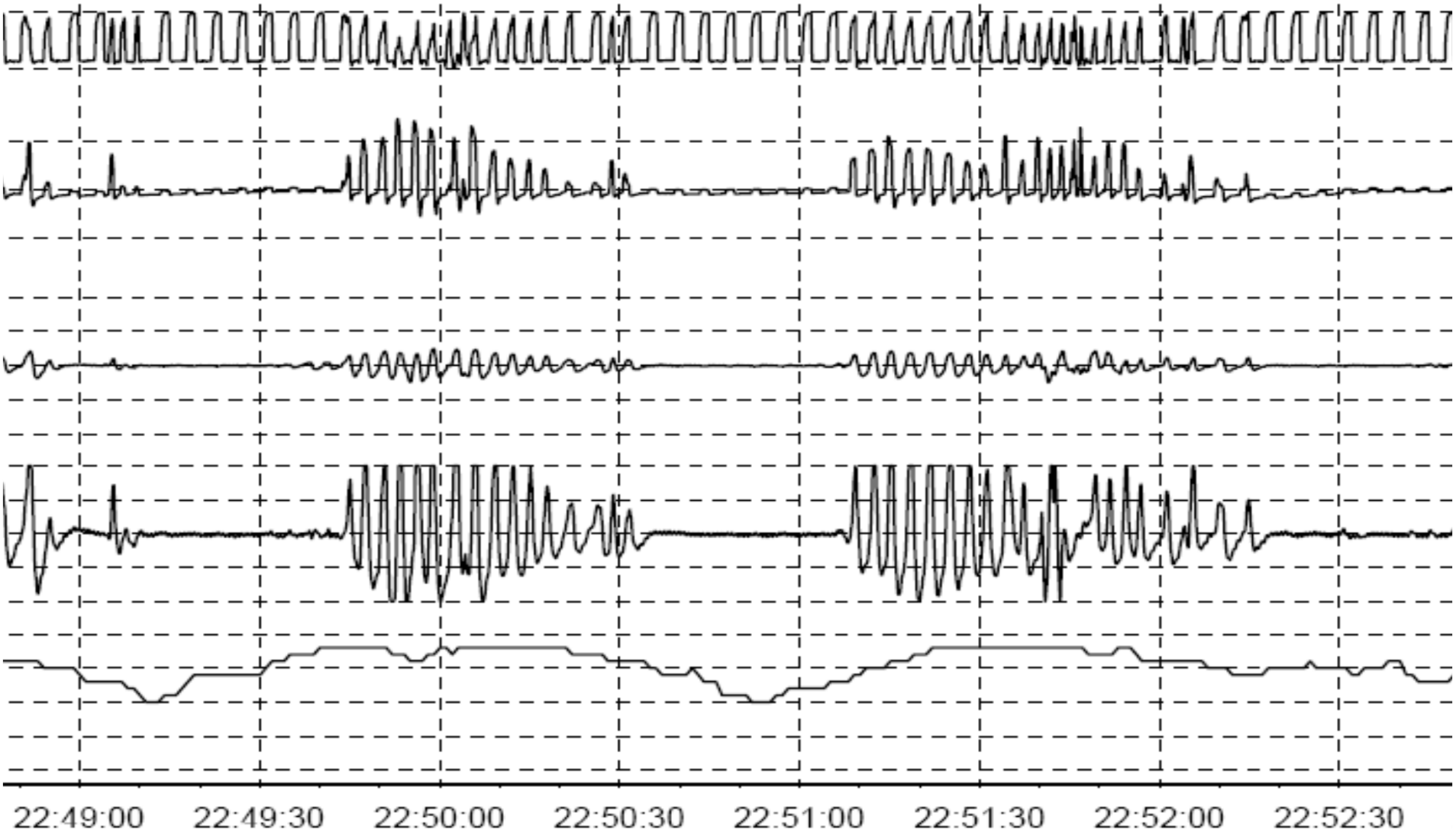

Pression
Débit
Thorax
Abdomen
SpO2

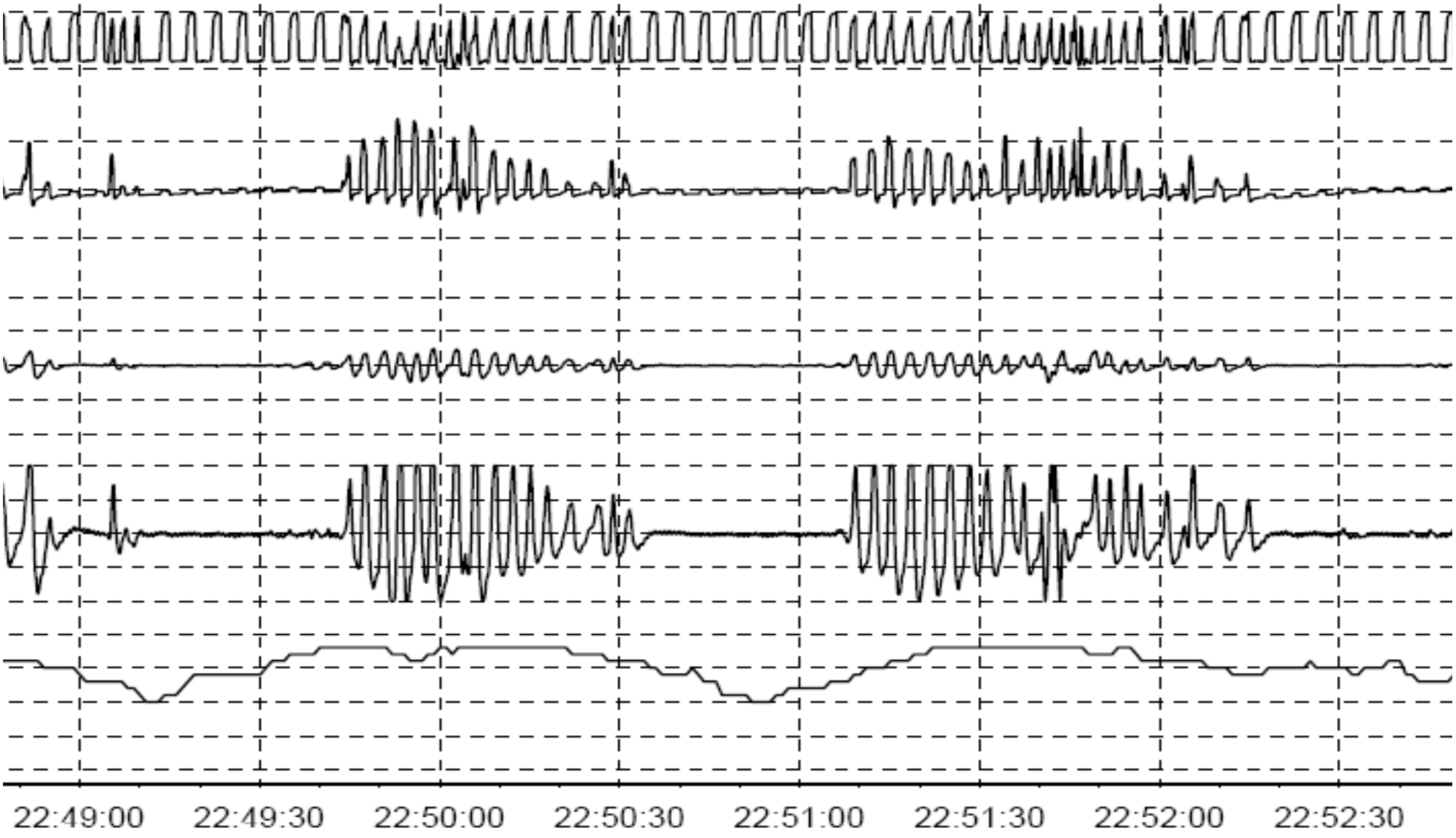


Obstruction VAS sans diminution de la commande ventilatoire,
Lutte avec les muscles respiratoires accessoires


Pression
Débit
Th
ABD
SpO2

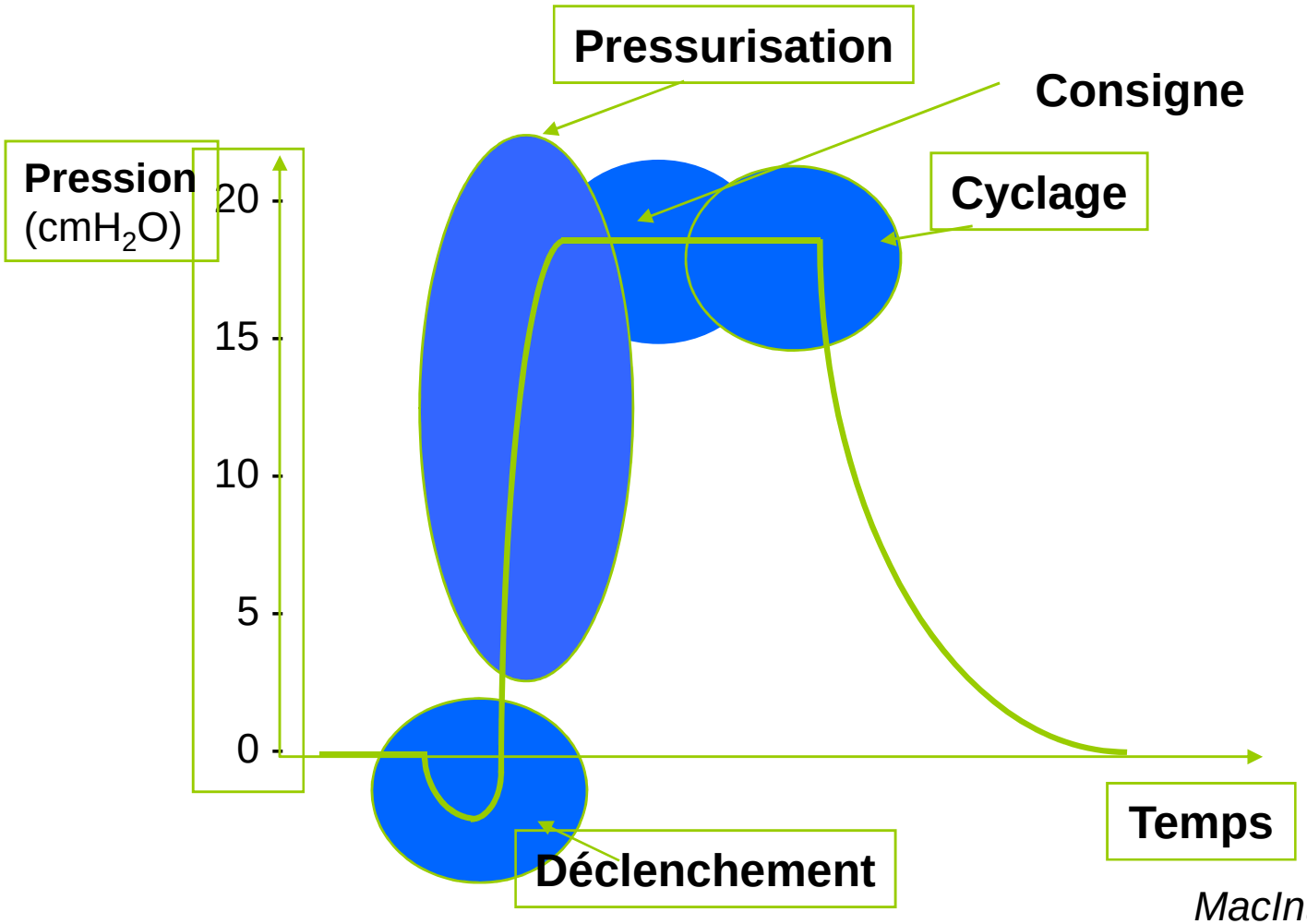

Pression
Débit
BAROMETRIQUE, fuites non intentionnelles compliquées
d'efforts inspiratoires non récompensés
Th
ABD
SpO2


22:49:00
22:49:30
22:50:00
22:50:30
22:51:00
22:51:30
22:52:00
22:52:30

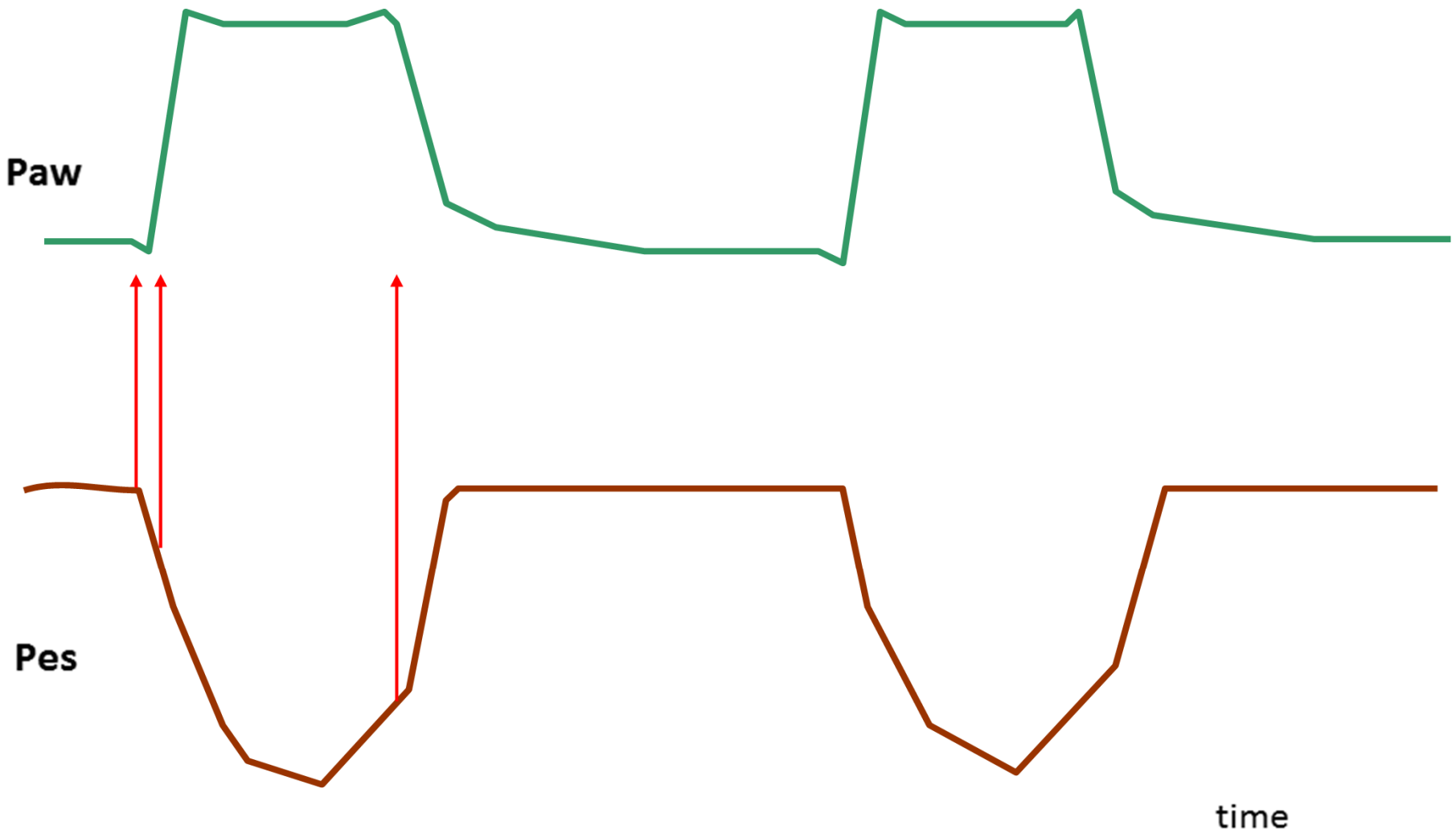


Obstruction complète des VAS avec diminution commande centrale

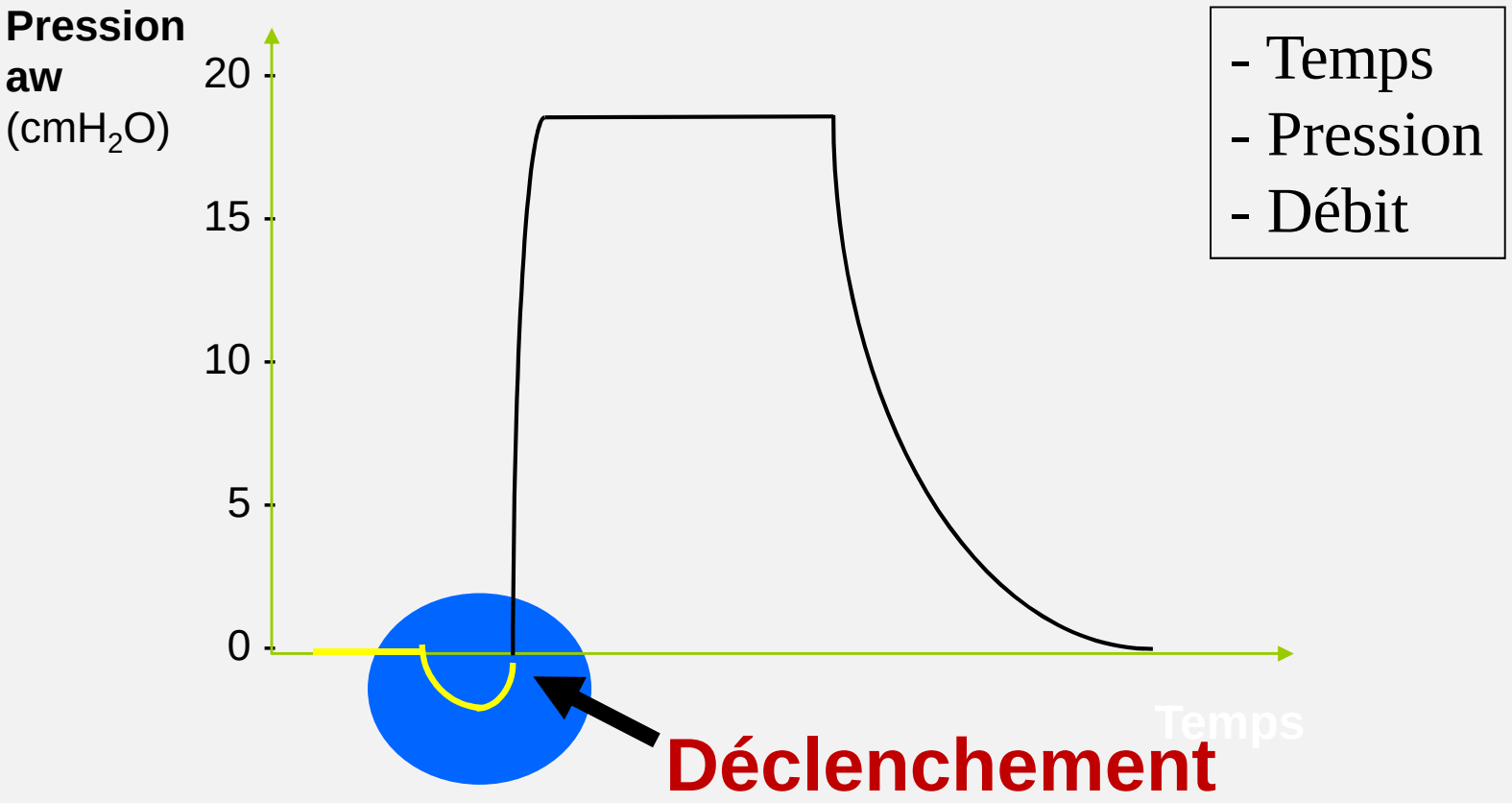
Les phases du cycle



MacIntyre et al., Chest 1990
Tobin et al., Am J Respir Crit Care Med 2001


Paw
Pes
time

Le déclenchement

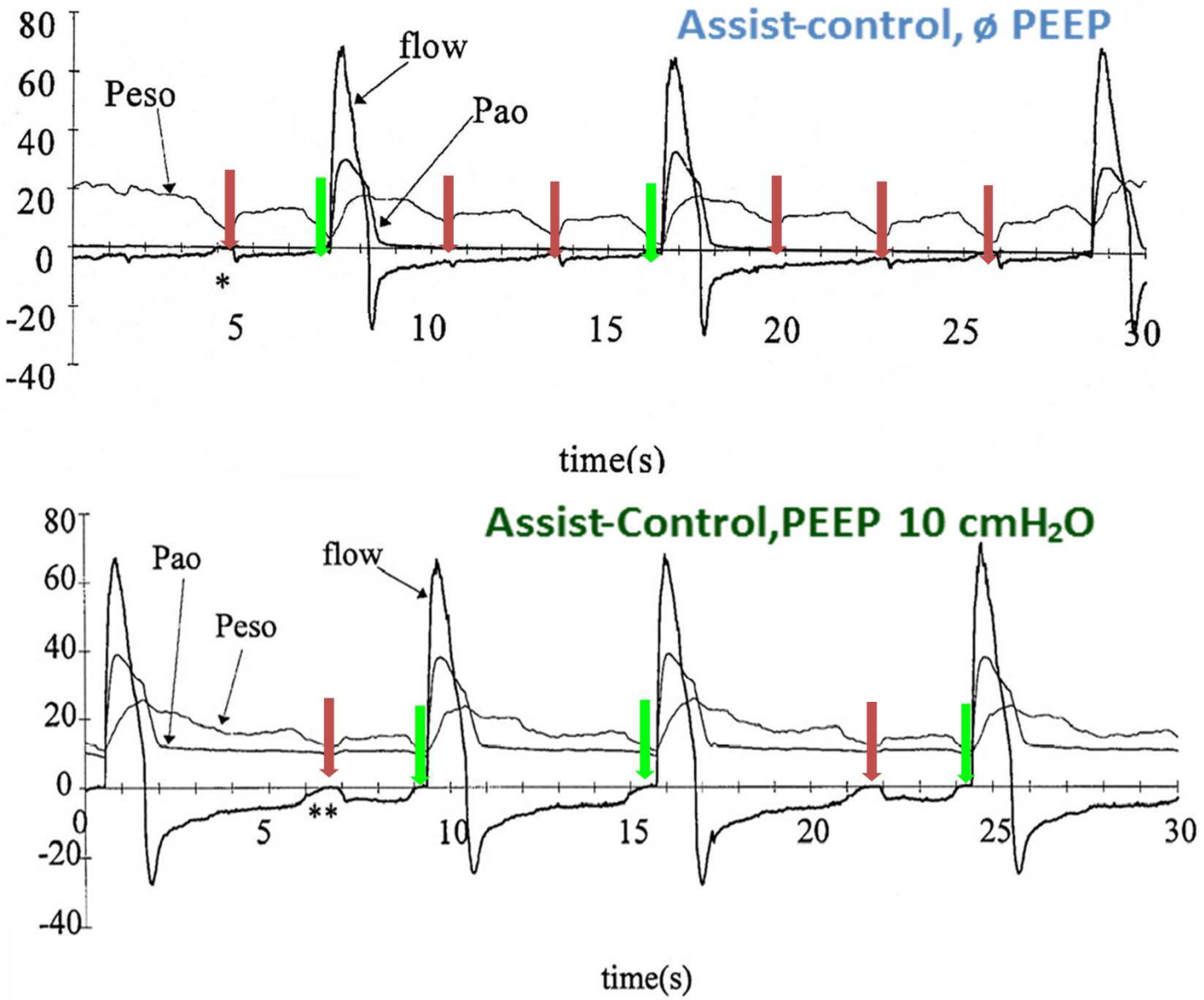


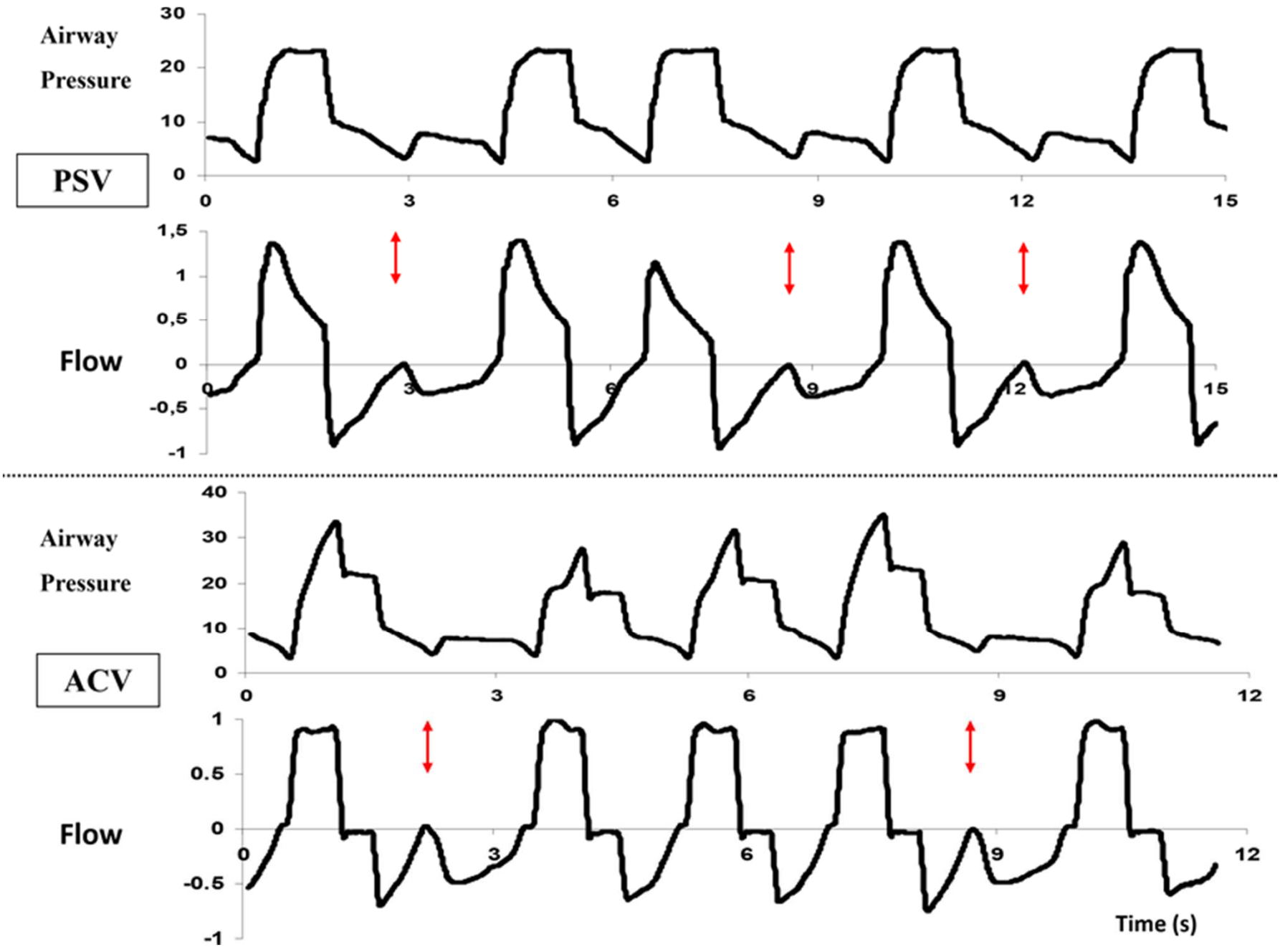

Aide inspiratoire/VS PEP
Admettre patient
Nébuliseur
Etat
1:14
30 cmH2O
90 l/min
-90
500 ml
20 µV
Pcrête (cmH2O)
60
25
Pmoyen. (cmH2O)
10
PEP (cmH2O)
5
F resp. (resp./min)
40
18
5
O2 (%)
50
Ti/Ttot
0.26
VMe (l/min)
C
7.0
40.0
4.0
Vc insp. (ml)
471
Vc exp. (ml)
405
Edi max (µV)
5.7
Edi min (µV)
0.2
Autres réglages
Conc. d'O2
50
21
%
100
PEP
5
0
cmH2O
50
Niv. AI sur PEP
20
0
cmH2O
120
Autres valeurs

Les efforts inspiratoires non récompensés

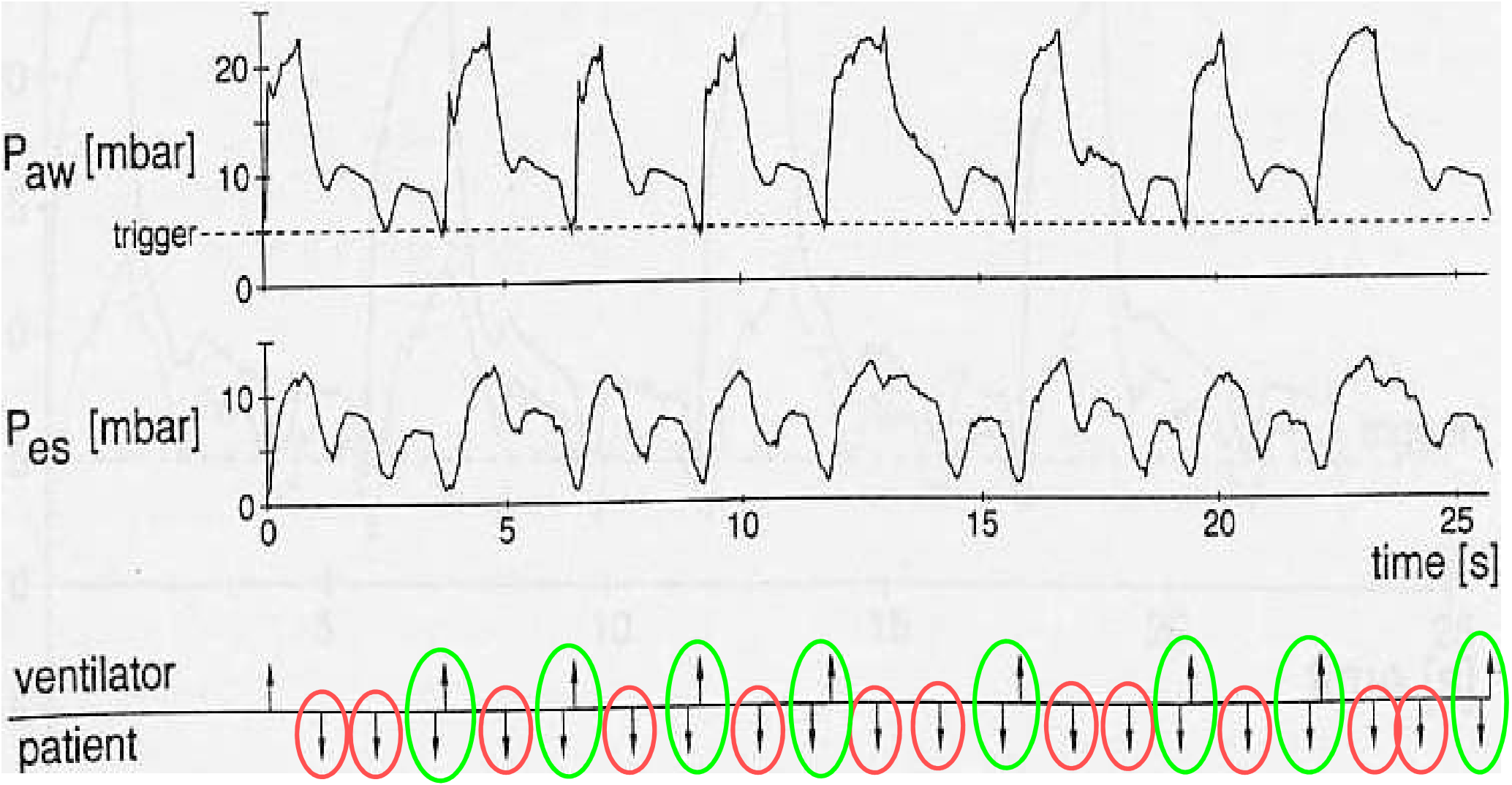
Triggering asynchrony

Chao et al., Chest 1997; 112: 1592-1599




Airway
Pressure
PSV
30
20
10
0
0
3
6
9
12
15
Flow
1,5
1
0,5
0
-0,5
-1
Airway
Pressure
ACV
40
30
20
10
0
0
3
6
9
12
Flow
1
0.5
0
-0.5
-1
Time (s)

VSAI efforts inspiratoires inefficaces



Fabry et al., Chest 1995

Efforts inspiratoires non récompensés

Efforts inspiratoires non récompensés

Causes :

. Fuites non intentionnelles

. Faiblesse musculaire

. Obstruction nasale (avec masque nasal !)

. Effort inspiratoire par la bouche au cours d'une VNI nasale

. Auto-PEP avec un seuil de déclenchement peu sensible

. Distension pulmonaire liée à la ventilation mécanique (AI trop importante)

Efforts inspiratoires non récompensés

Solutions :

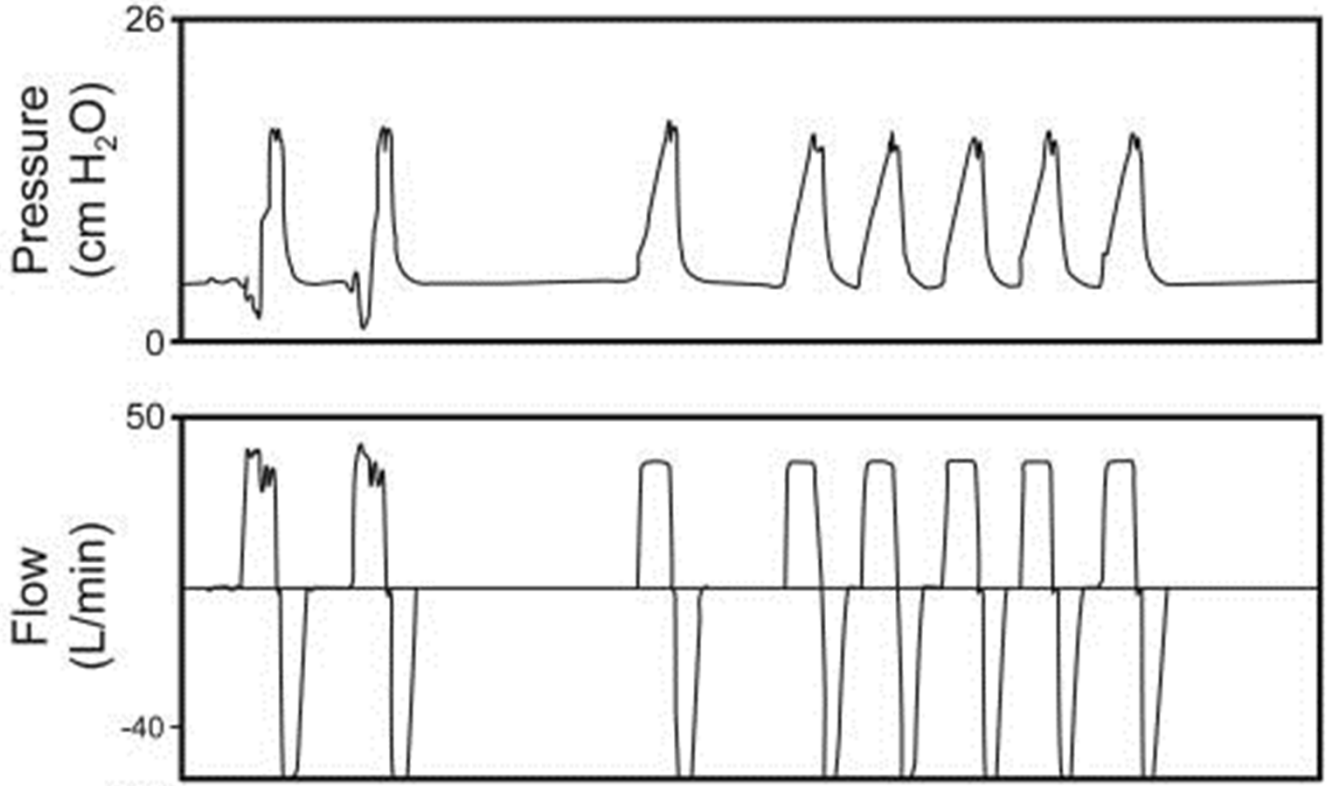
. Contrôler les fuites non intentionnelles

. ↑ sensibilité trigger inspiratoire (faiblesse musculaire)

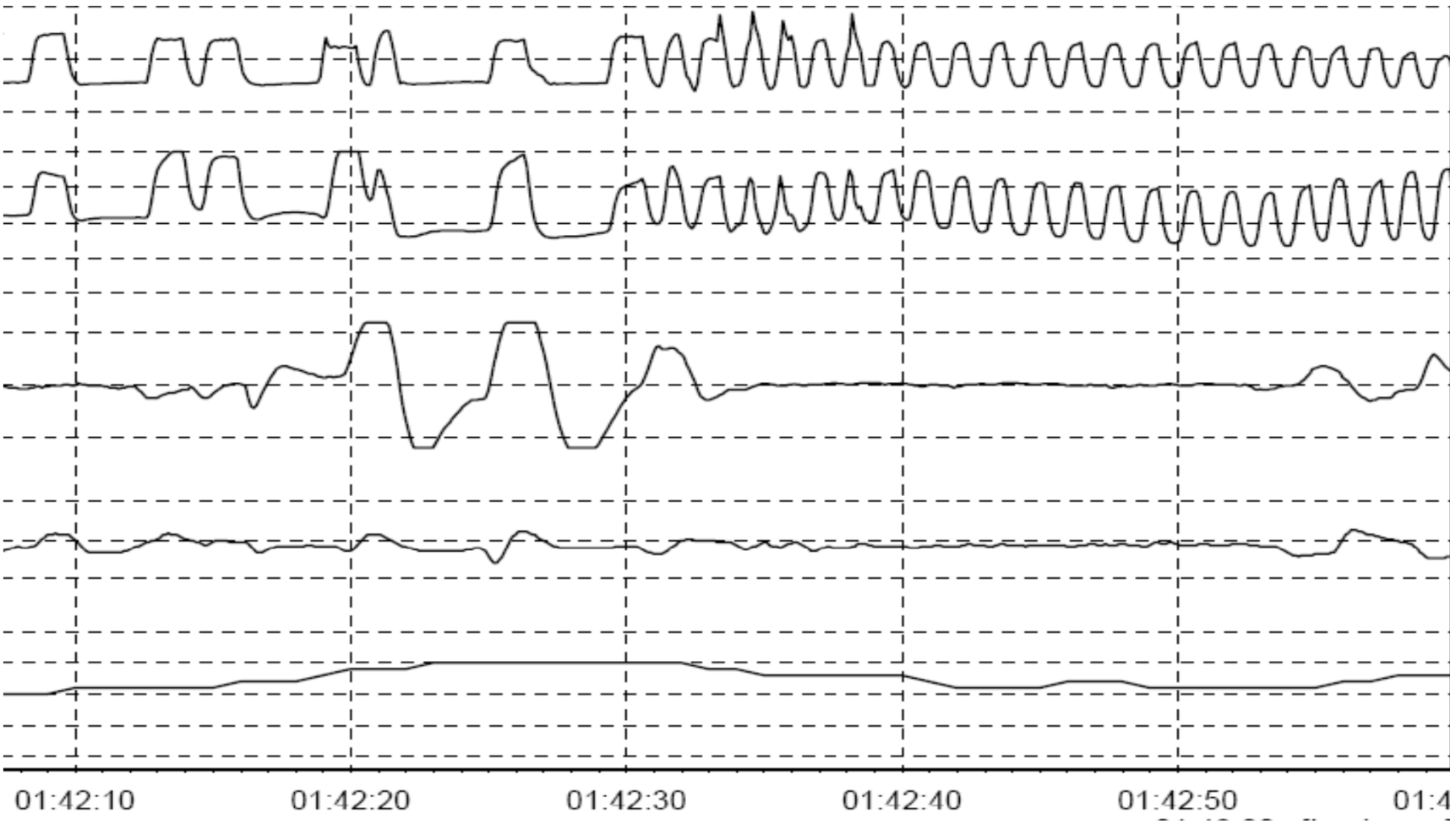
. ↑ PEP (PEP intrinsèque)

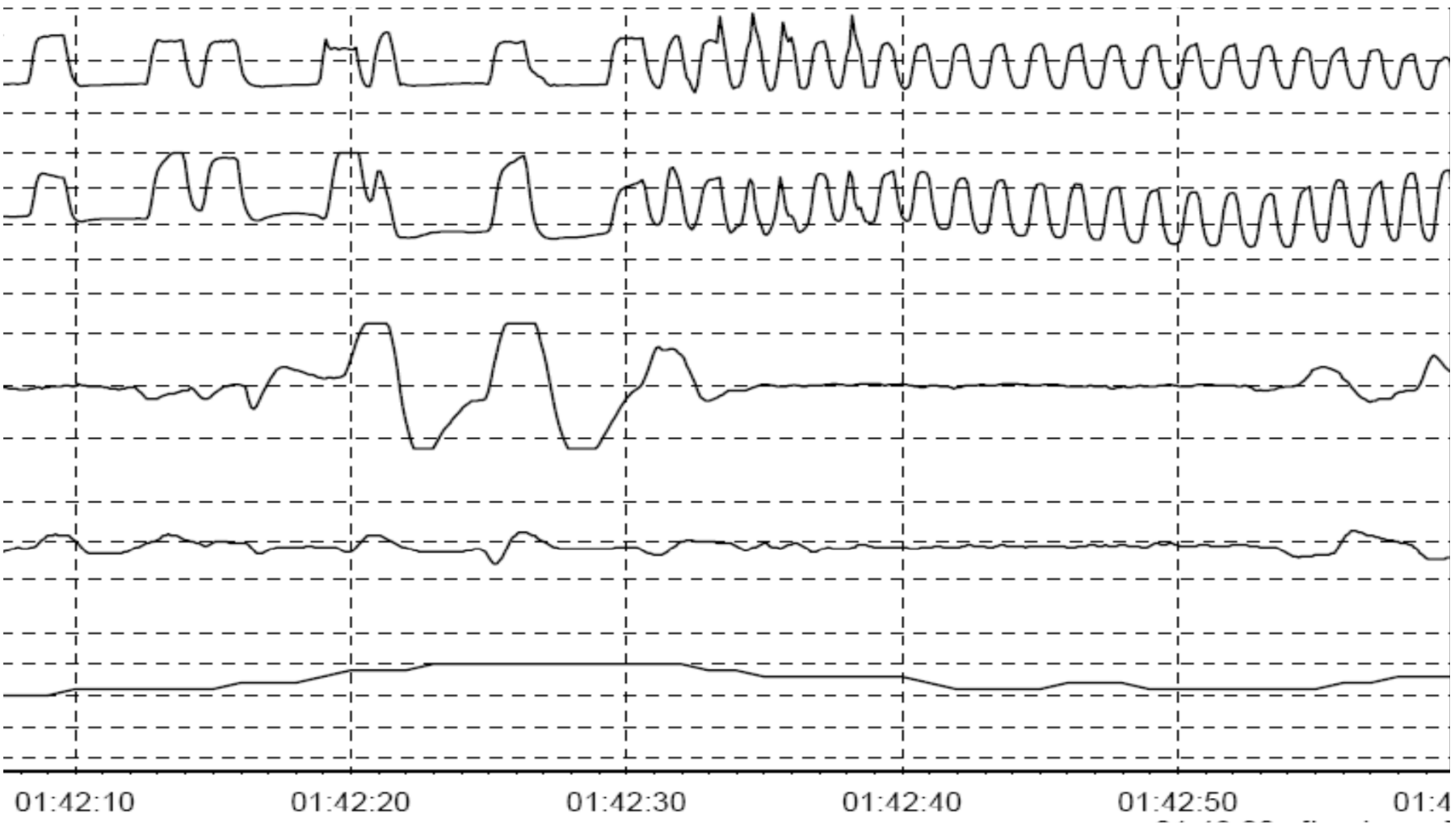
. Education au masque nasal (inspiration buccale)

. ↓ AI, ↑ sensibilité trigger expiratoire


26
Pressure
(cm H_2O)
0
50
Flow
(L/min)
-40

?


01:42:10
01:42:20
01:42:30
01:42:40
01:42:50
01:4



Auto-déclenchement : > 3 cycles respiratoires à fréquence > 40 cycles/min
en l'absence de mouvement respiratoire en rapport

AUTO-DECLENCHEMENT

Causes :

. Fuites non intentionnelles

. Seuil de déclenchement trop sensible ou PEP trop élevée

. Troubles du rythme cardiaque

. Défaillance du ventilateur

Solutions :

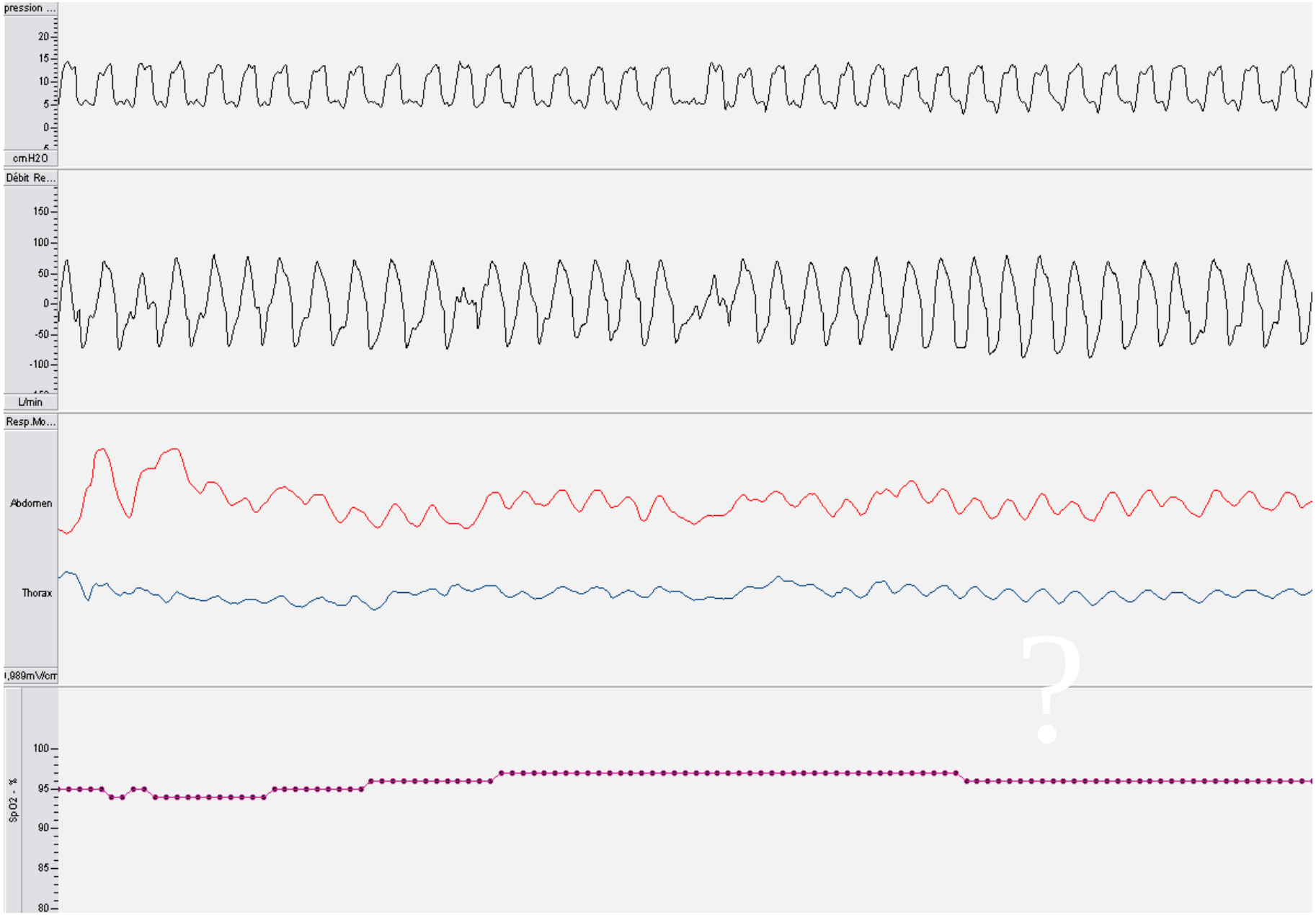
. Contrôler les fuites non intentionnelles

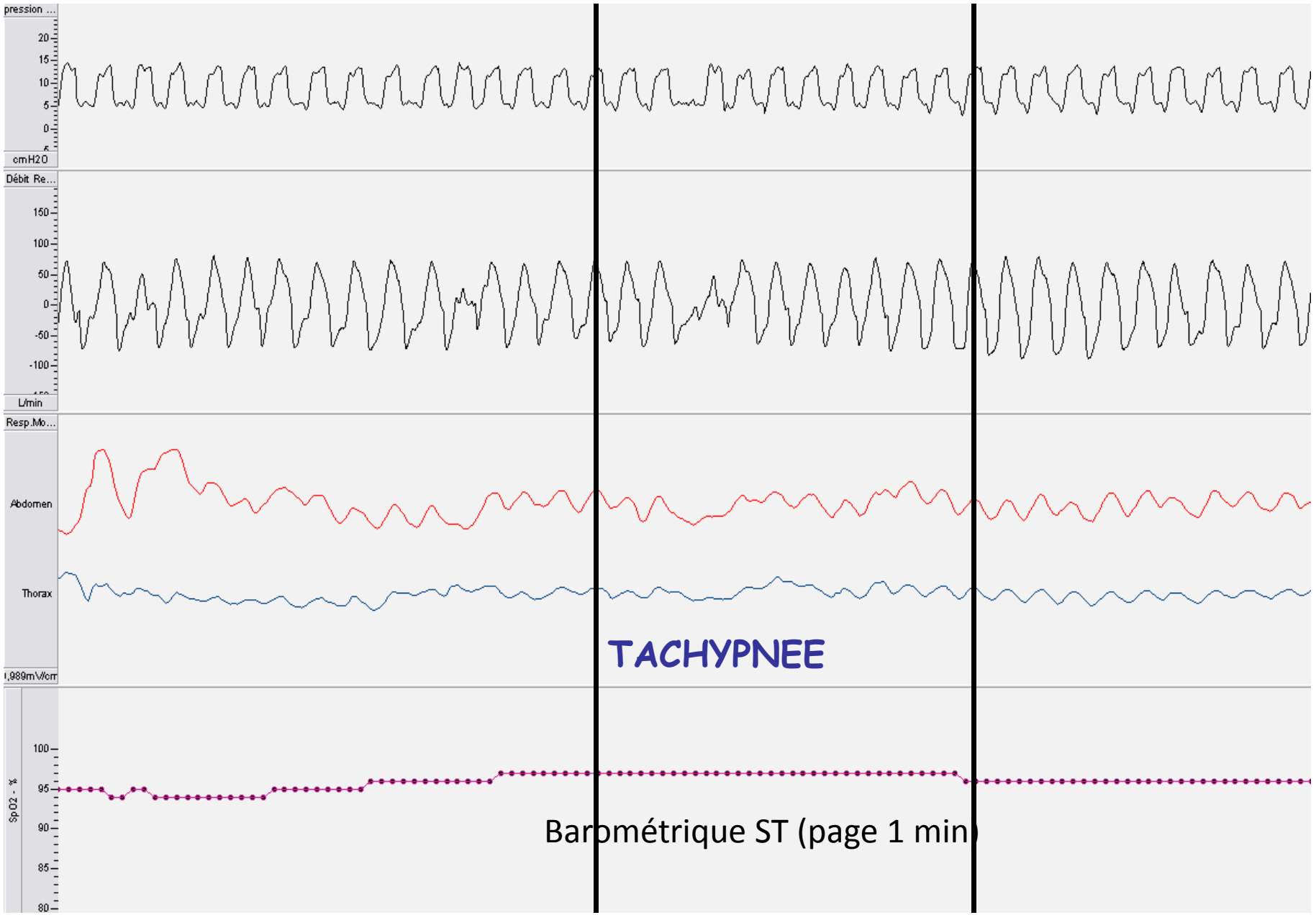
. Diminuer la sensibilité du trigger inspiratoire

. Diminuer la PEP

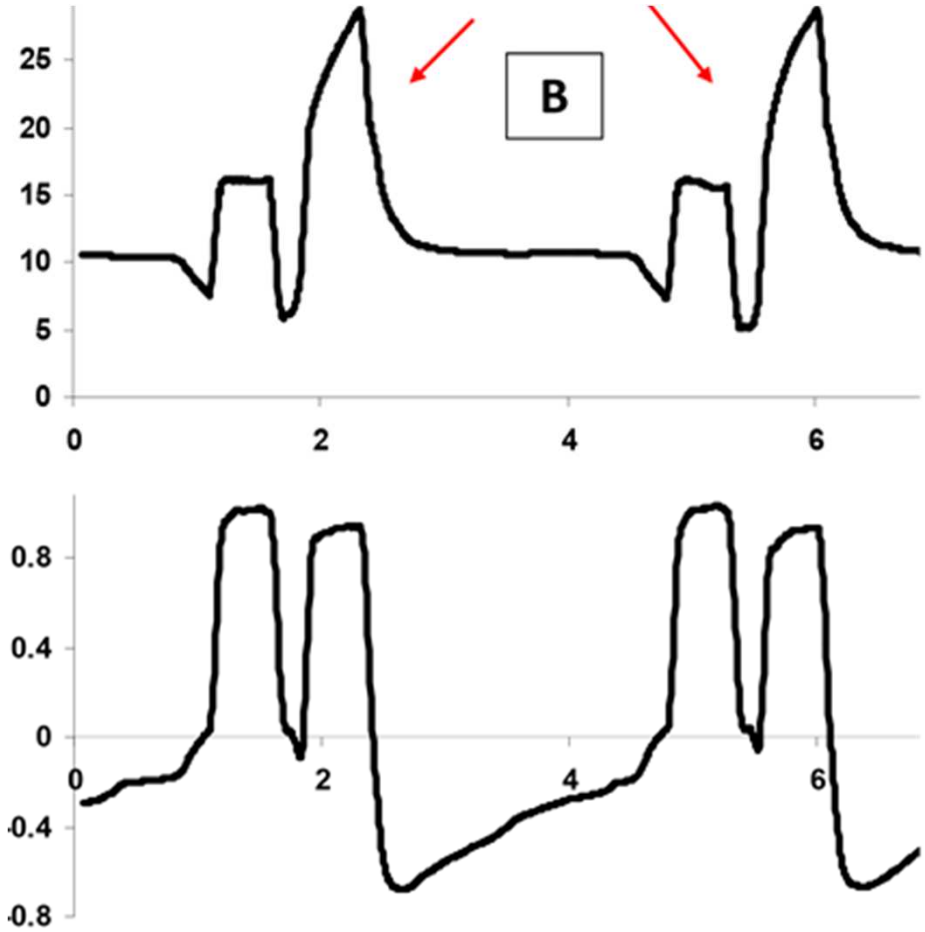
. Contrôle technique

Diagnostic différentiel





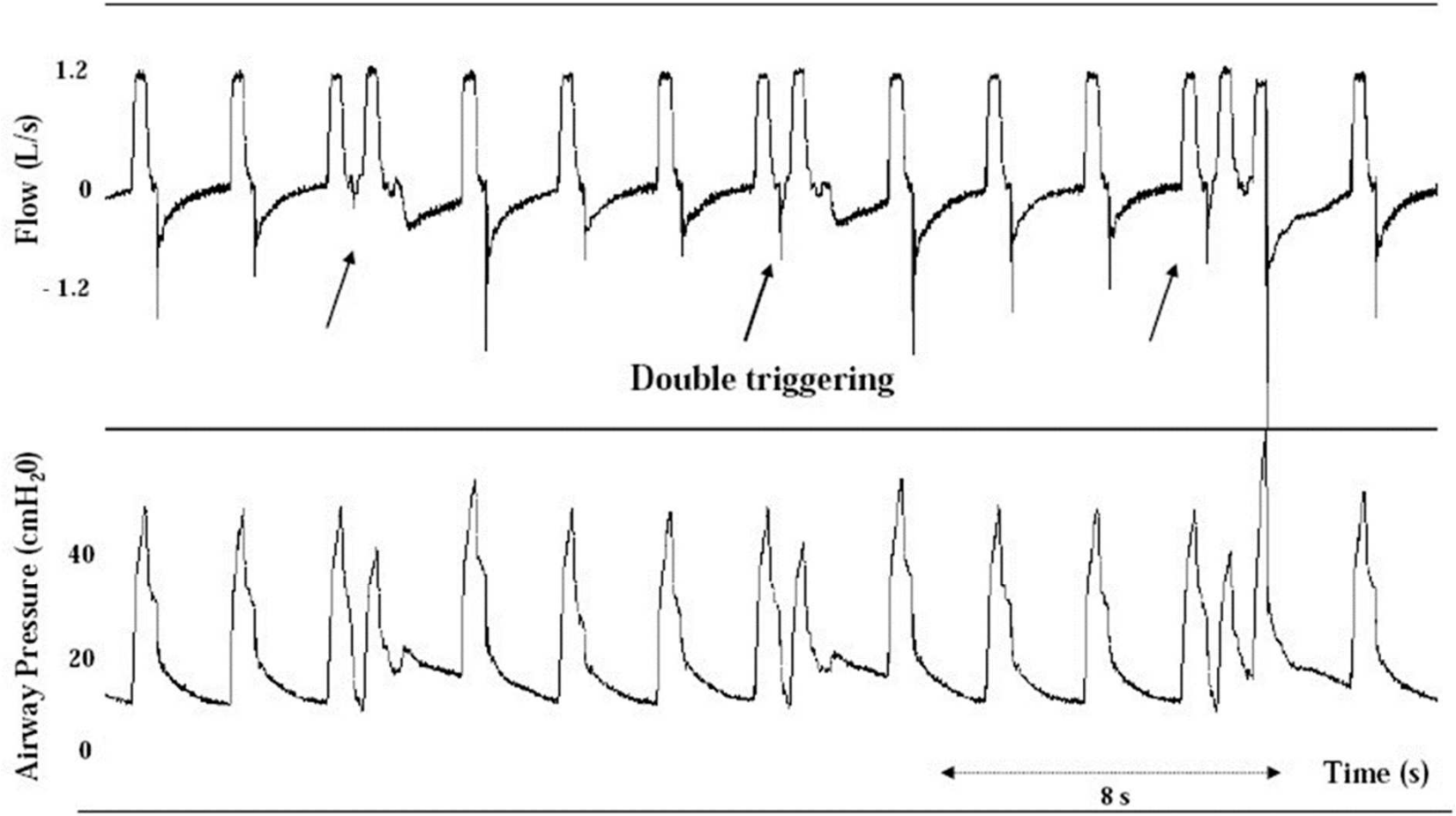
Barométrique ST (page 1 min)


B
25
20
15
10
5
0
0
2
4
6
0.8
0.4
0
-0.4
-0.8
0
2
4
6

Esophageal

(cmH_2O)

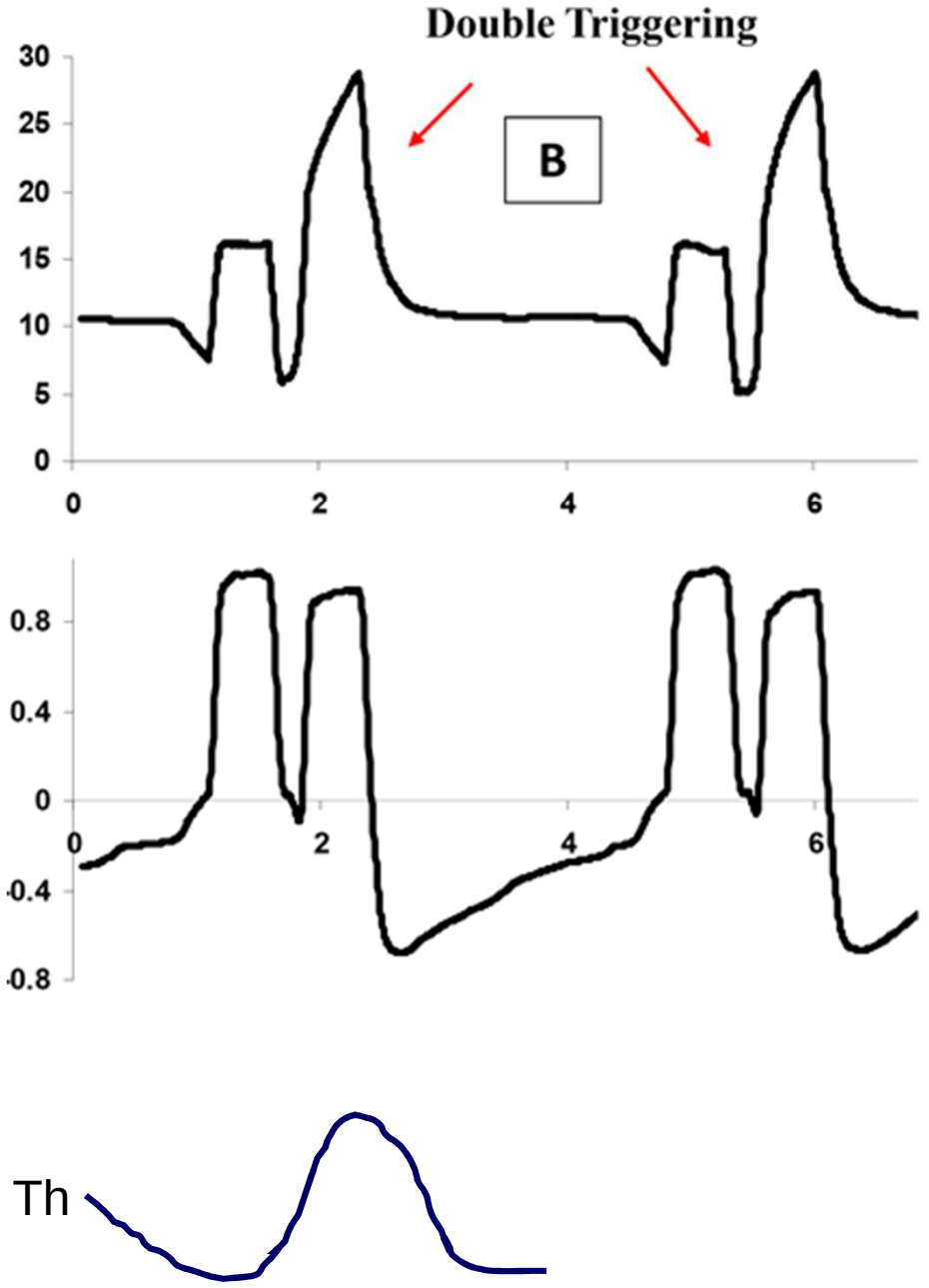
ACV



Double triggering

"Polygraphic data" from sofware

DOUBLE DECLENCHEMENT (type 1)



DOUBLE DECLENCHEMENT (type 1)

Intérêt des sangles thoracique et abdominale

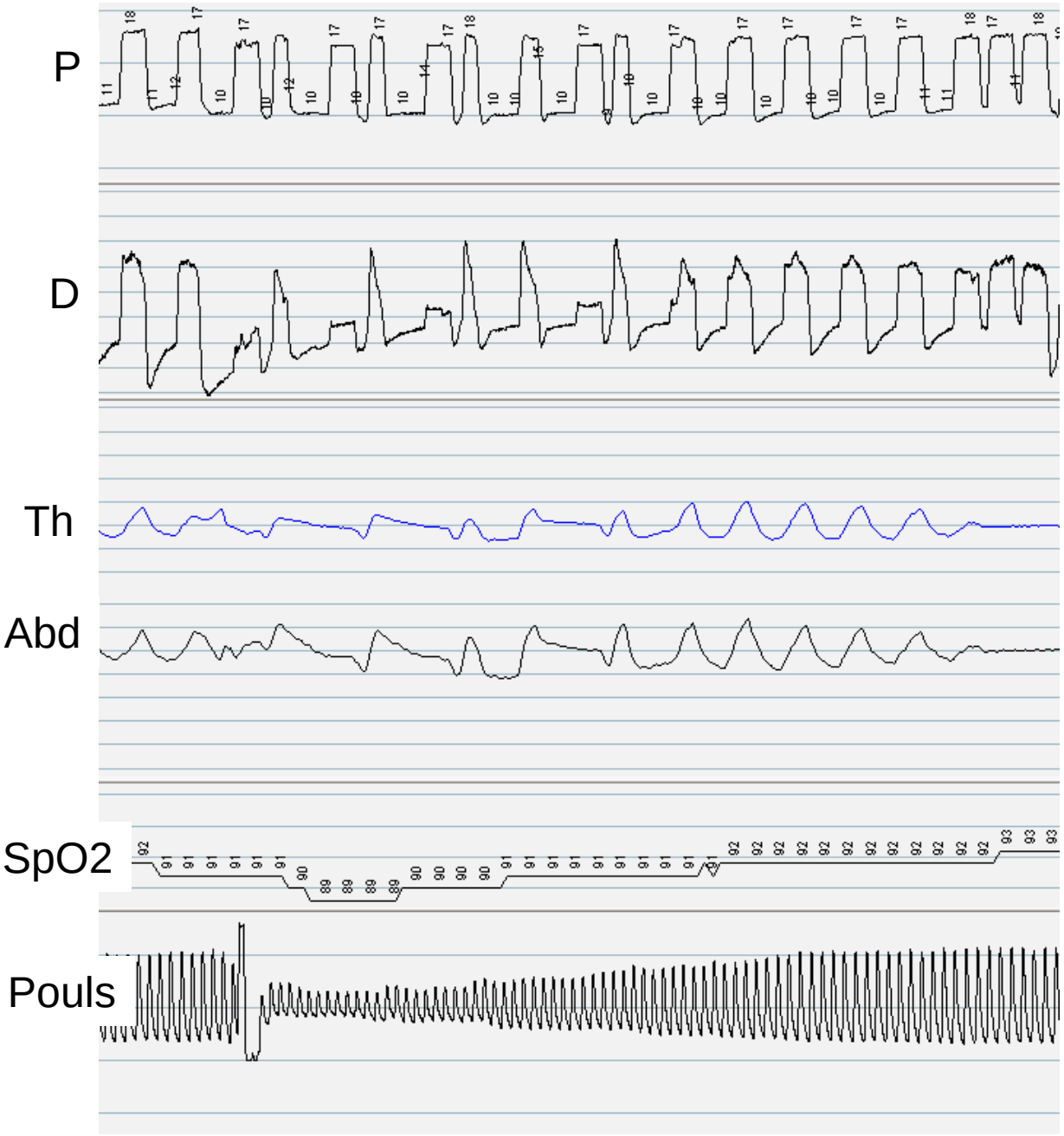
Cause :

. Mouvement respiratoire concomitant du 2ème cycle :

effet de la fréquence de sécurité

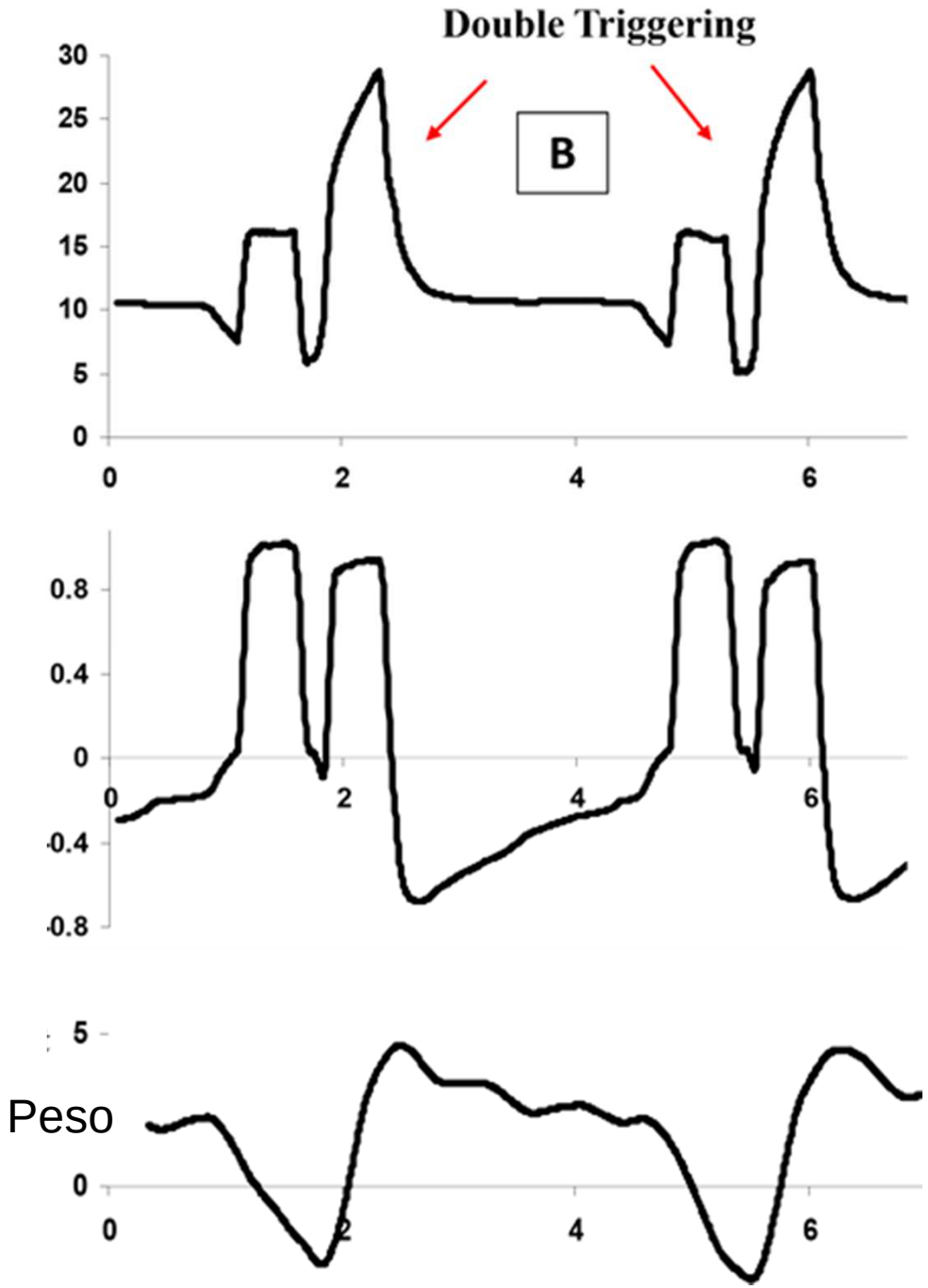
Solution

. ↓ fréquence respiratoire


P
D
Th
Abd
SpO2
Pouls

?

DOUBLE DECLENCHEMENT (type 2)



DOUBLE DECLENCHEMENT (type 2)

Vignault L et al. Intensive Care Med 2009; 35 : 840

DOUBLE DECLENCHEMENT (type 2)

Intérêt des sangles thoracique et abdominale

Cause :

. un seul mouvement respiratoire concomitant

du double déclenchement : fuites, sensibilité du trigger inspiratoire,

défaillance technique

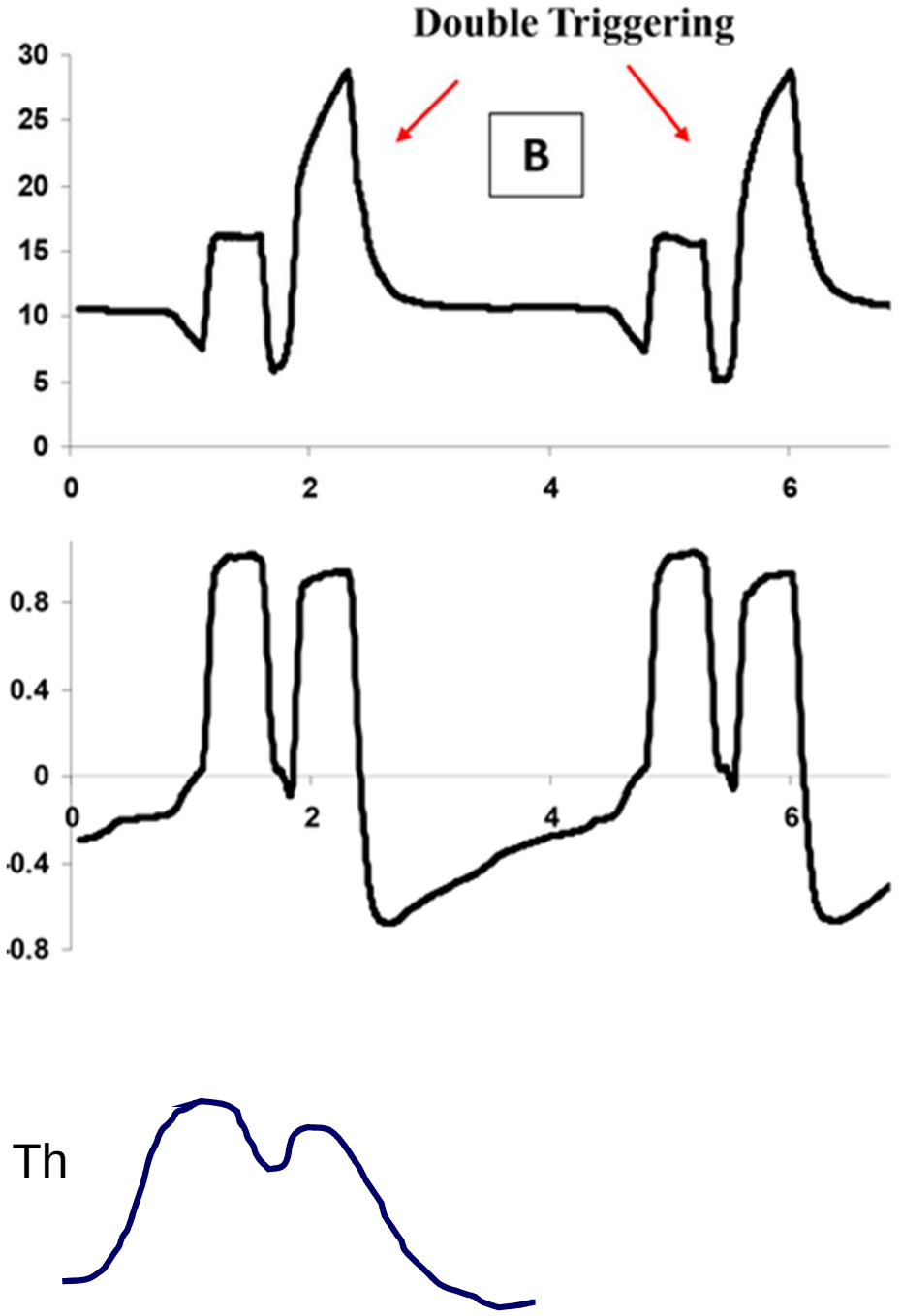
Solution :

. Contrôler les fuites

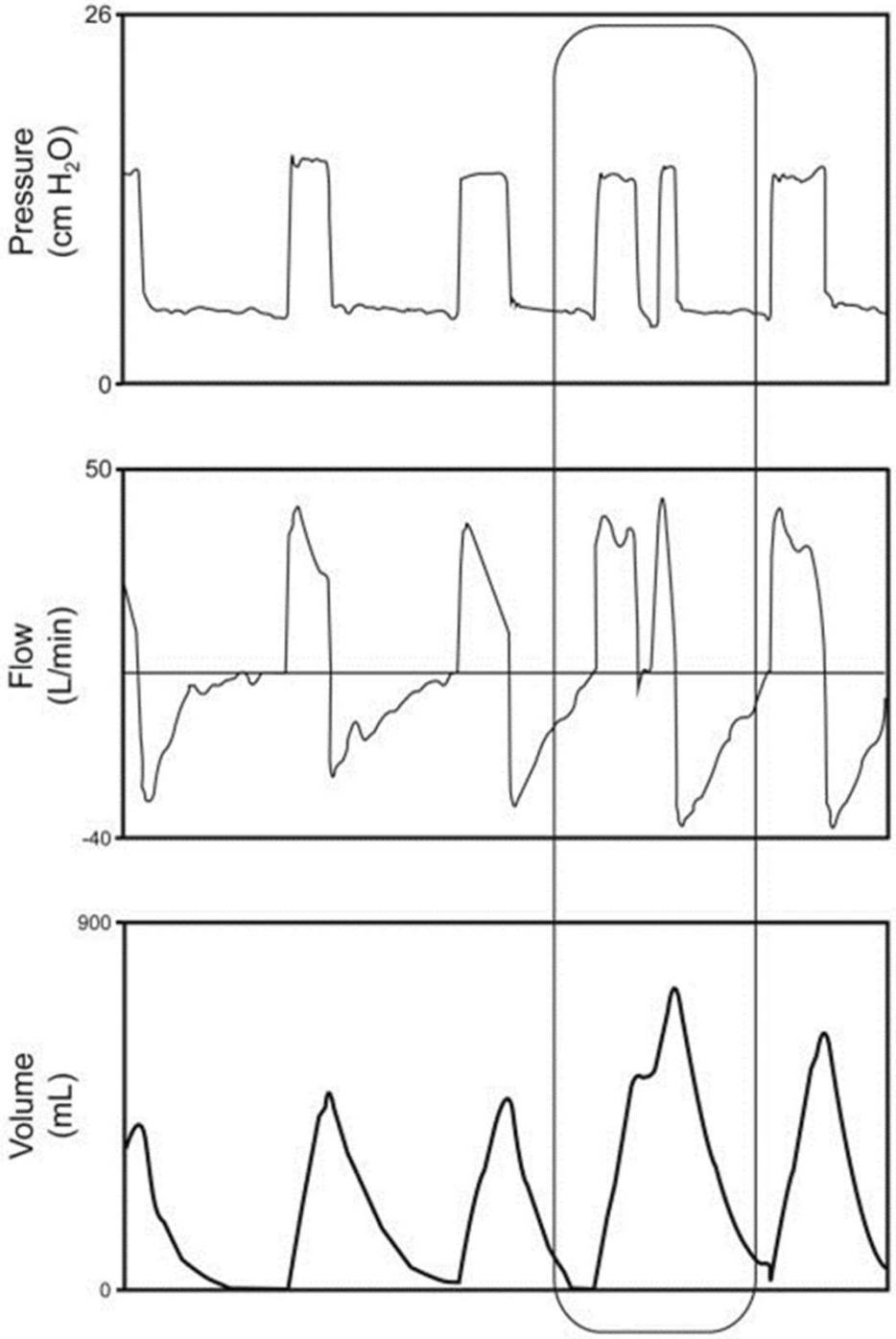
. ↓ sensibilité trigger inspiratoire

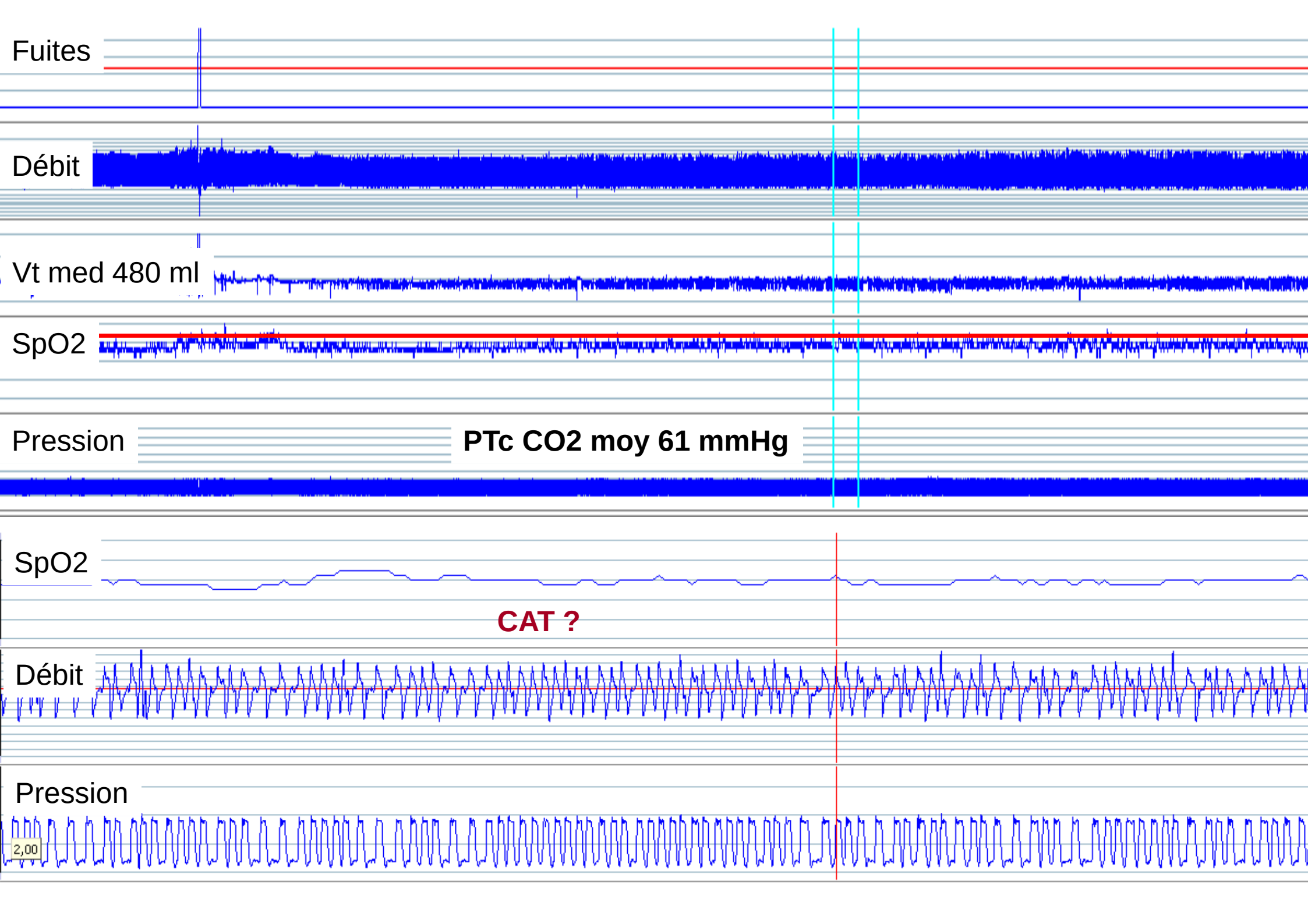
. Contrôle technique

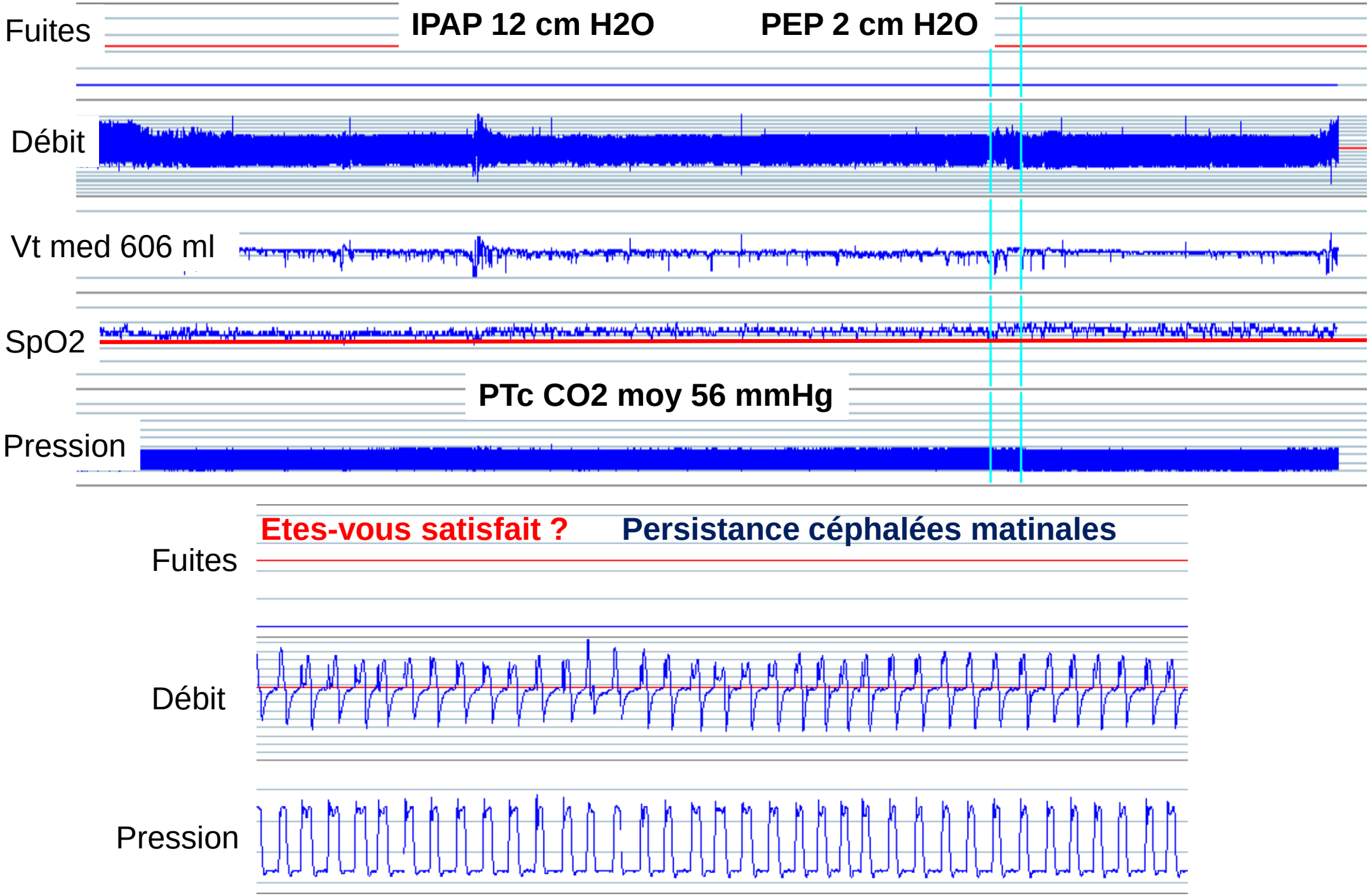
DOUBLE DECLENCHEMENT (type 3)



DOUBLE DECLENCHEMENT (type 3)




Fuites
Débit
Vt med 480 ml
SpO2
Pression
PTc CO2 moy 61 mmHg
SpO2
CAT ?
Débit
Pression
2,00


Fuites
IPAP 12 cm H2O
PEP 2 cm H2O
Débit
Vt med 606 ml
SpO2
PTc CO2 moy 56 mmHg
Pression
Etes-vous satisfait ?
Persistance céphalées matinales
Fuites
Débit
Pression

DOUBLE DECLENCHEMENT (type 3)

Intérêt des sangles thoracique et abdominale

Cause :

. Deux mouvements respiratoires successifs :

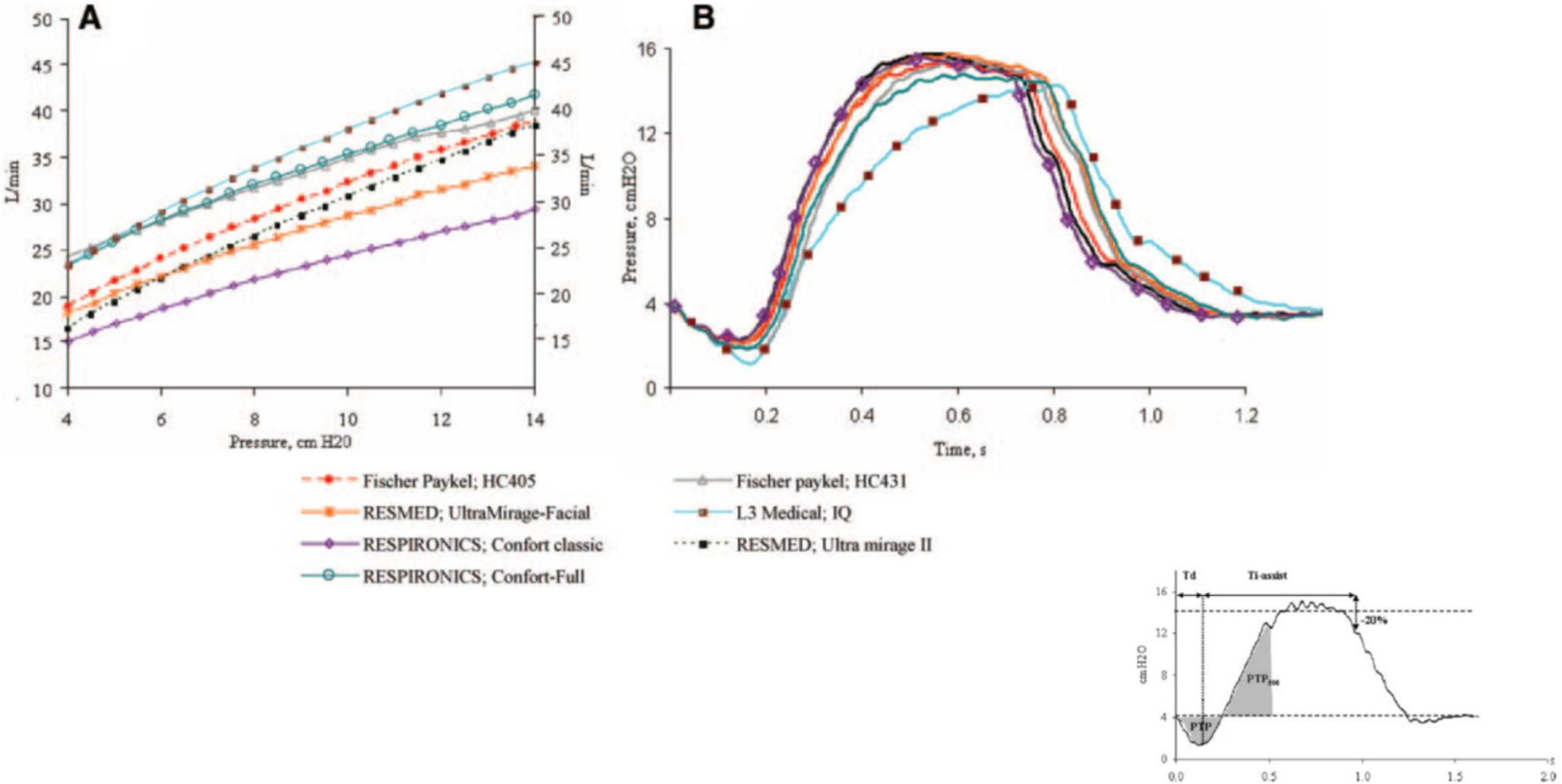
rappel inspiratoire par insuffisance de ventilation (« soif d'air ») :

IPAP faible (réglage, fuite calibrée inappropriée),

Solutions :

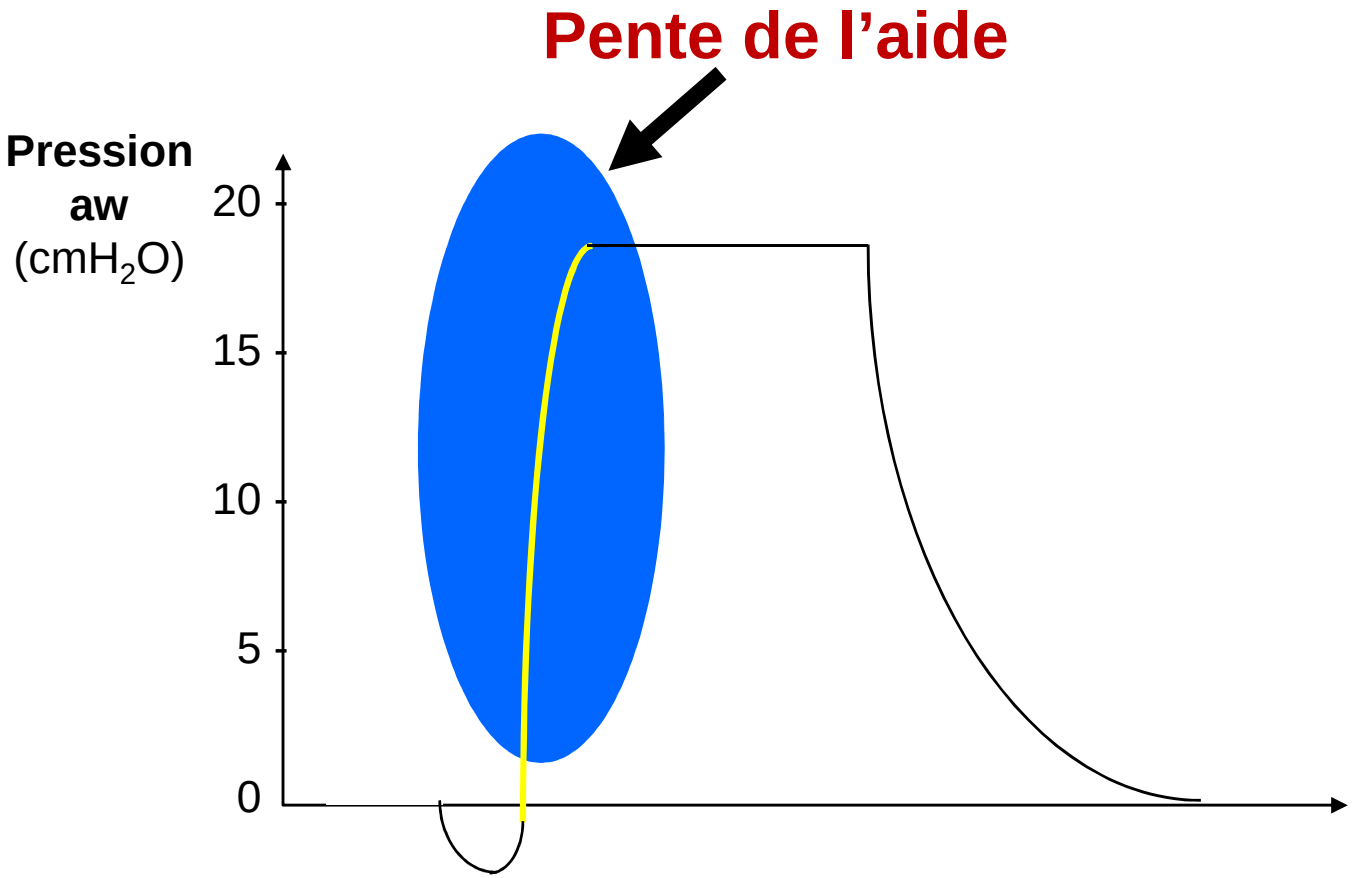
. ↑ AI

Intentional Leaks in Industrial Masks Have a Significant Impact on Efficacy of Bilevel Noninvasive Ventilation



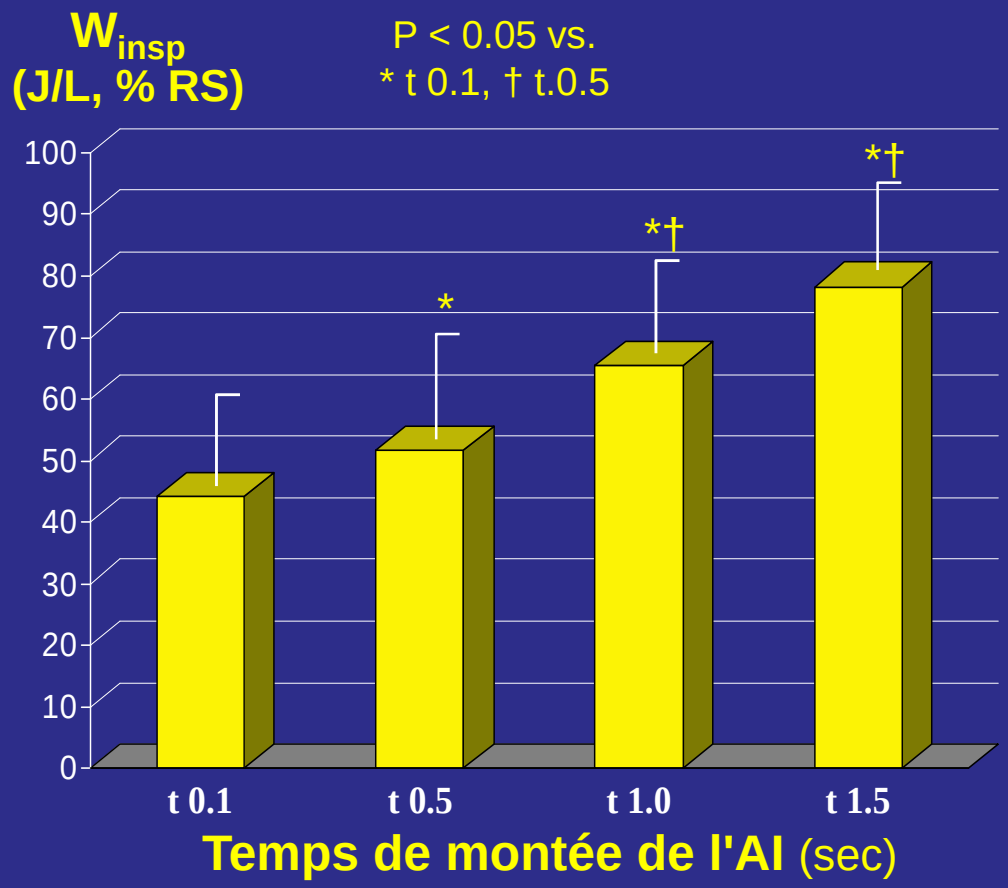
Borel JC et al. Chest 2009; 135: 669-677

Le temps de montée en pression



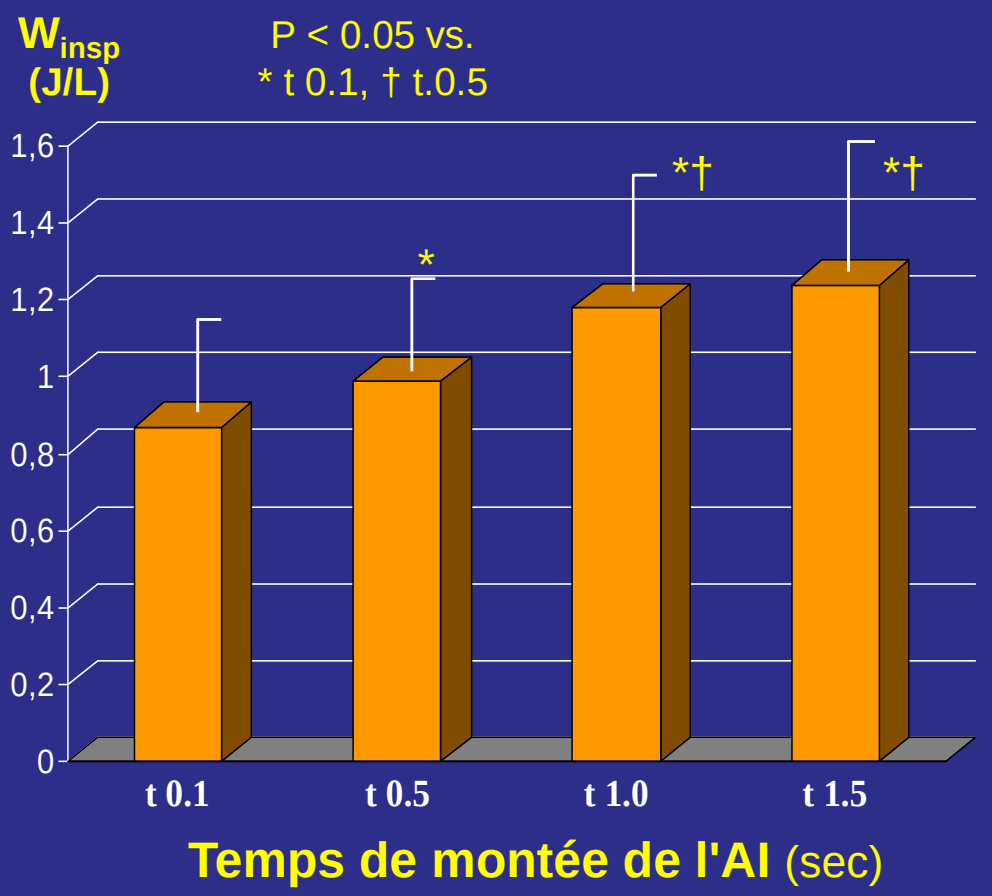
Le temps de montée en pression

Patients restrictifs



Bonmarchand Crit Care Med 1999

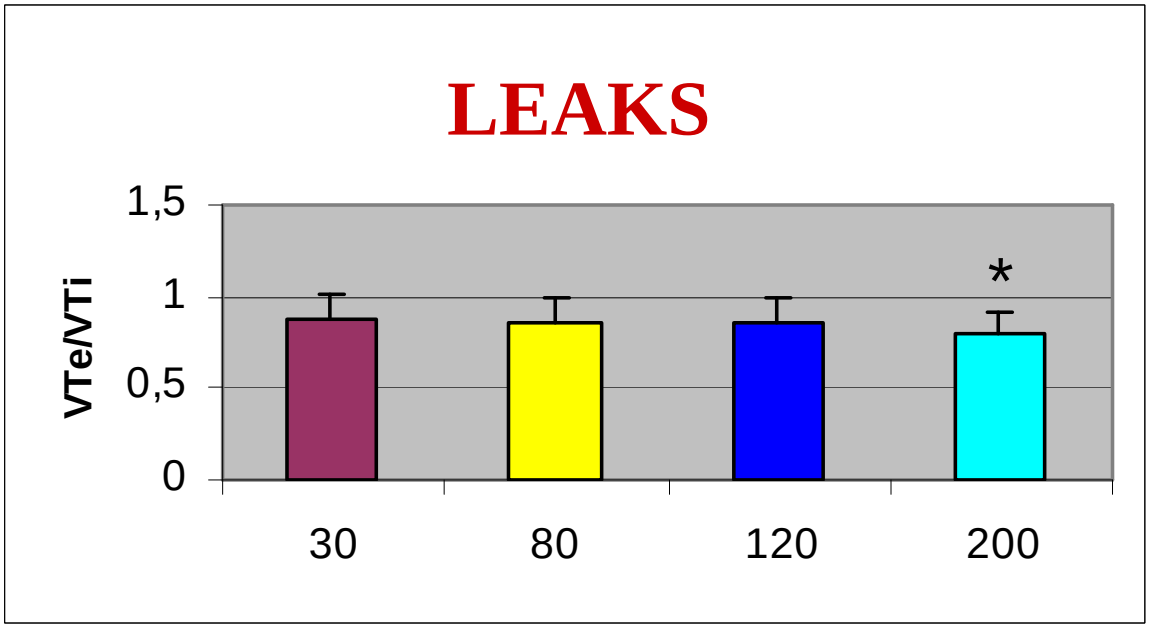
Patients obstructifs



Bonmarchand Intensive Care Med 1996

Monitoring of Noninvasive Ventilation
Pressurisation Rate (cmH2O/s)

COPD
n = 15



Breathing pattern, ABG : NS
PTPdi lowest with the fastest rate
Patient's tolerance, poorer with the fastest rate

Prinianakis G et al. Eur Respir J 2004; 23 : 314-320

AIR ARRIVE TROP VITE / TROP FORT

Diagnostic clinique :

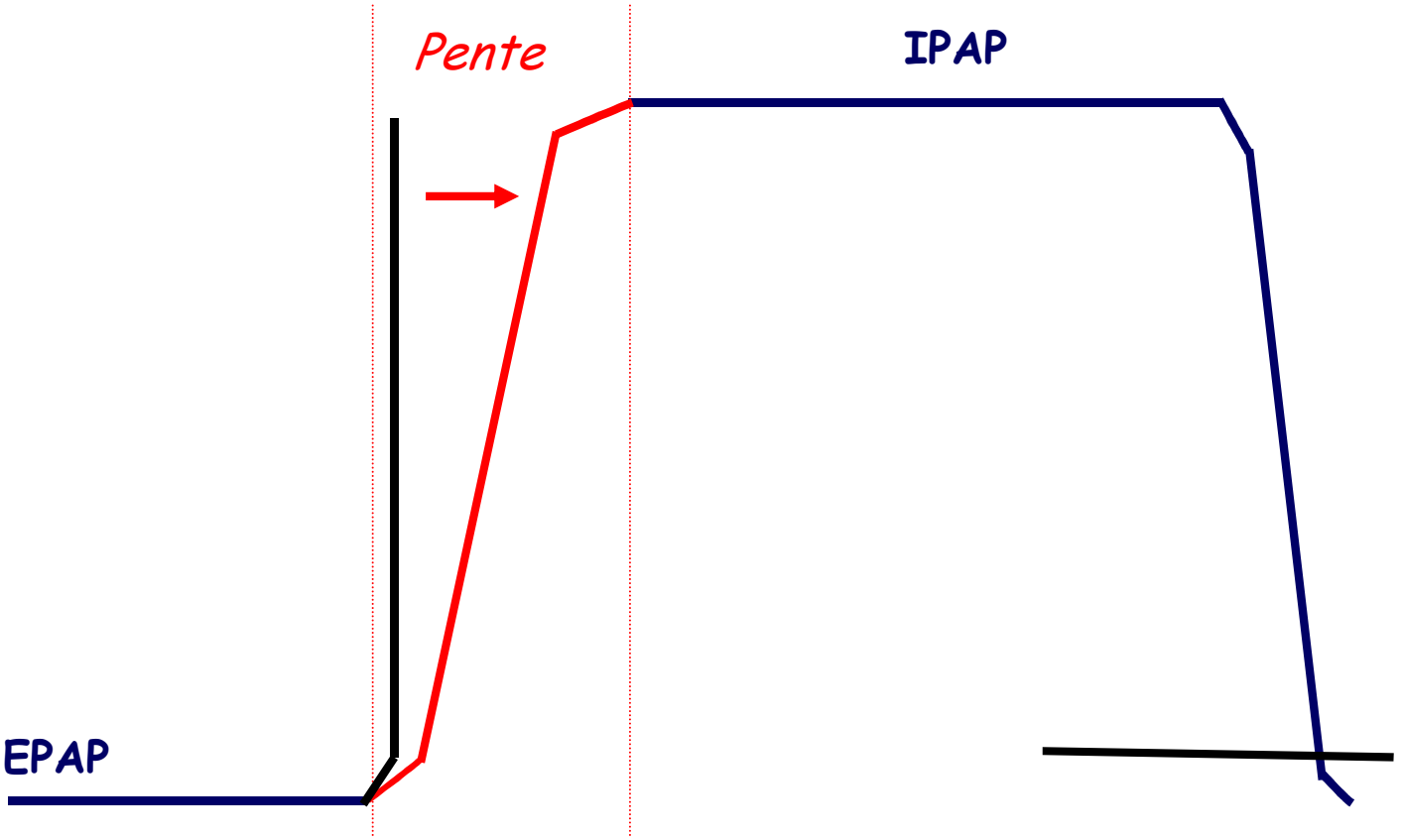
. Bien faire la différence d'avec trop d'air

Causes :

. Temps de montée en pression trop court (pente trop verticale)

Solution :

. Allonger le temps de montée en pression (diminuer la pente)



AIR ARRIVE TROP LENTEMENT

Diagnostic clinique :

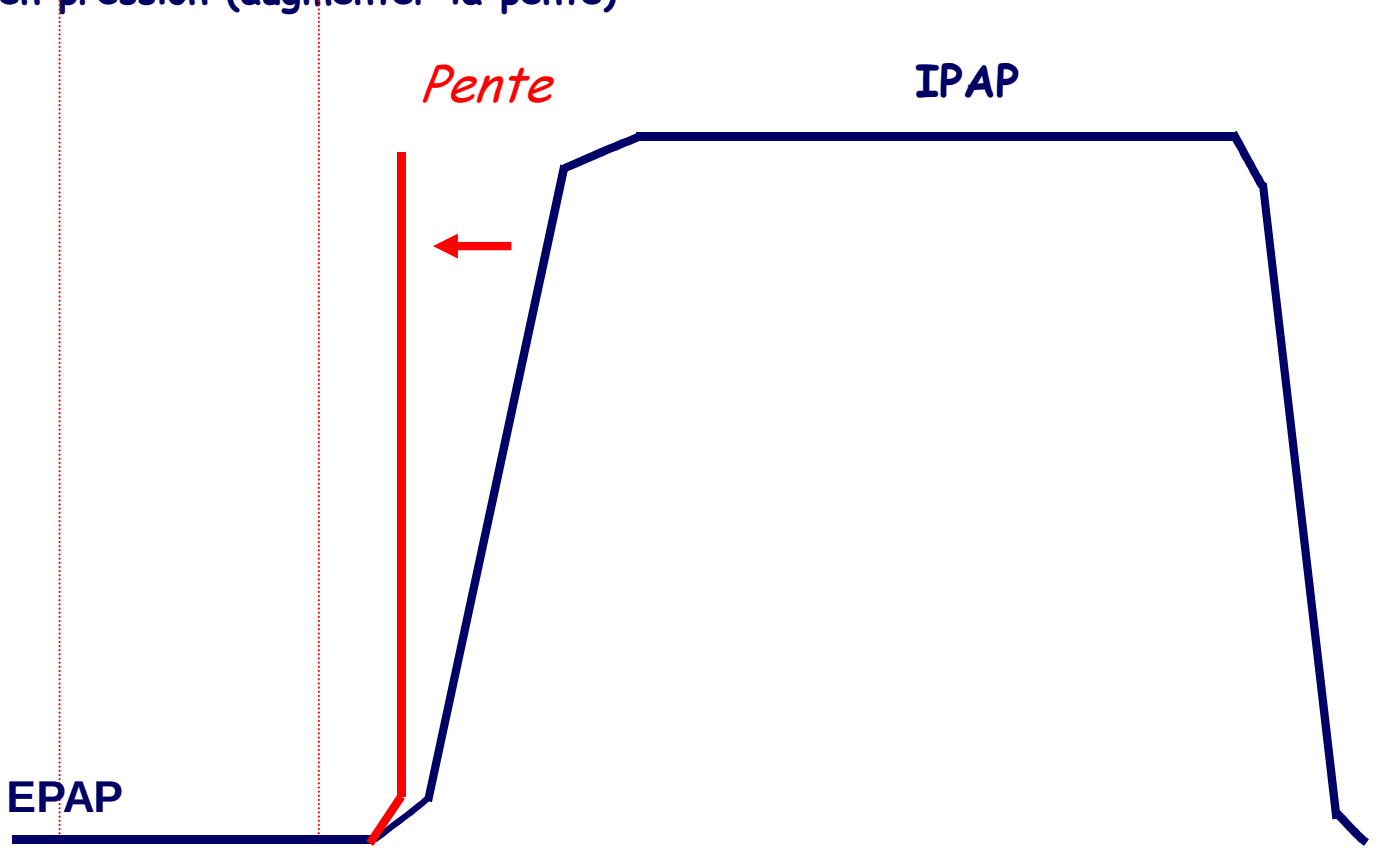
. Bien faire la différence d'avec pas assez d'air

Causes :

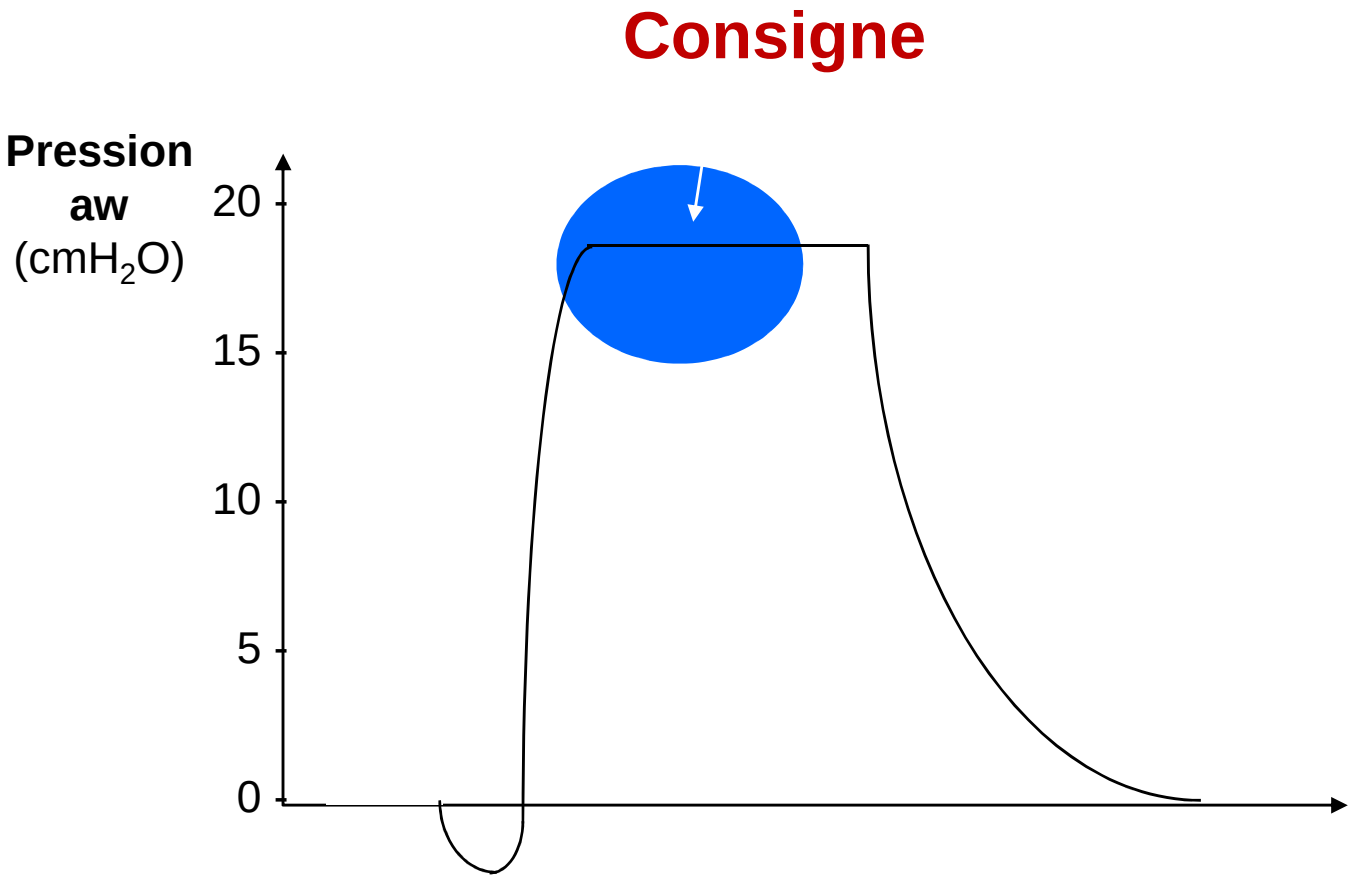
. Temps de montée en pression trop long (pente trop inclinée, trop « douce »)

Solution :

. Diminuer le temps de montée en pression (augmenter la pente)



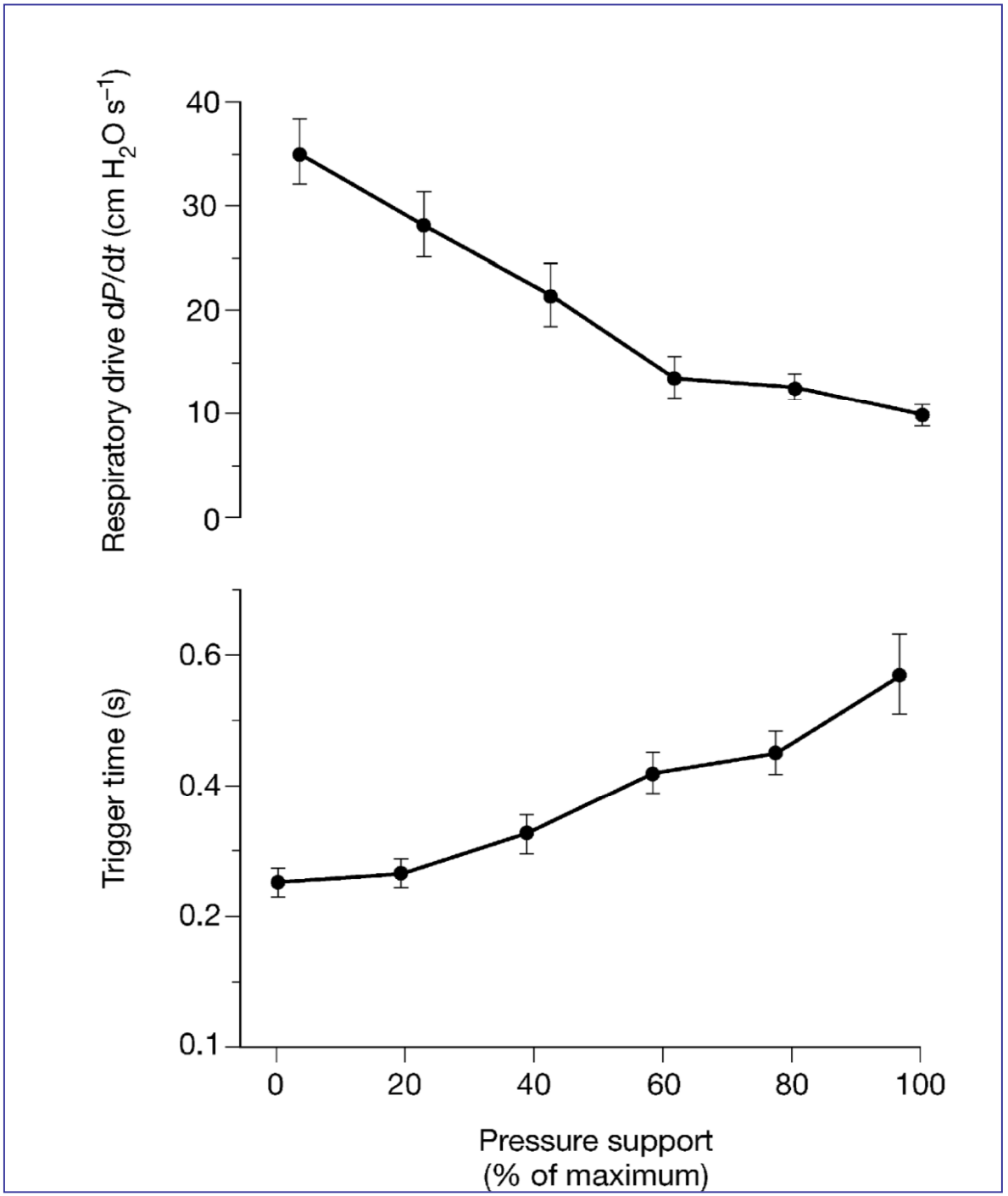
La variable contrôle



Niveau de l’AI

- Monter l’aide jusqu’au maximum tolérable
- Regarder la FR et MR accessoires

Leung et al.
AJRCCM 1997; 155: 1940

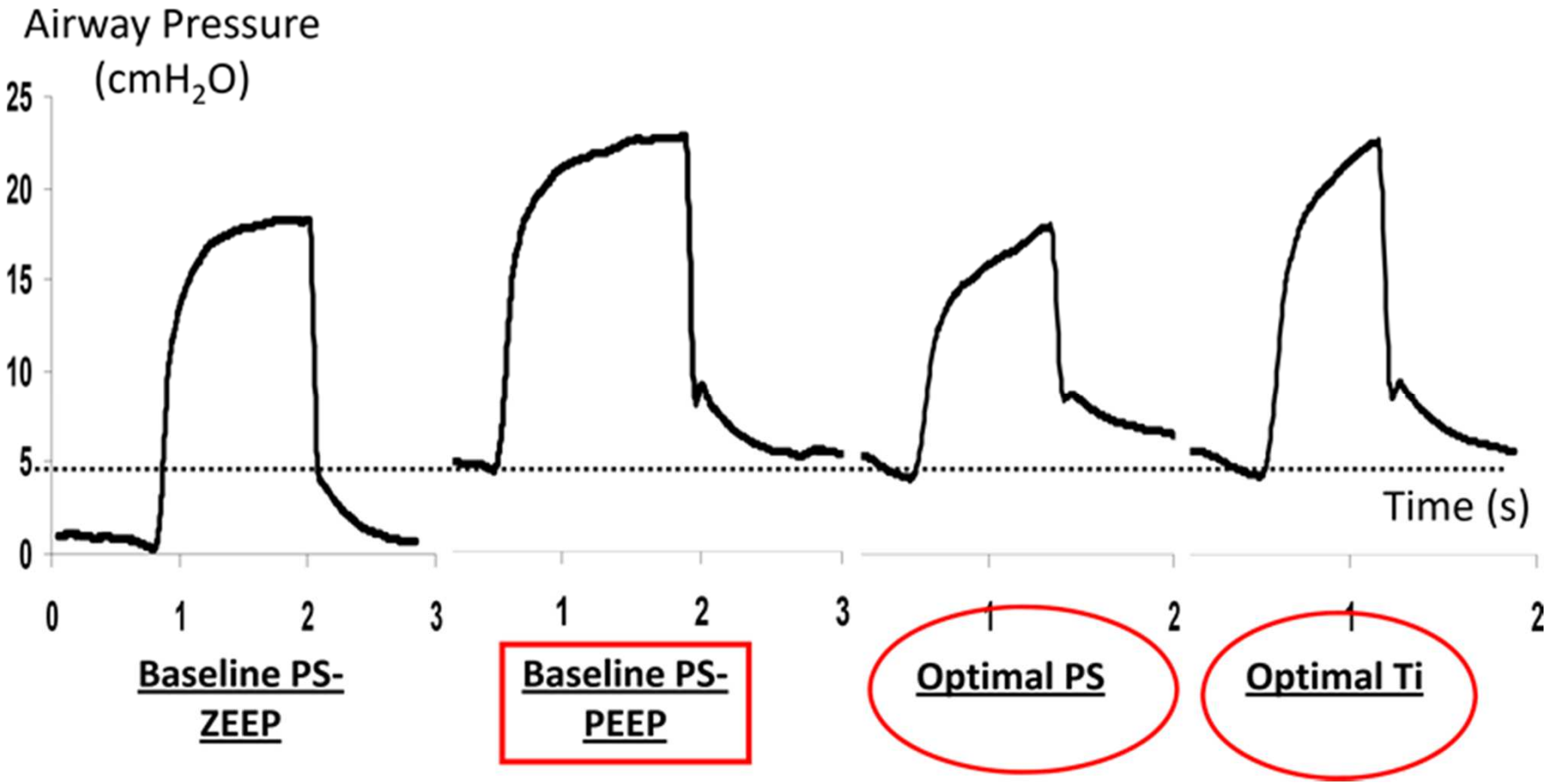


Intensive Care Med
DOI 10.1007/s00134-008-1121-9

ORIGINAL

Arnaud W. Thille
Belen Cabello
Fabrice Galia
Aissam Lyazidi
Laurent Brochard

Reduction of patient-ventilator asynchrony by reducing tidal volume during pressure-support ventilation



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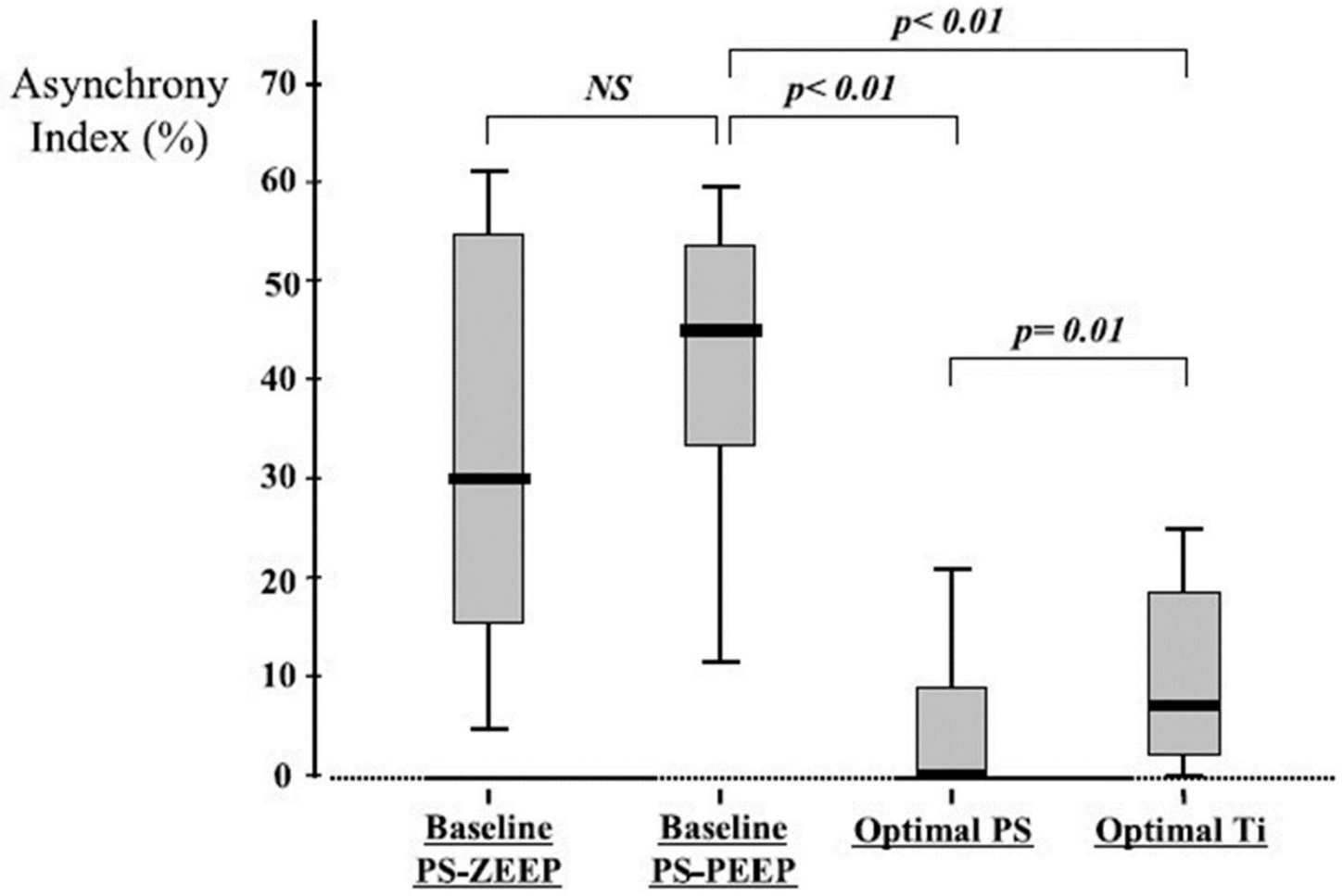
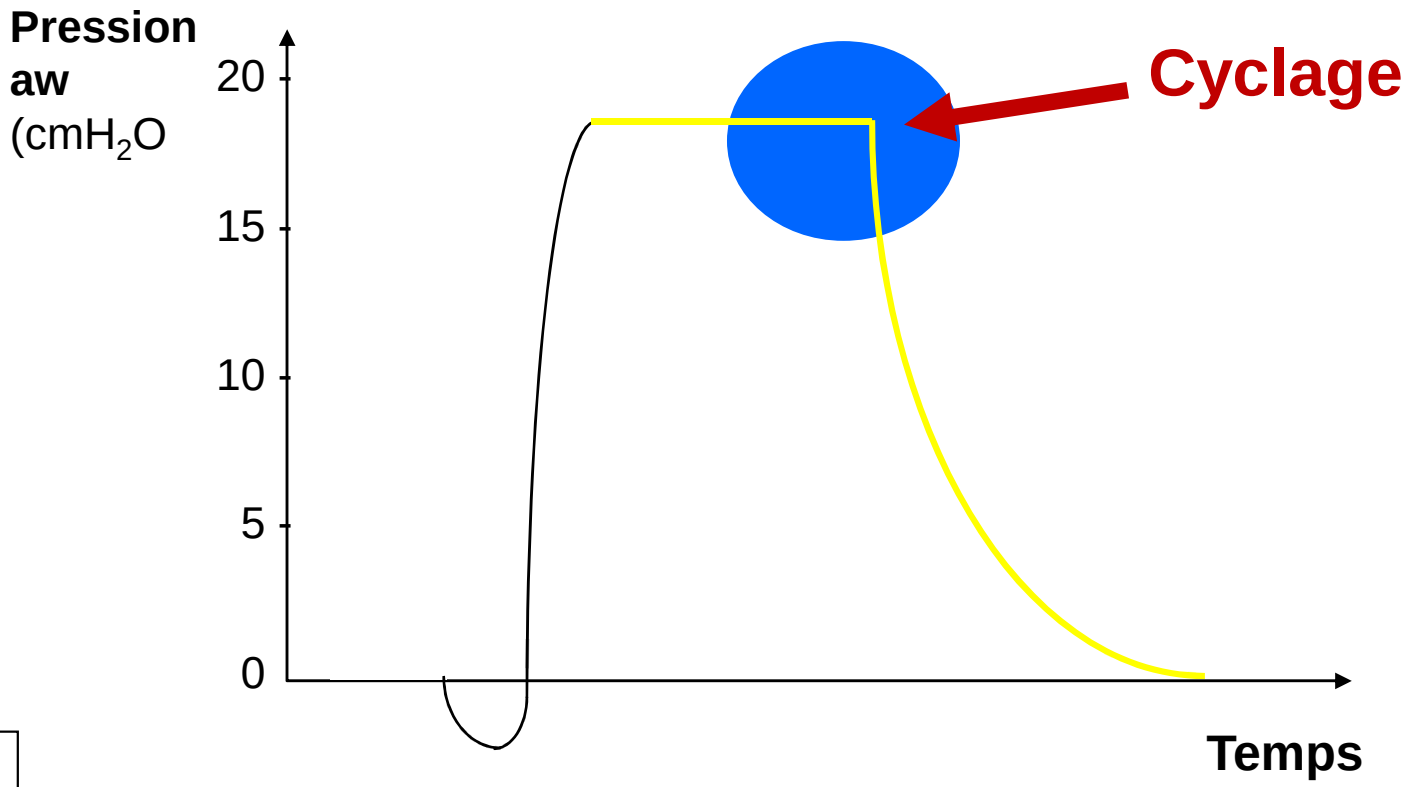
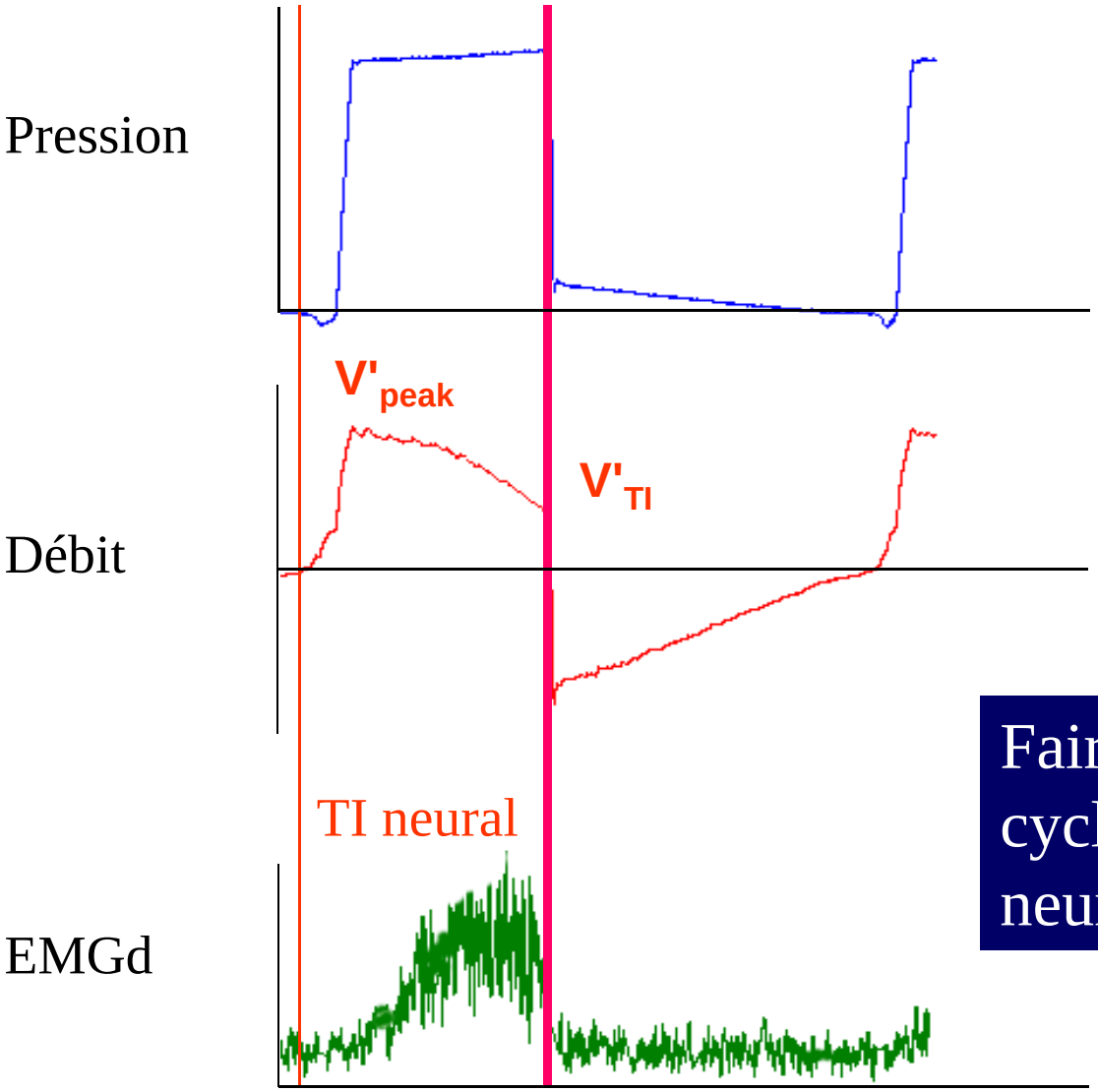


Le cyclage



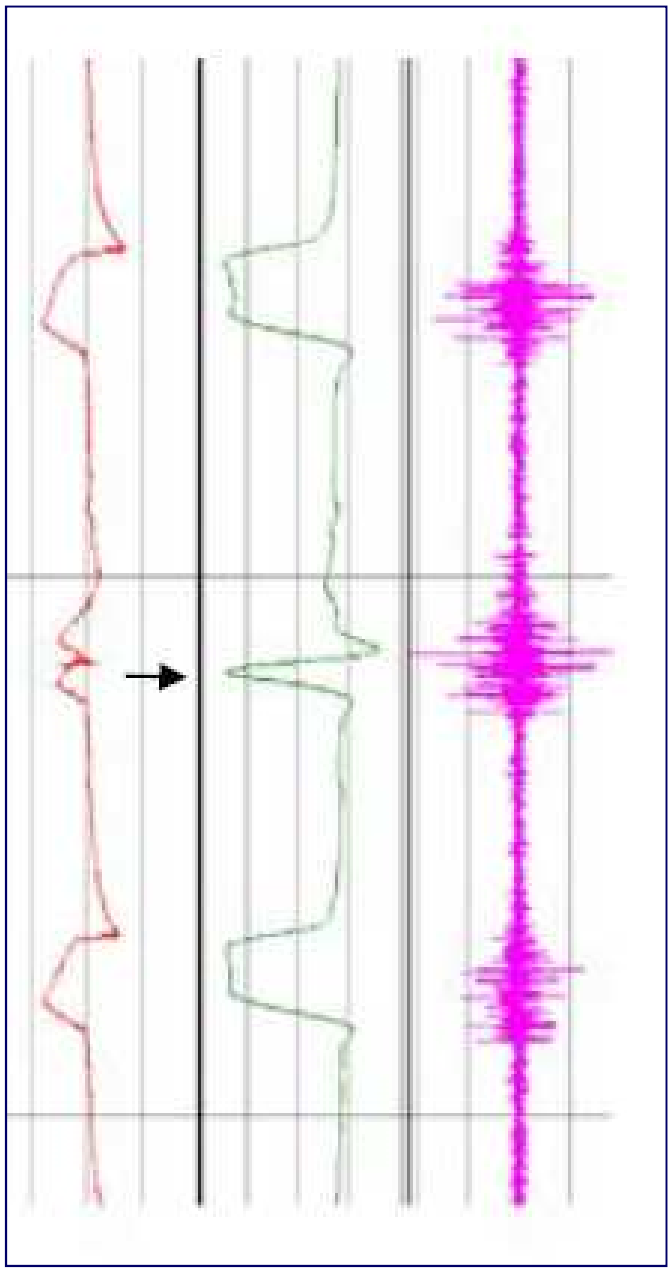
- Temps
- Débit

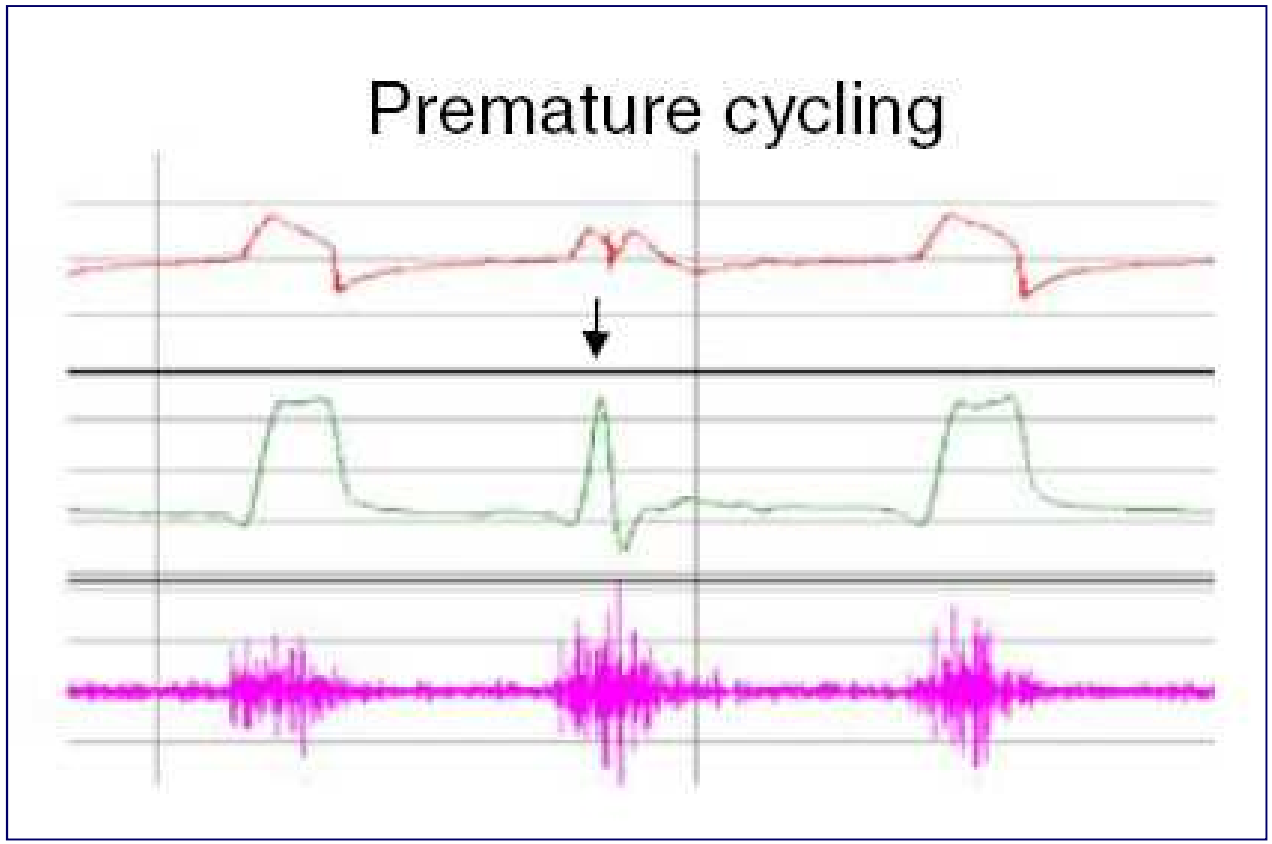
Le cyclage idéal en VSAI



Faire correspondre le cyclage avec la fin du temps neural

Yamada J Appl Physiol 2000





Vignault L et al. Intensive Care Med 2009; 35 : 840

CYCLAGE PRECOCE

Quelques causes identifiées

. Ti ou Ti max trop court

. Trigger expiratoire trop sensible (IR restrictive)

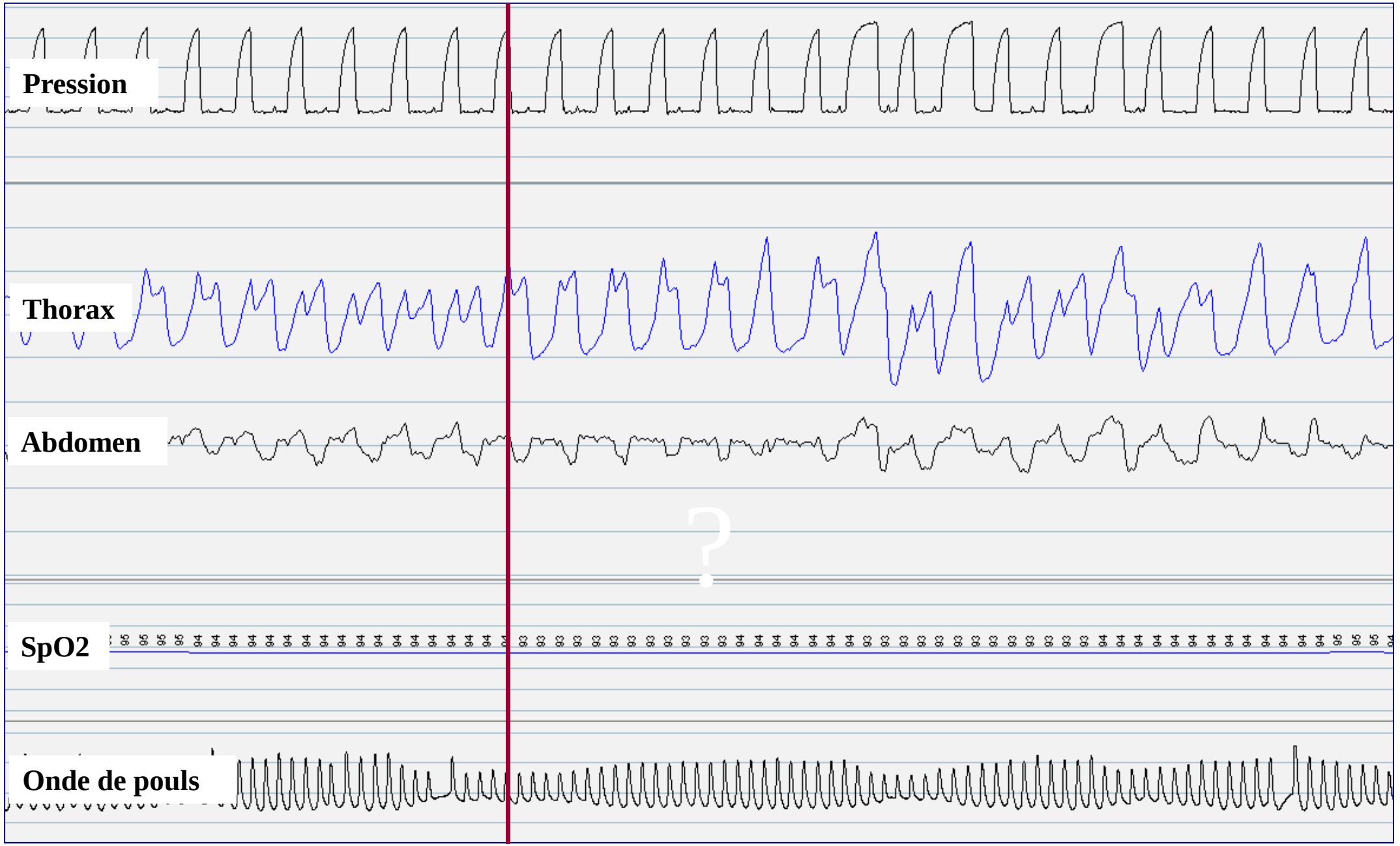
. Obstruction (VAS, ↓ compliance pulmonaire)

Solutions

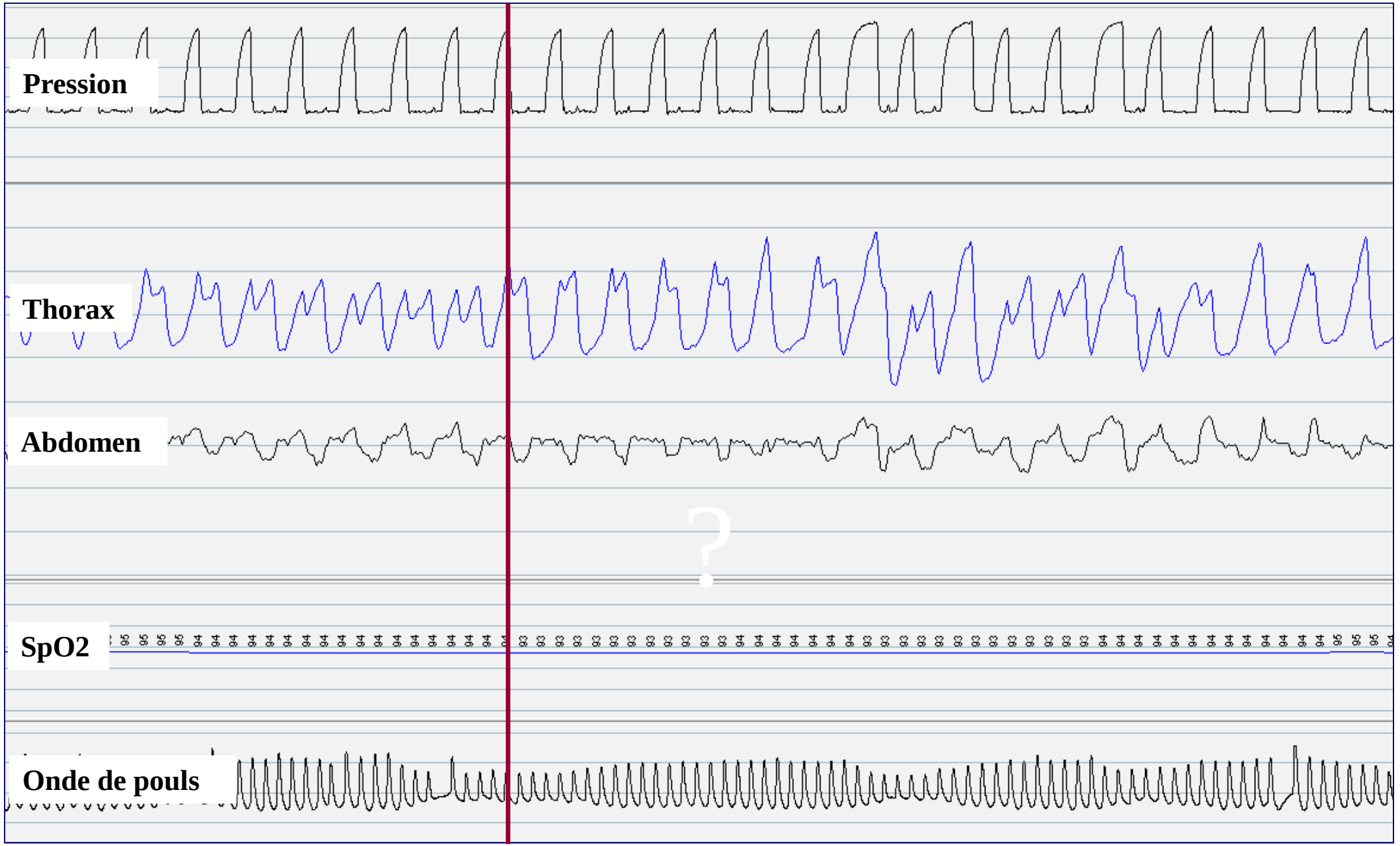
. ↑ Ti ou Ti max

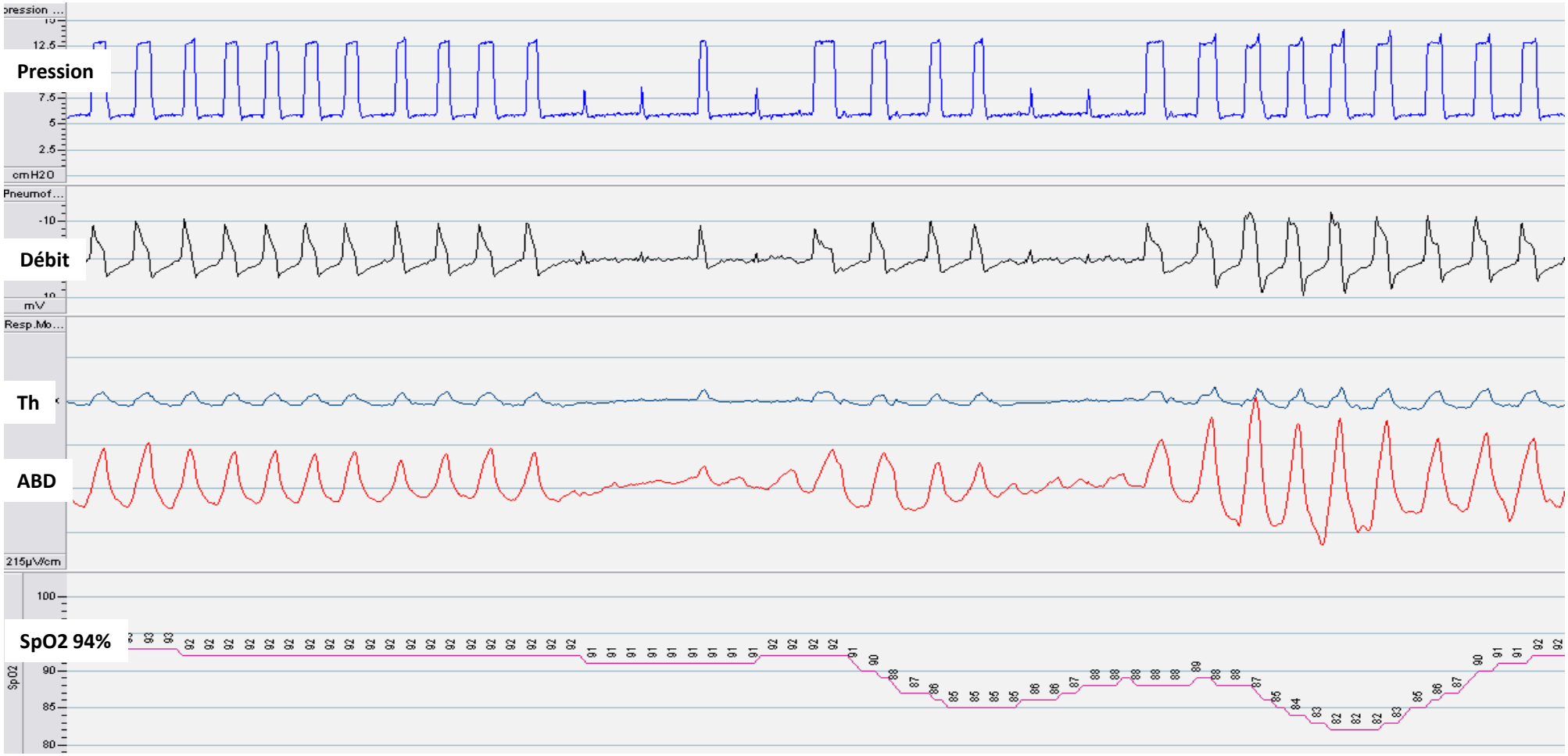
. ↓ sensibilité trigger expiratoire

. Stabilisation des VAS (↑ PEP)

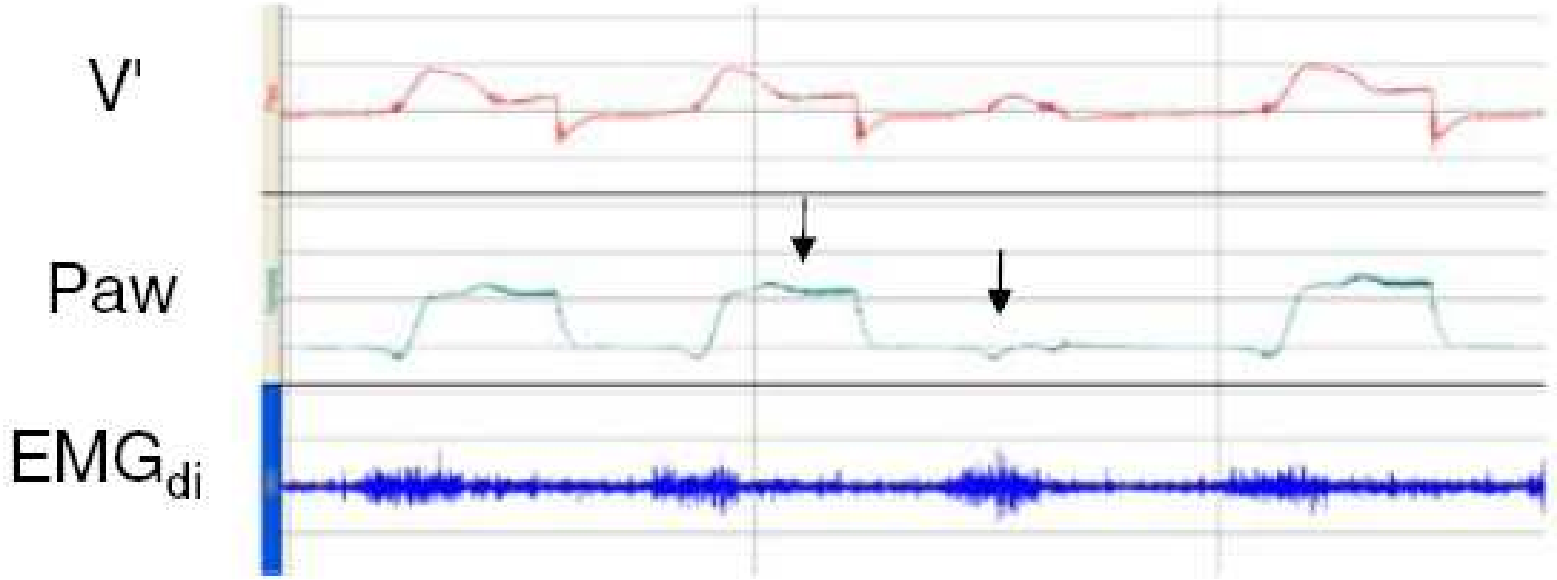

Pression
Thorax
Abdomen
?
SpO2
Onde de pouls

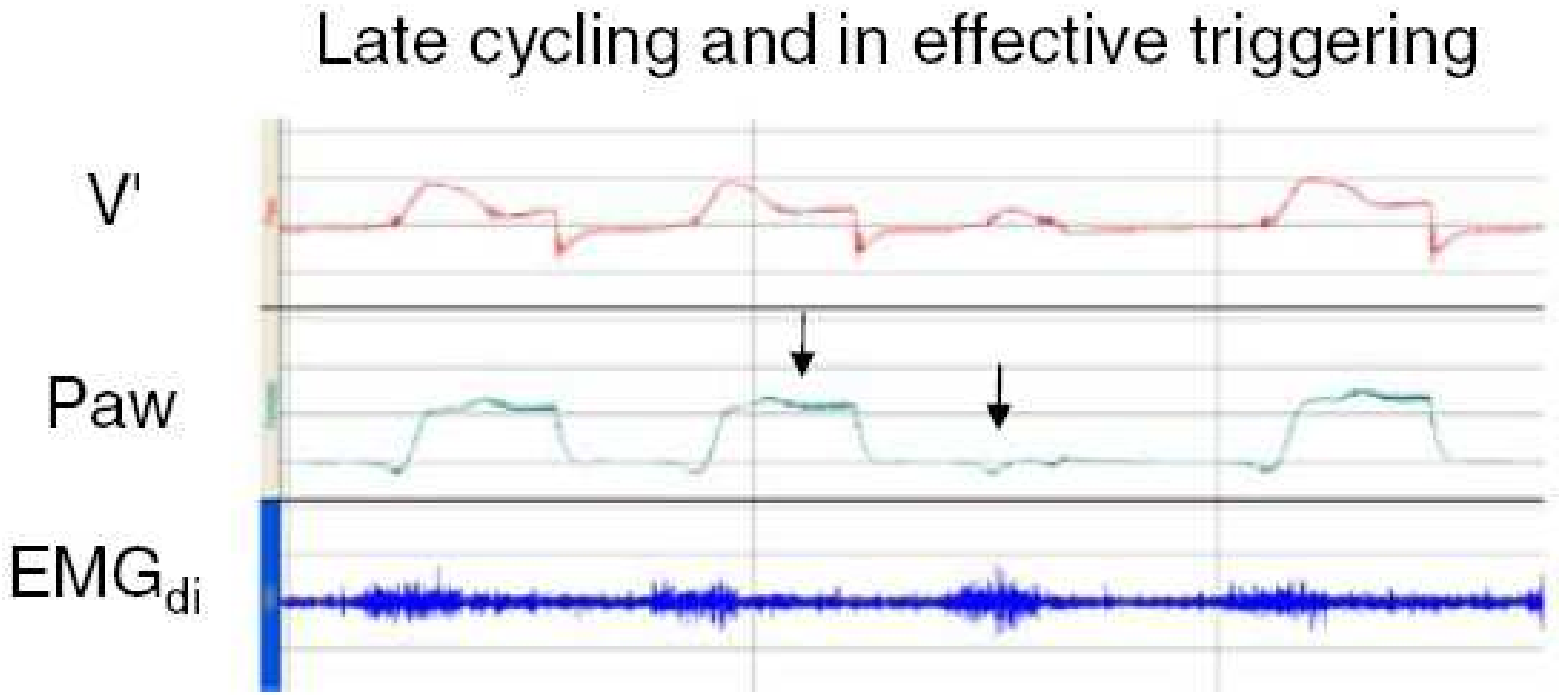
Cyclage précoce compliqué d’efforts inspiratoires non récompensés



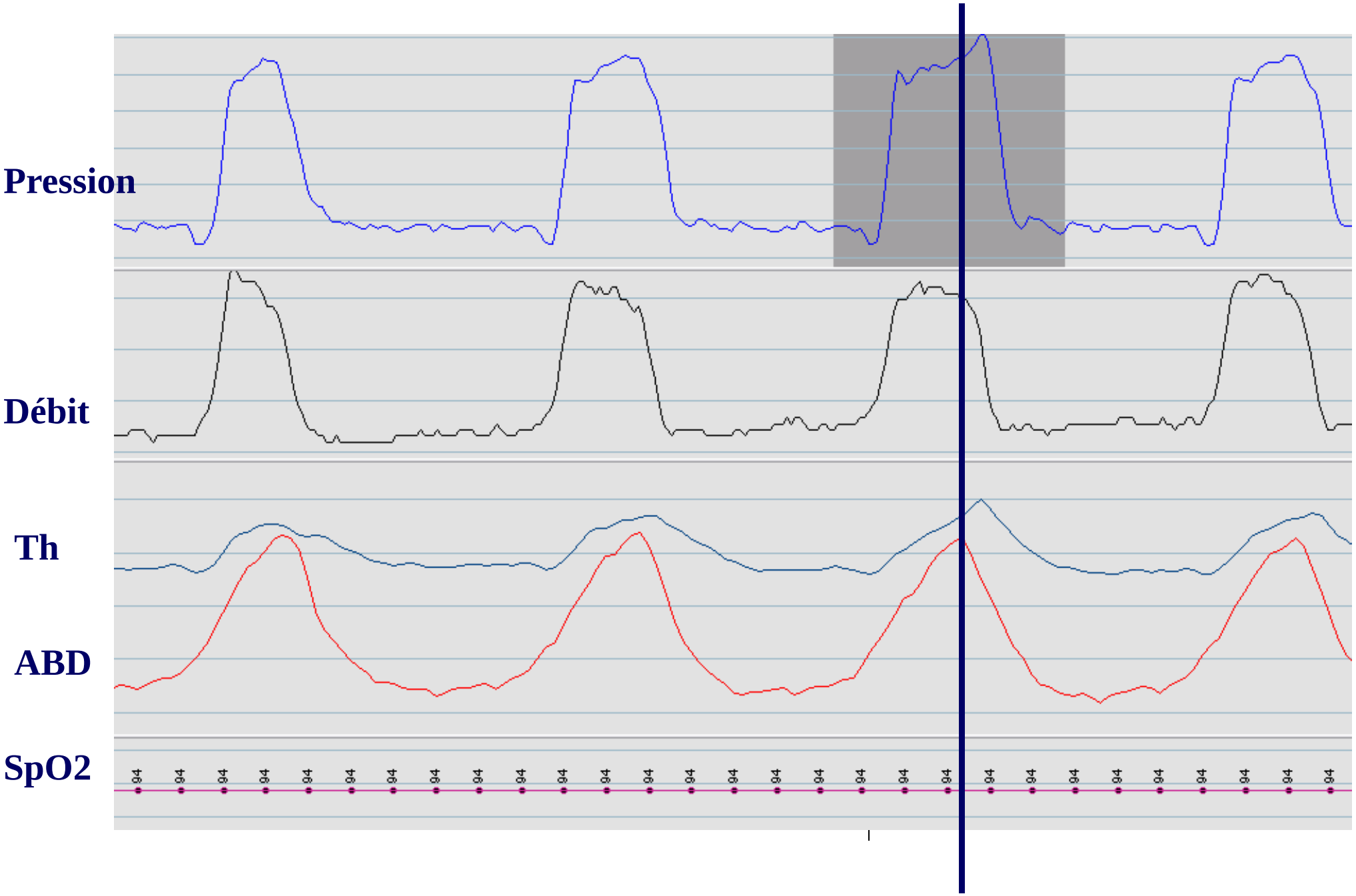

Pression
Débit
Th
ABD
SpO2 94%
cmH2O
mV
215µV/cm
SpO2

?


V'
Paw
EMG$_{di}$

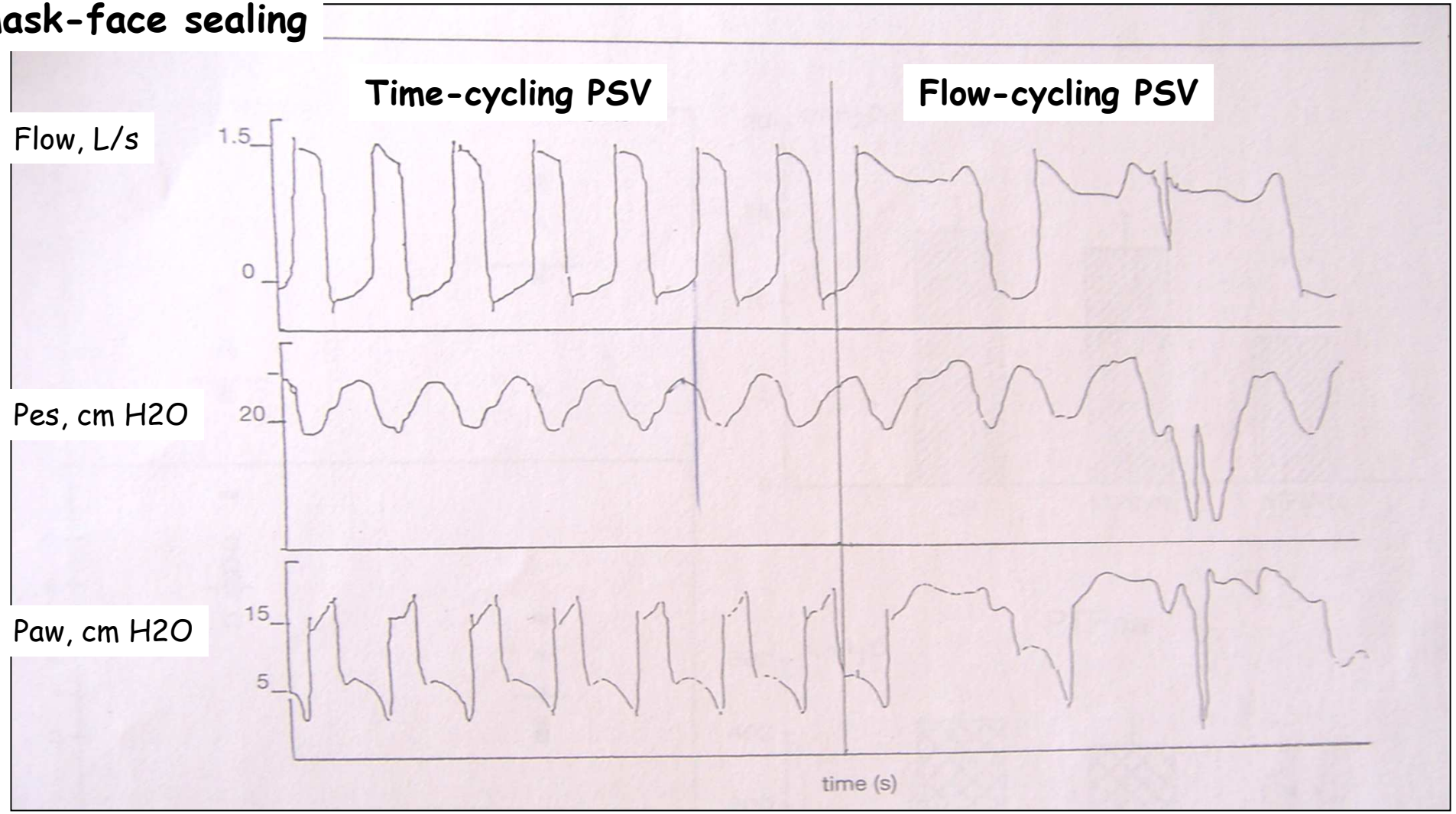


Vignault L et al. Intensive Care Med 2009; 35 : 840


Pression
Débit
Th
ABD
SpO2
94

Patient-ventilator asynchrony during noninvasive ventilation : the role of expiratory trigger

Leaks :
incomplete mask-face sealing



Calderini E et al. Intensive Care Med 1999; 25 : 662

CYCLAGE TARDIF

Principales causes

. Ti min trop long

. Trigger expiratoire peu sensible

. Fuites non intentionnelles et cyclage en débit

Solutions

. Cyclage (↓ Ti min, ↑ sensibilité trigger expiratoire)

. Contrôler les fuites non intentionnelles

Impact of Expiratory Trigger Setting on Delayed Cycling and Inspiratory Muscle Workload

Didier Tassaux, Marc Gainnier, Anne Battisti, and Philippe Jolliet

Medical Intensive Care, University Hospital, Geneva, Switzerland; and Medical Intensive Care, Ste. Marguerite University Hospital, Marseille, France

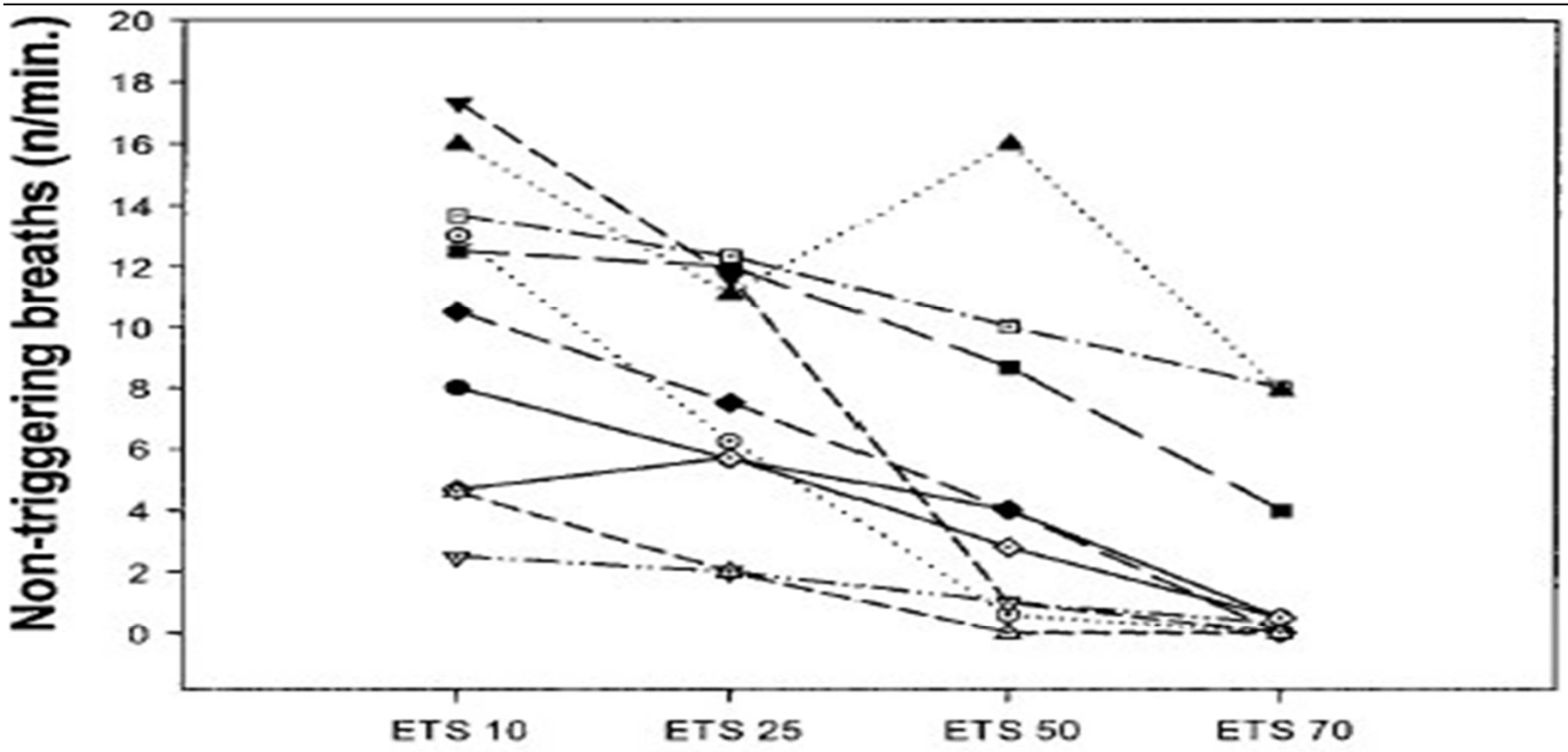
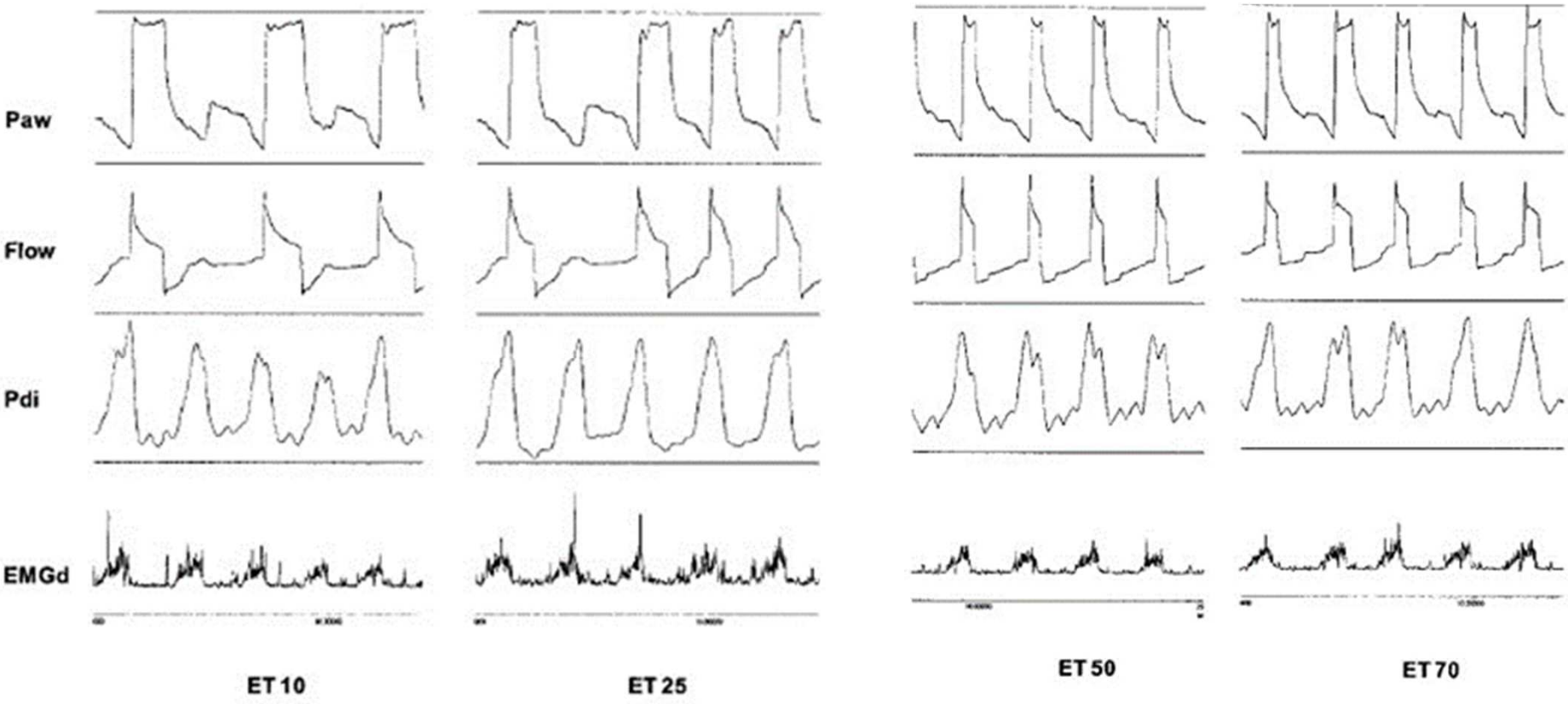
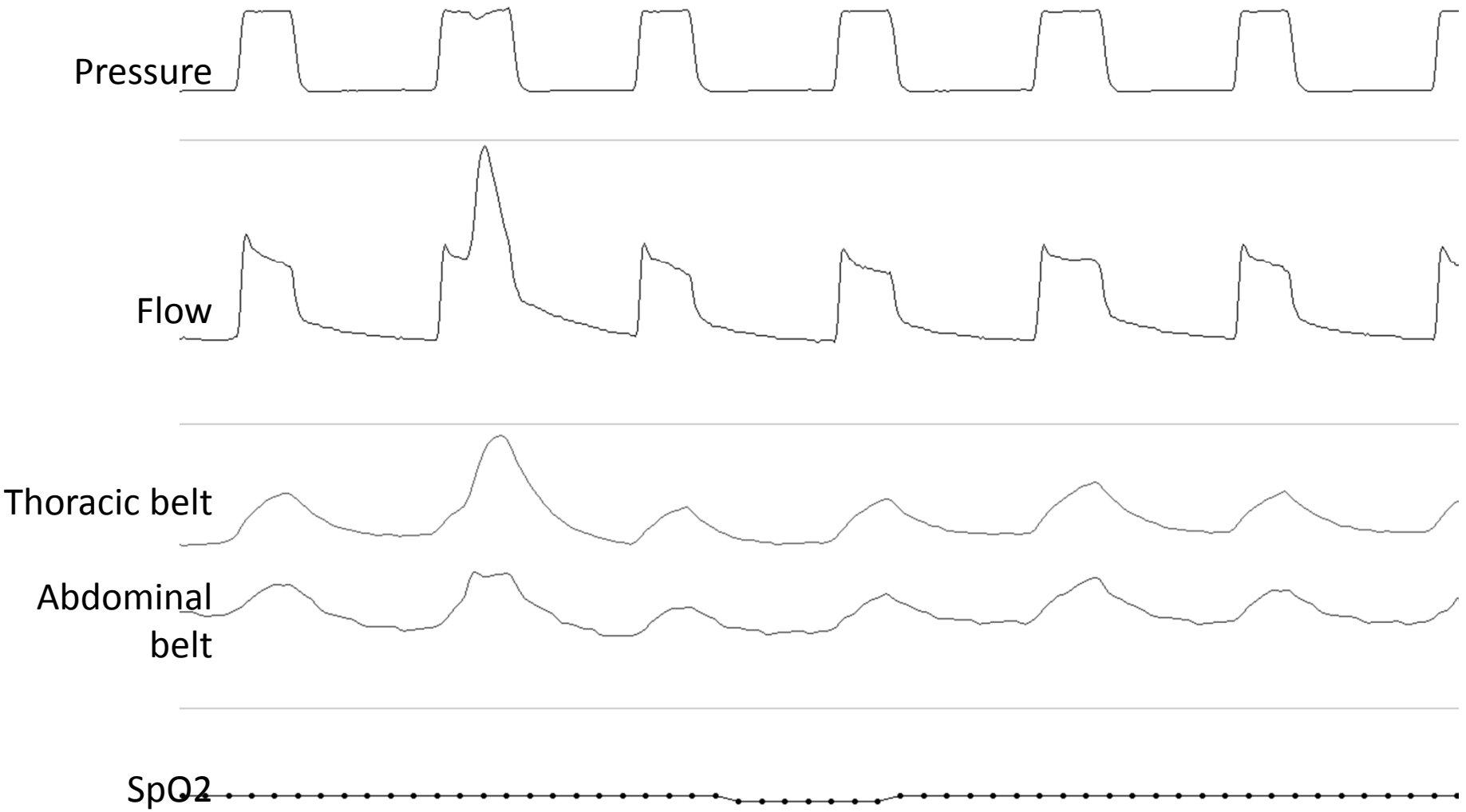


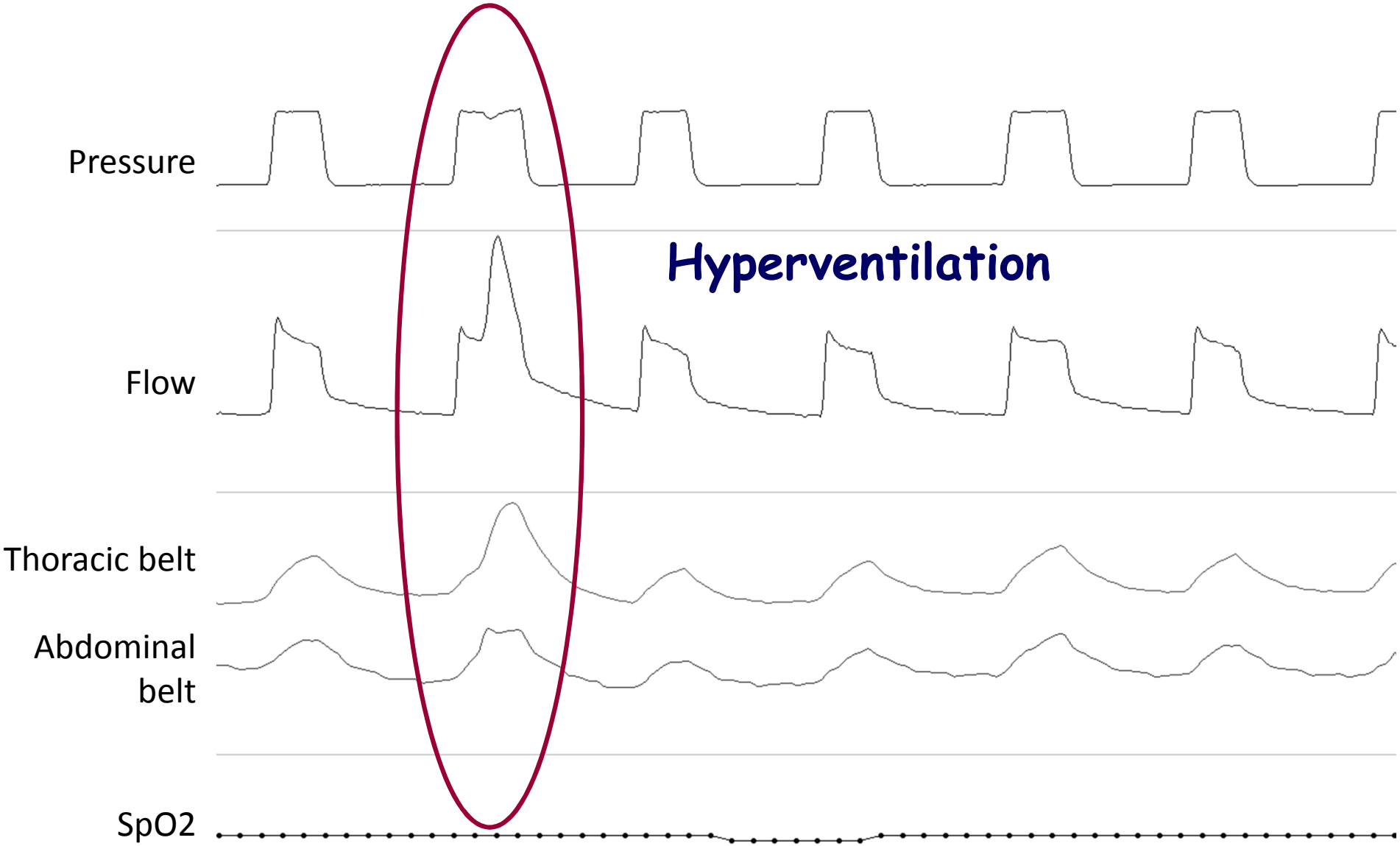
Figure 3. Individual variations in the number of nontriggering breaths at each of the four ET settings (10, 25, 50, and 70% of peak inspiratory flow rate).

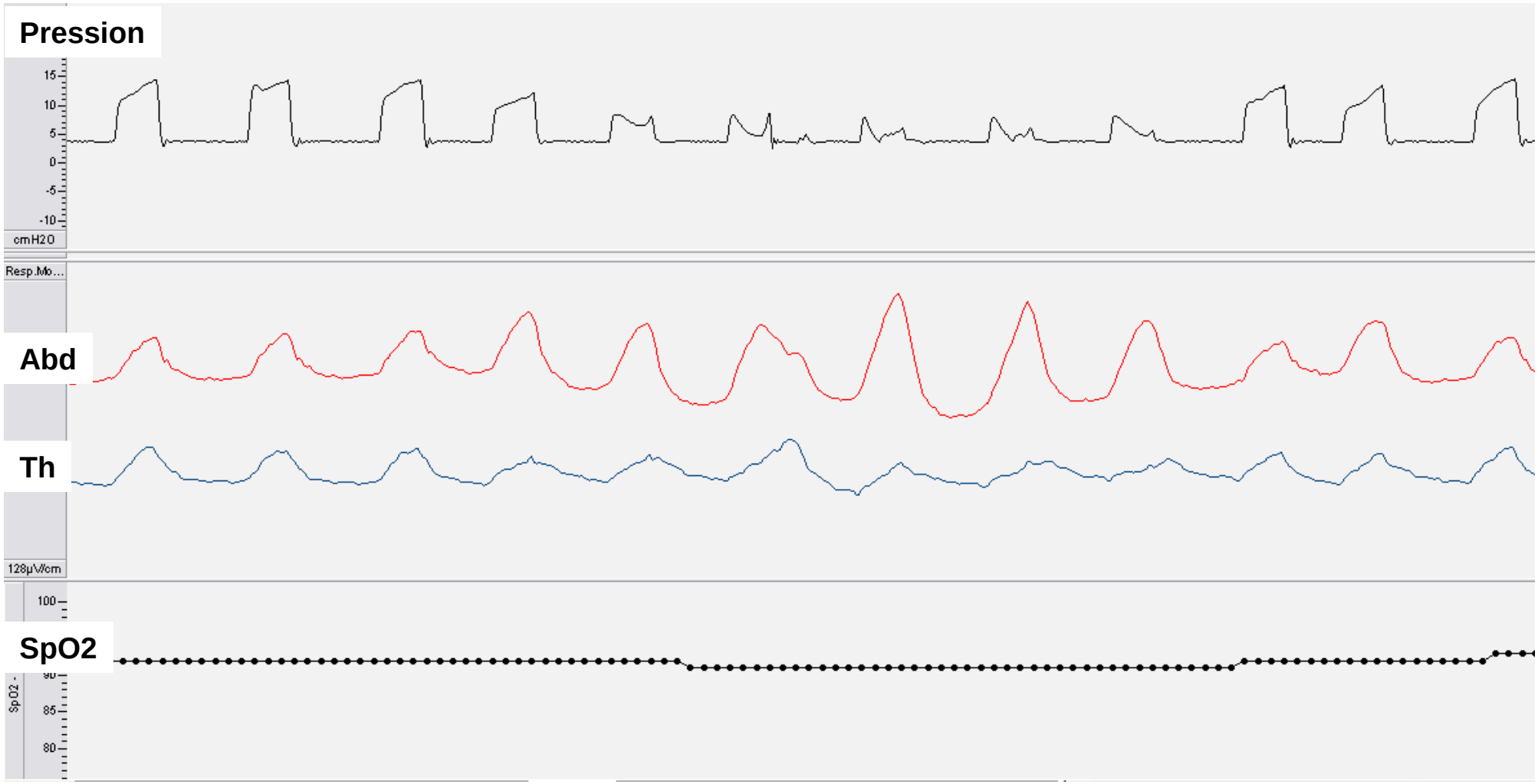

Paw
Flow
Pdi
EMGd
ET 10
ET 25
ET 50
ET 70

Réglages non optimaux !


Pressure
Flow
Thoracic belt
Abdominal belt
SpO2

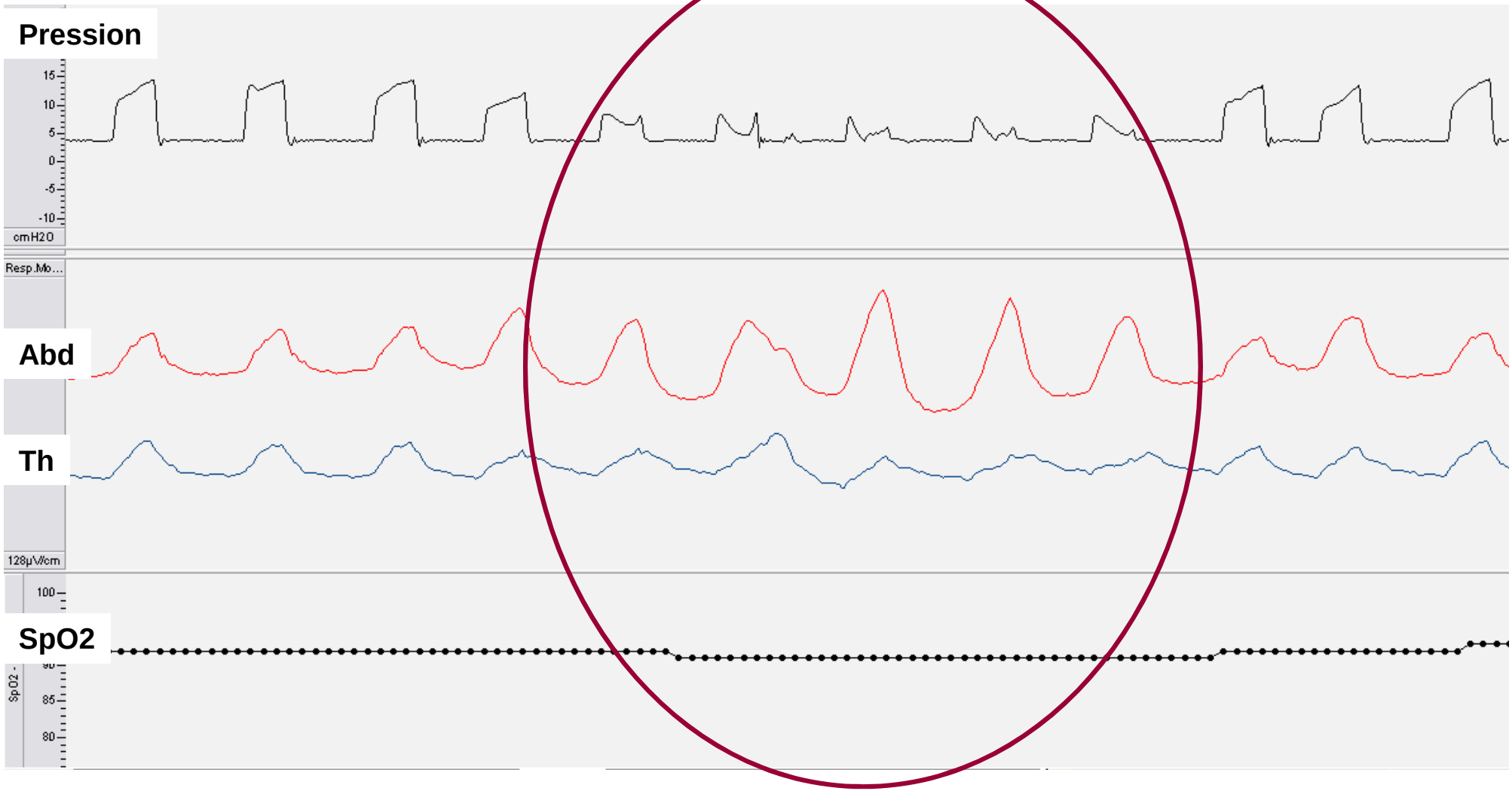
Ventilateur à régulation de pression




Pression
15
10
5
0
-5
-10
cmH2O
Resp.Mo...
Abd
Th
128µV/cm
100
SpO2
SpO2 -
85
80

Ventilateur à régulation de volume

Hyperventilation



Asynchronismes – Epidémiologie
Ventilation à domicile
Maladies neuromusculaires

- Dans 58% des cas
- Auto-déclenchement 30% (NREM 1-2)
- Efforts inspiratoires non récompensés 45% (NREM 1-2)
- Cyclage tardif

Asynchronismes
Conséquences cliniques

- Inconfort
- Désaturations en oxygène
- Micro-éveils, fragmentation du sommeil, déstructuration du sommeil
- Inobservance VNI

} VNI à domicile

USI – Réanimation : pas de corrélation avec le taux d'intubation,

Durée de séjour en USI ou taux de mortalité

Vignaux L et al. Intensive Care Med 2009; 35: 840

Proposal for a systematic analysis of polygraphy or polysomnography for identifying and scoring abnormal events occurring during non-invasive ventilation

J Gonzalez-Bermejo,[1] C Perrin,[2] J P Janssens,[3] J L Pepin,[4] G Mroue,[5] P Léger,[6] B Langevin,[7] S Rouault,[8] C Rabec,[9] D Rodenstein,[10] on behalf of the SomnoNIV Group

THORAX

Thorax 2012; 67: 546-52

FUITES NON INTENTIONNELLES non majeures ou secondaires

OBSTRUCTION PARTIELLE OU TOTALE DES VAS

. avec diminution de la commande ventilatoire

. sans diminution de la commande ventilatoire

ASYNCHRONISME PATIENT-MACHINE

. Efforts inspiratoires non récompensés

. Auto et double déclenchement

. Cyclage précoce, TMPI > Temps inspiratoire minimum

. Cyclage tardif

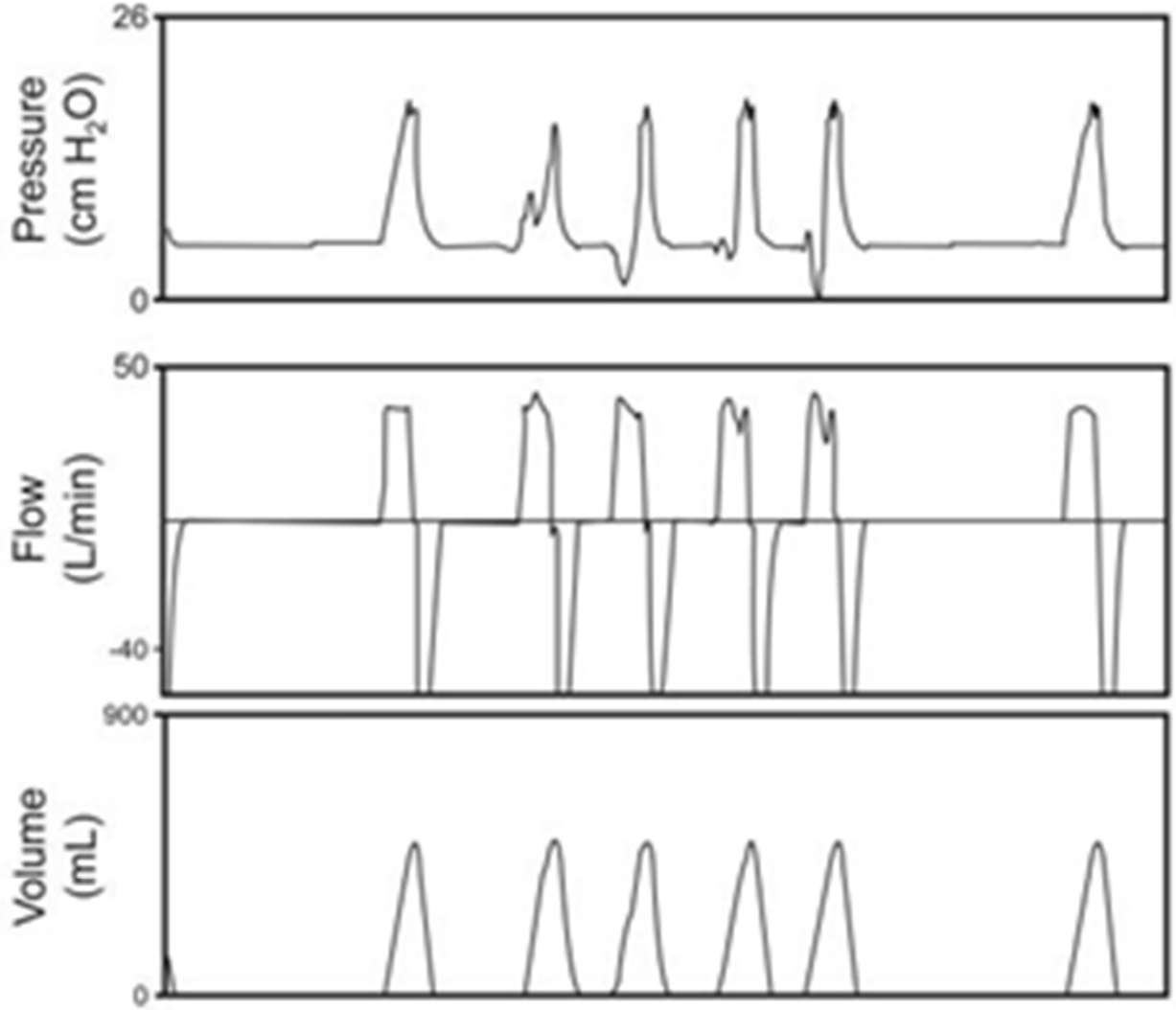
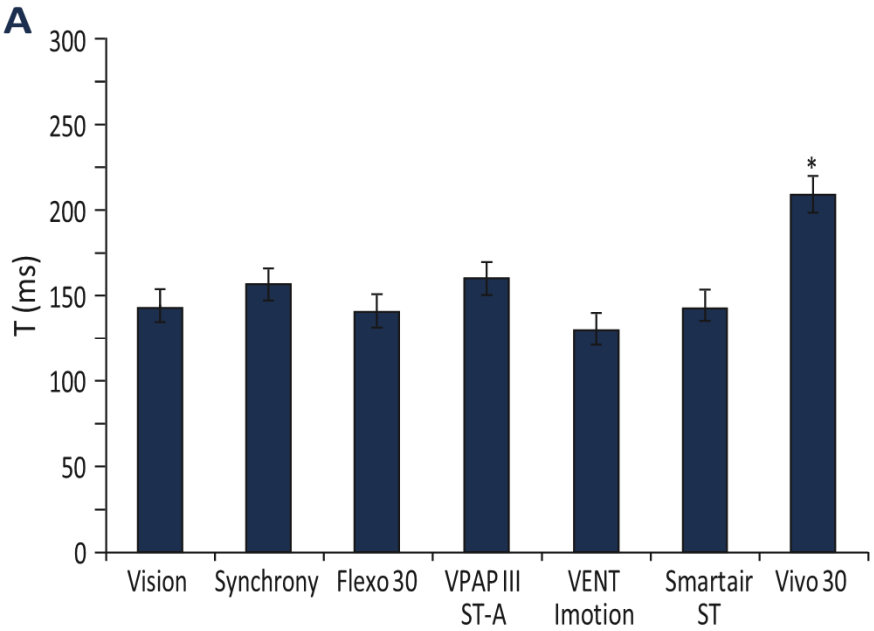
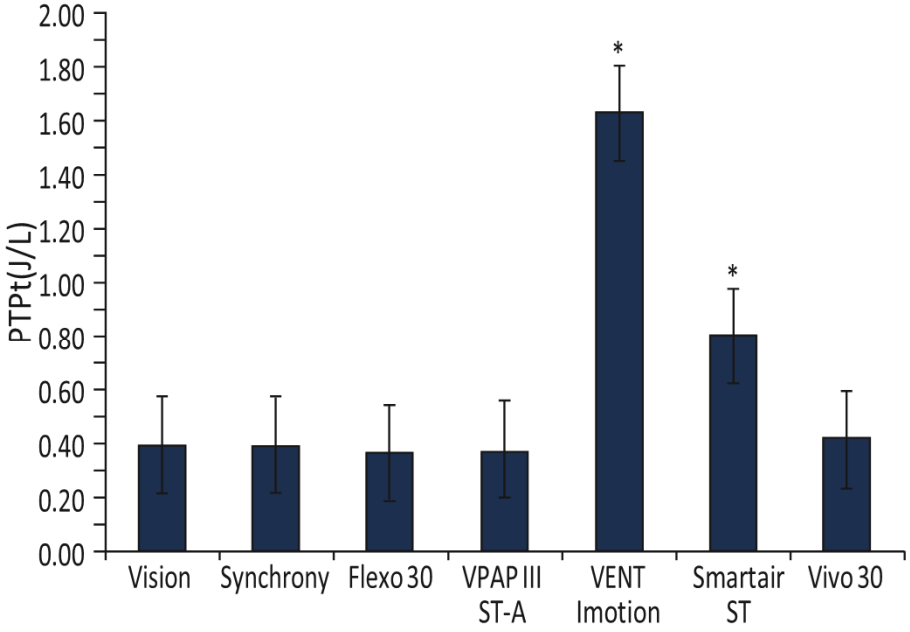


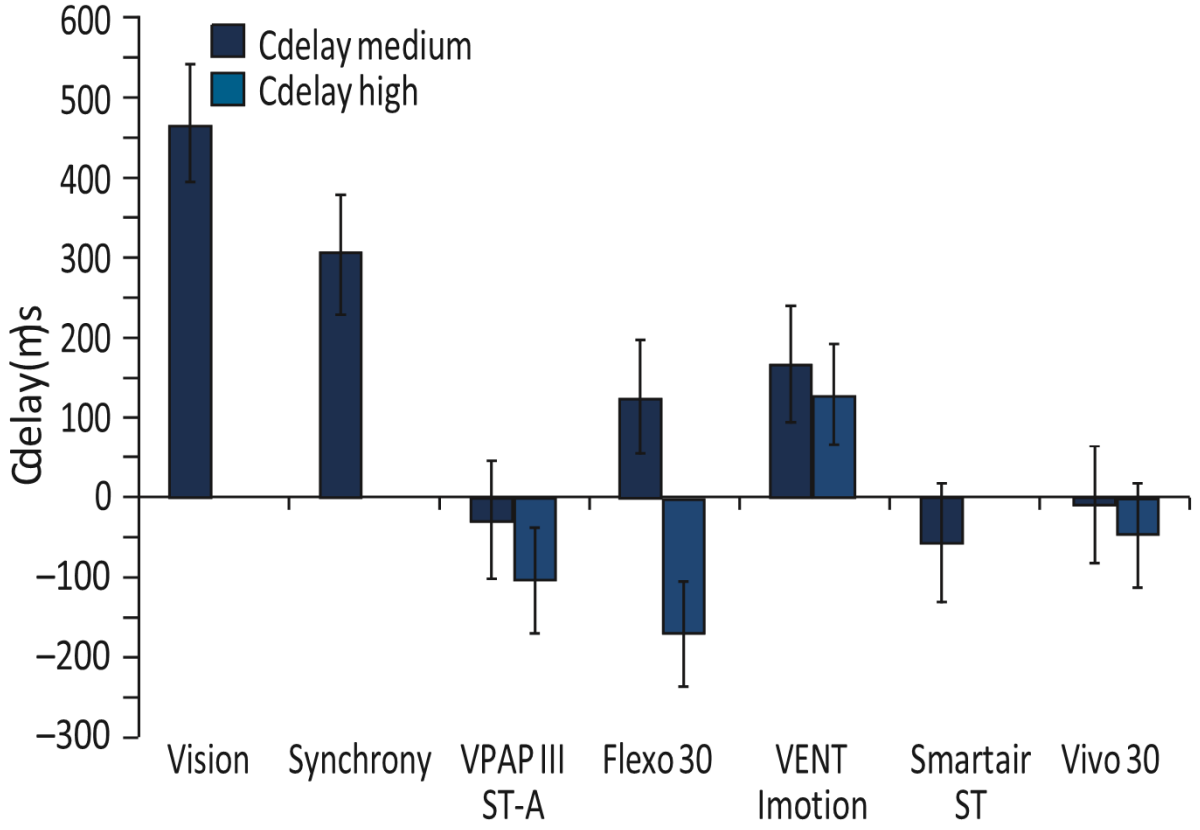
Fig.1.Volumecontrolcontinuousmandatoryventilationdemonstratingamandatorybreathdeliveredwithoutpatienteffort,followedby2breathswherepatientdemandexceedsthesetventilatorflow,depictingtheclassicalterationinthepressurewaveformfollowedbyasecondmandatorybreath.

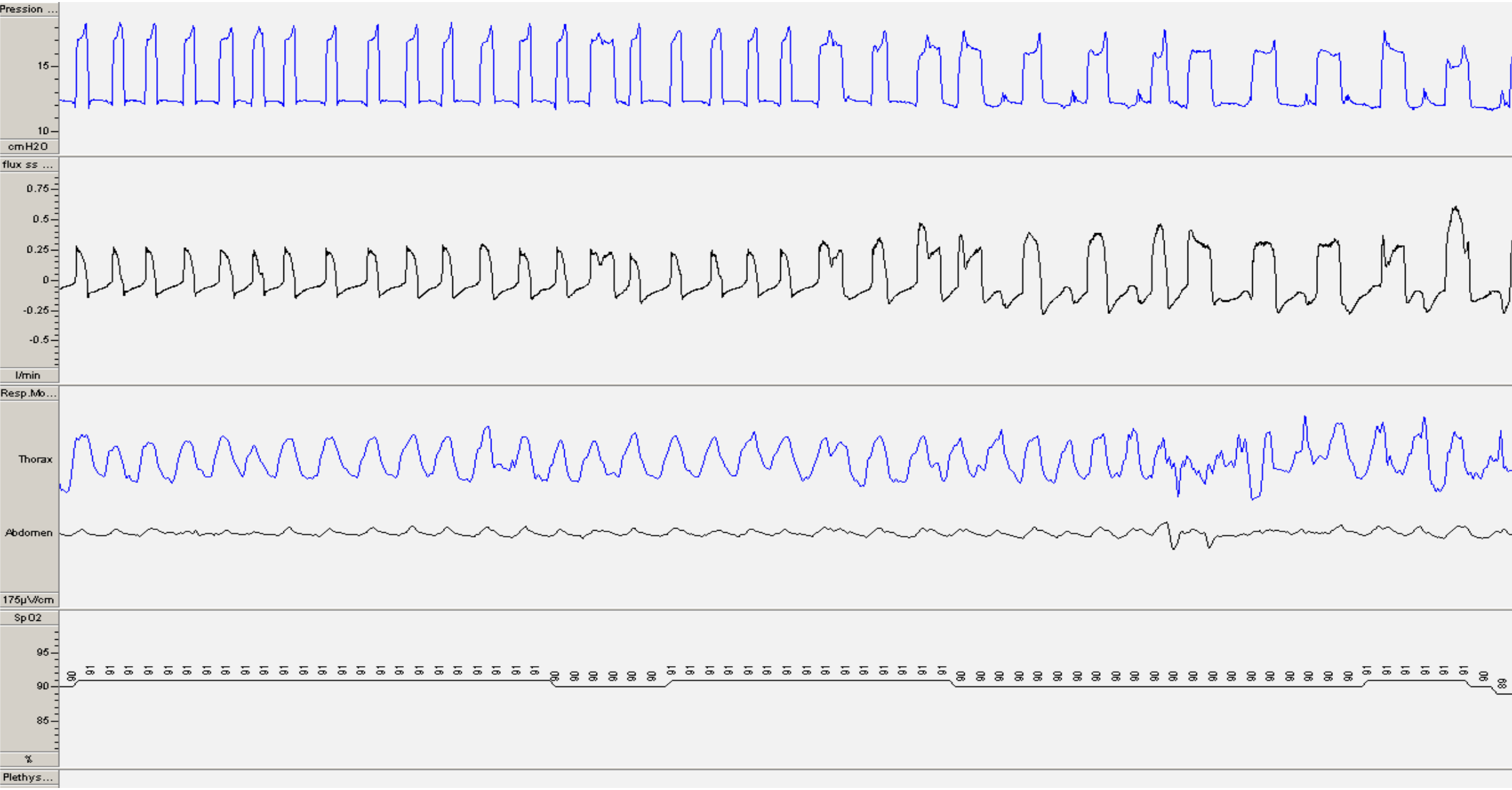
Performance Characteristics of Seven Bilevel Mechanical Ventilators in Pressure-Support Mode with Different Cycling Criteria: A Comparative Bench Study

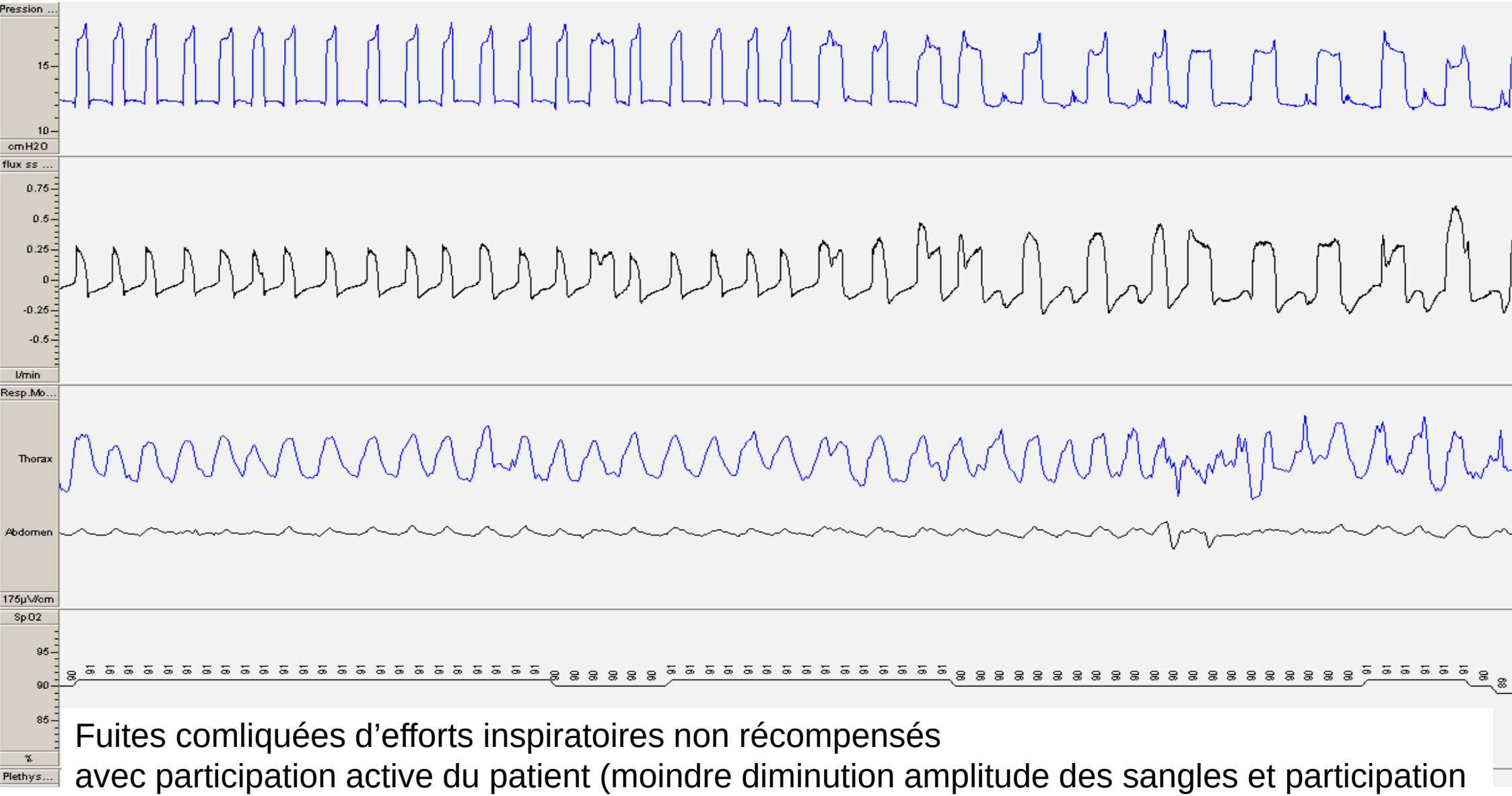




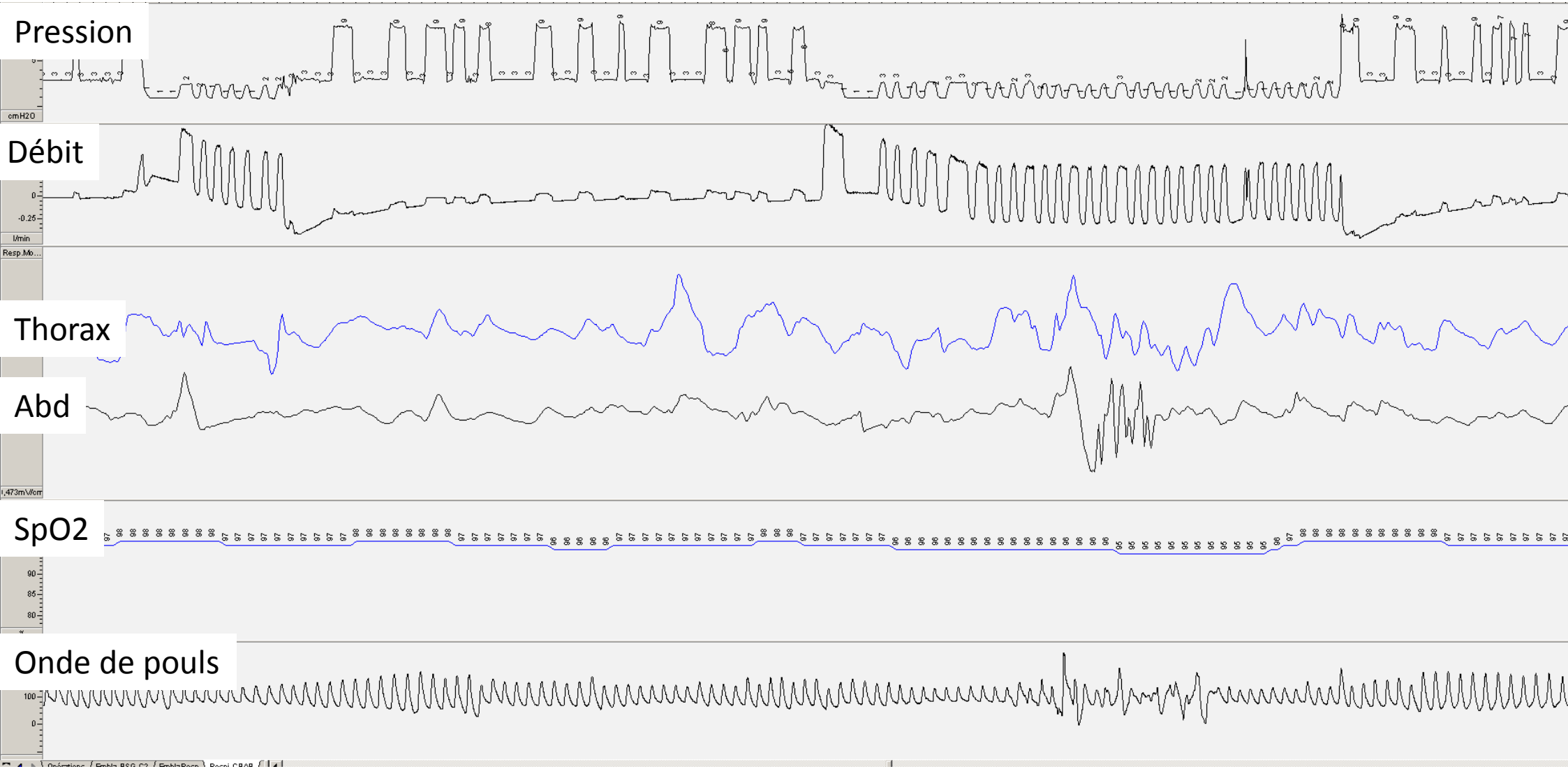
Performance Characteristics of Seven Bilevel Mechanical Ventilators in Pressure-Support Mode with Different Cycling Criteria: A Comparative Bench Study

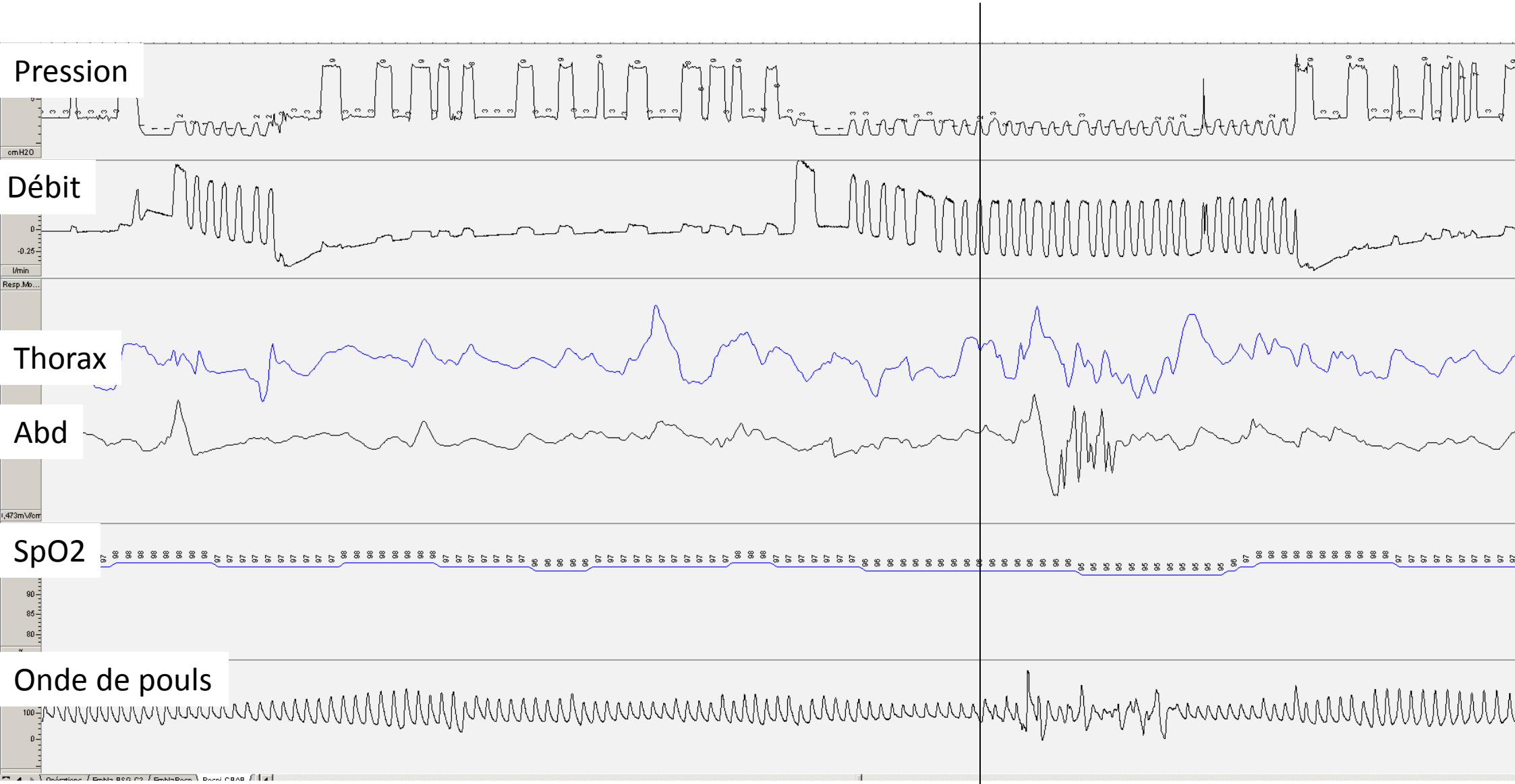



Pression ...
15
10
cmH2O
flux ss ...
0.75
0.5
0.25
0
-0.25
-0.5
l/min
Resp.Mo...
Thorax
Abdomen
175µV/cm
SpO2
95
90
85
%
Plethys...

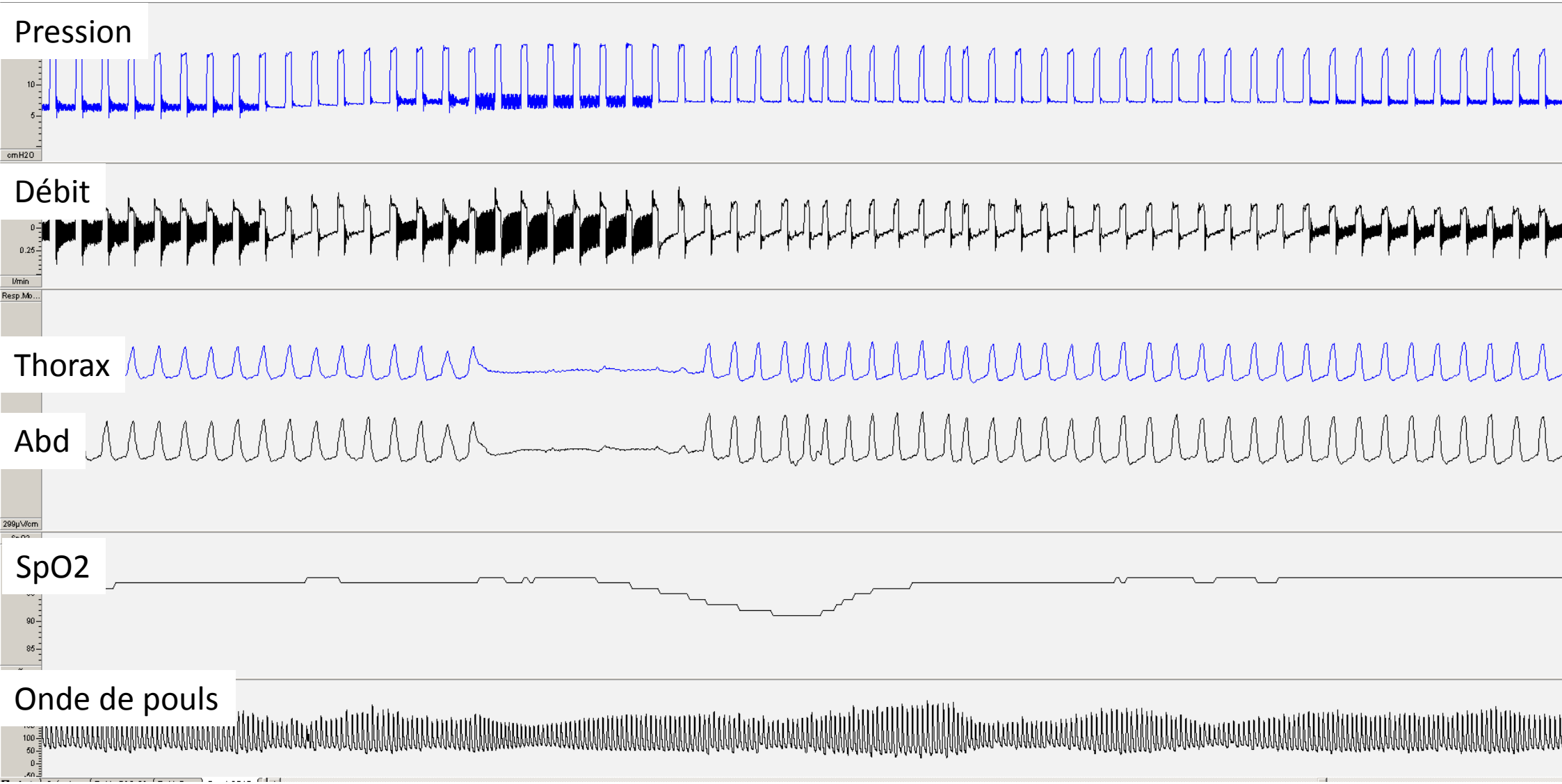


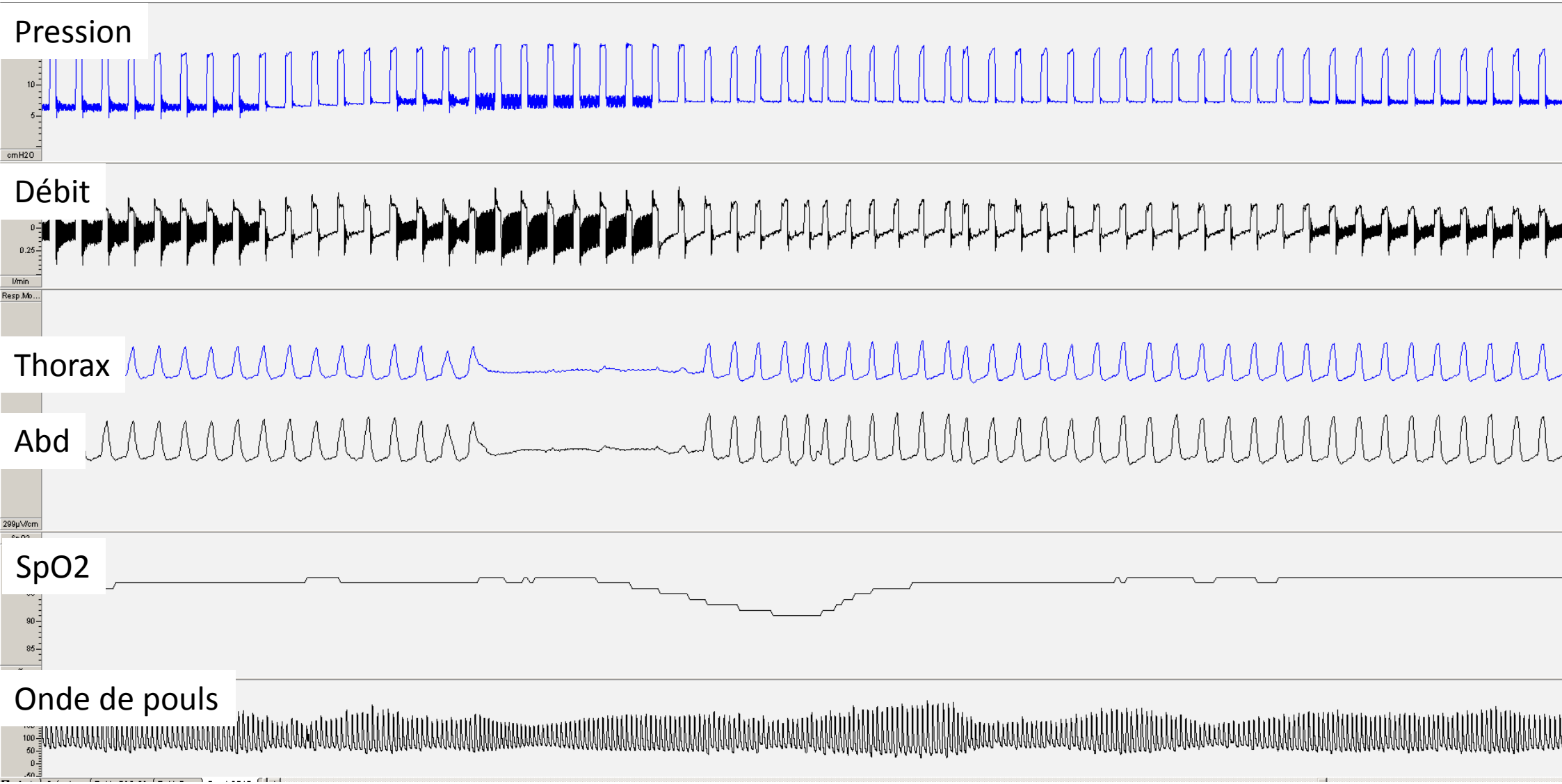
Fuites comliquées d’efforts inspiratoires non récompensés
avec participation active du patient (moindre diminution amplitude des sangles et participation
À l’augmentation de l’amplitude du débit)


Pression
cmH2O
Débit
0
-0.25
l/min
Resp.Mo...
Thorax
Abd
SpO2
90
85
80
Onde de pouls
100
0

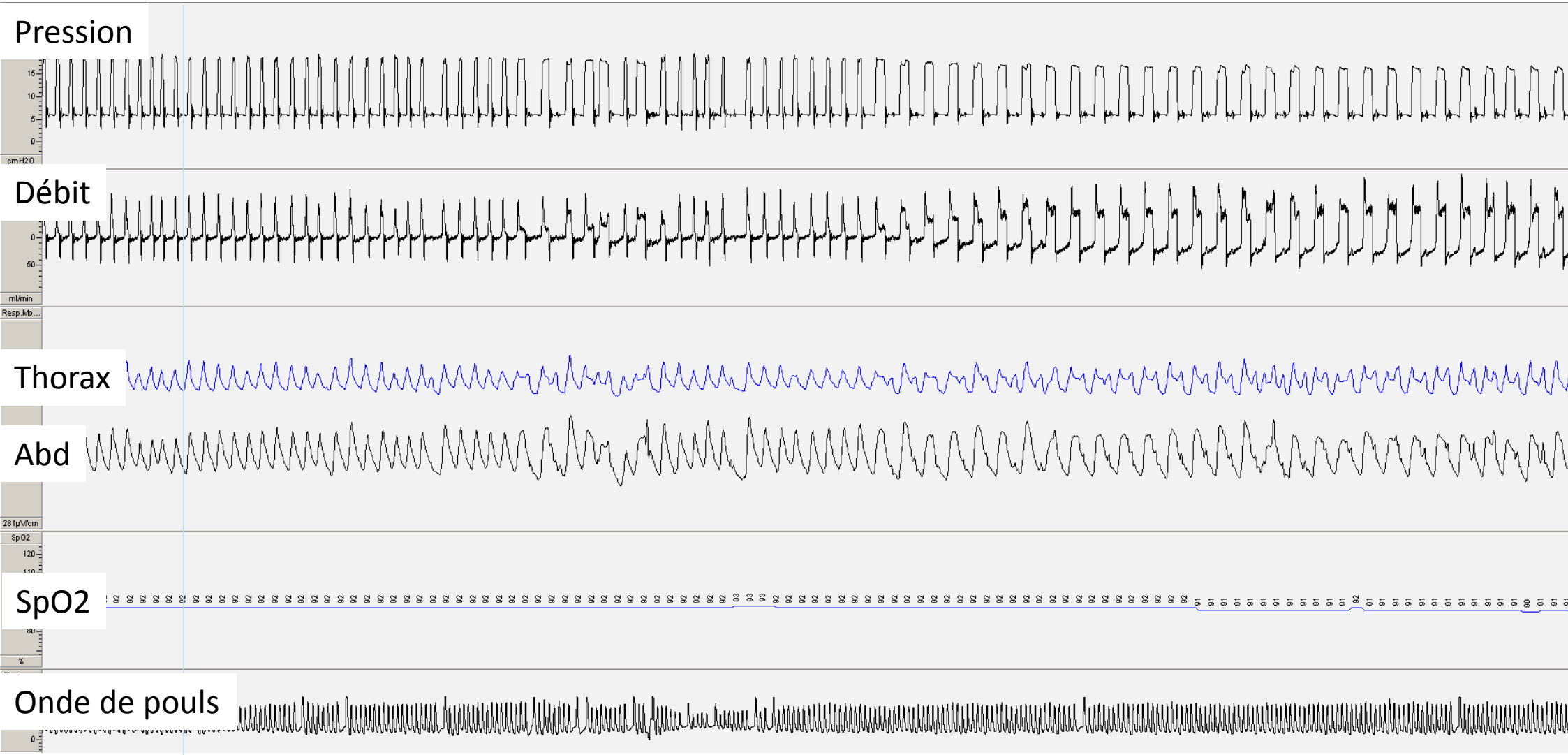


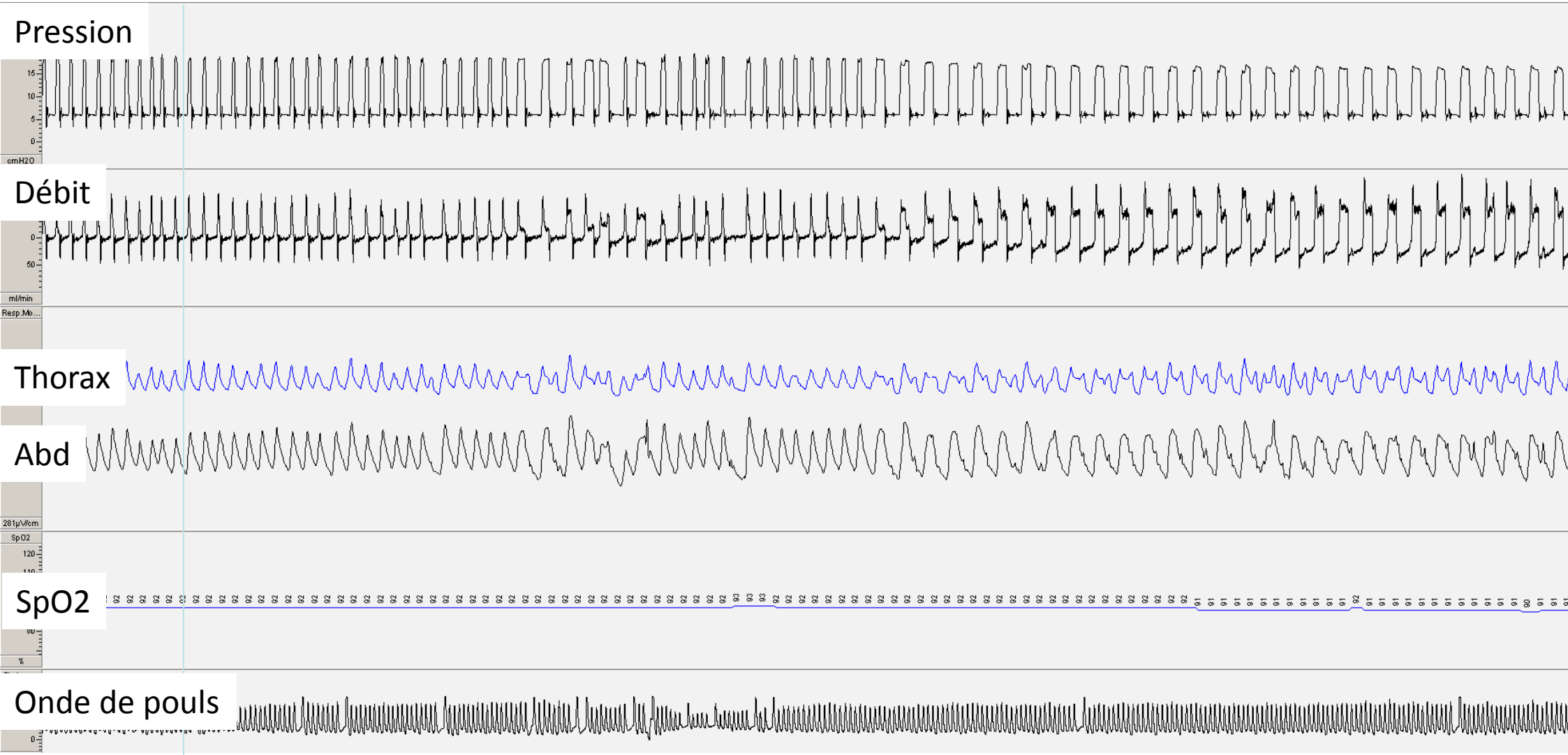
Myotonie de Steinert : Asynchronisme,
fuites non intentionnelles majeures avec autodéclenchement


Pression
10
5
cmH2O
Débit
0
0.25
l/min
Resp.Mo...
Thorax
Abd
299µV/cm
SpO2
90
85
Onde de pouls
100
50
0

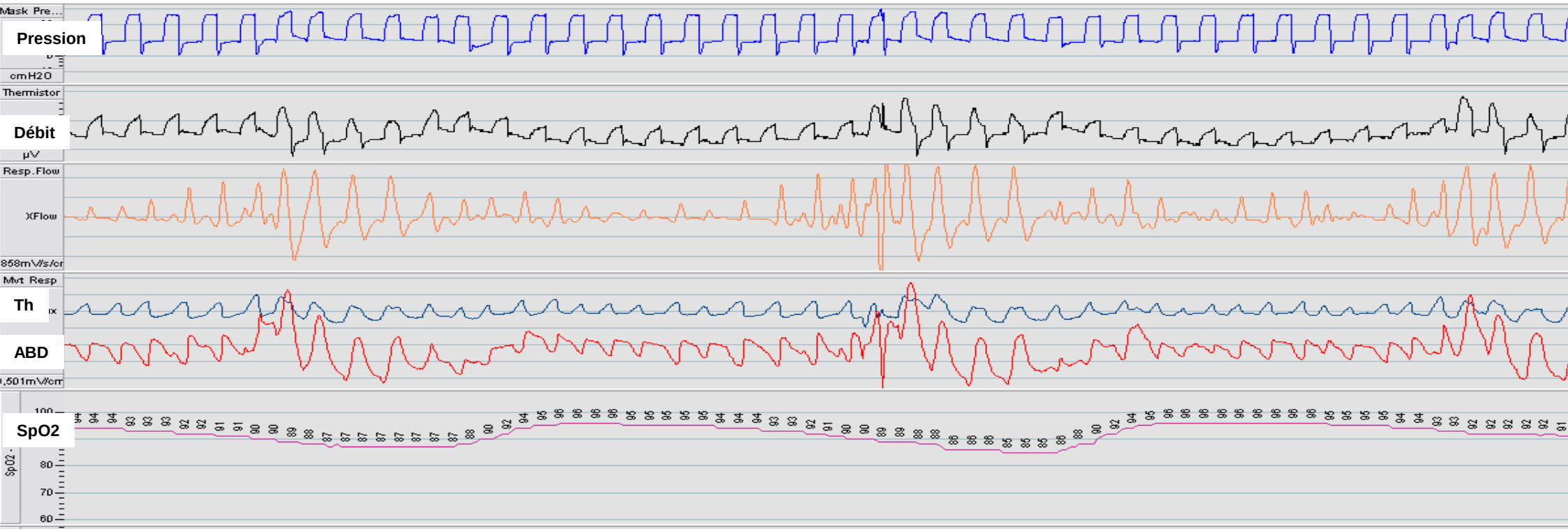


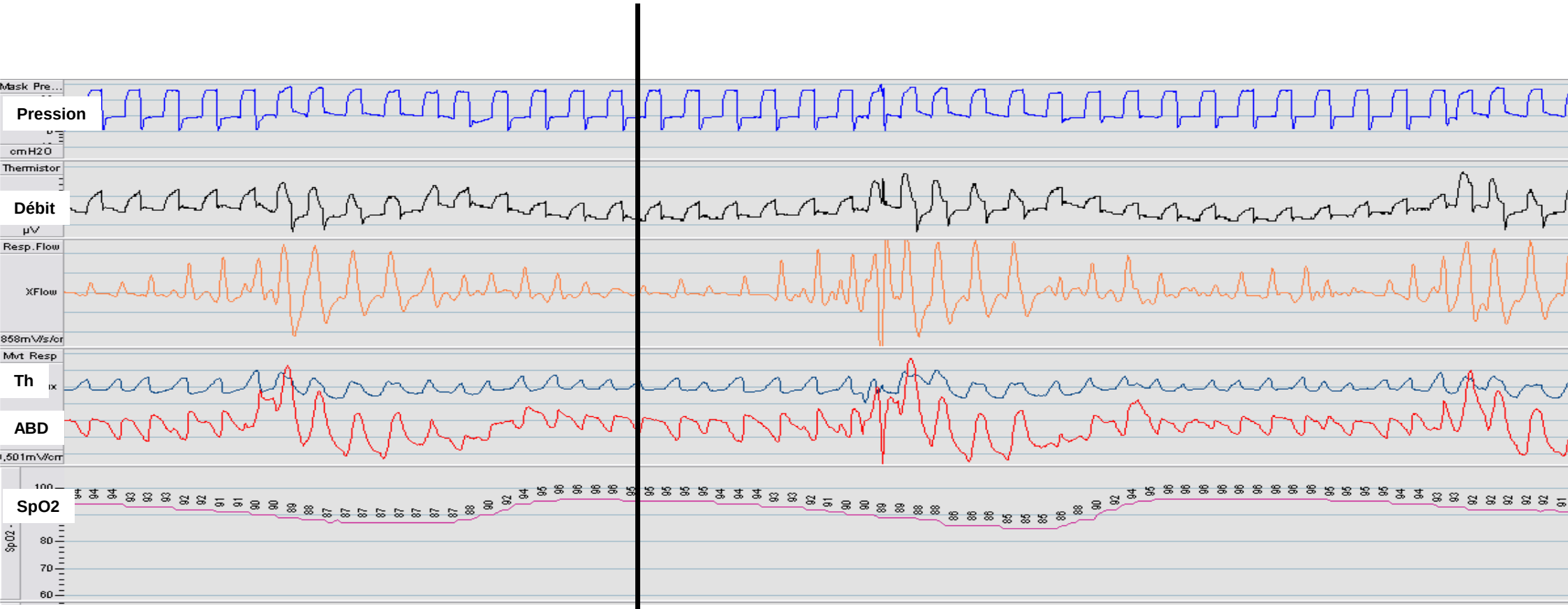
Obstruction des VAS avec diminution de la commande
(Réaction inappropriée du ventilateur par augmentation de la PEP préalable à l'évènement, Bipap A40)


Pression
15
10
5
0
cmH2O
Débit
0
50
ml/min
Resp.Mo...
Thorax
Abd
281µV/cm
SpO2
120
110
80
%
SpO2
Onde de pouls
0



Fuites non intentionnelles importantes (dépressurisation)
Compliquées d'efforts inspiratoires non récompensés malgré l'augmentation des efforts inspiratoires (augmentation de l'amplitude des mouvements thoraco-abdominaux sur la partie droite de la diapositive)


Pression
Débit
Th
ABD
SpO2
Mask Pre...
cmH2O
Thermistor
µV
Resp.Flow
XFlow
Mvt Resp
SpO2
100
80
70
60



Obstruction VAS sans diminution commande centrale
Attention, la déflexion thoracique est positive (comme celle du ventilateur) alors celle de l'abdomen est négative = lutte avec les muscles du cou + complications
fuites non intentionnelles (aplatissement du débit) et asynchronisme