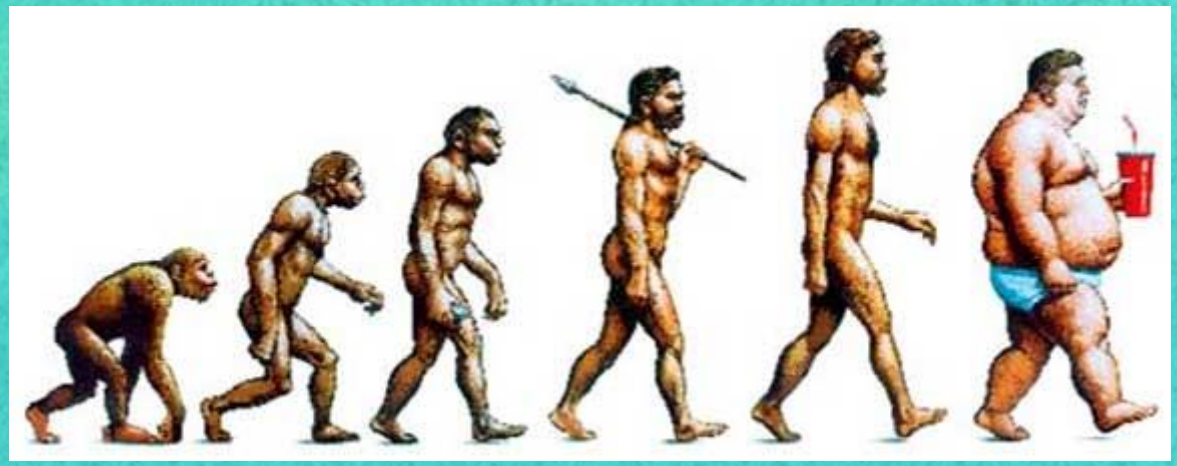
Anesthésie bariatrique

Présentée par Gabriel Fournier



http://www.emdocs.net/wp-content/uploads/2015/03/obesity-evolution.jpg

Introduction

- Épidémie d'obésité
  - ≥25% population canadienne adulte
  - Taux en augmentation dans les 40 dernières années
- Comorbidités importantes
  - Coût significatif
- Explosion des cas de chirurgies bariatriques
  - 1992 (16 200 cas) vs 2008 (220 000) aux É-U
  - Amélioration significative de l'expertise chirurgicale
  - Littérature anesthésique pauvre

Plan

- Considérations anesthésiques du patient obèse
- Gestion périopératoire des obèses
- Chirurgie bariatrique
- Considérations anesthésiques relatives à la chirurgie bariatrique
- Gestion périopératoire des patients en chirurgie bariatrique

Considérations anesthésiques chez l'obèse

Obésité

- IMC ≥ 30
- Obésité morbide
  - IMC ≥ 40
  - IMC ≥ 35 avec comorbidité importante liée à l'obésité
- Distribution adipeuse
  - Viscérale, androïde
    - ♂ > 102 cm
    - ♀ > 88 cm
  - Périphérique, gynécoïde

Effets endocrinologiques et inflammatoires

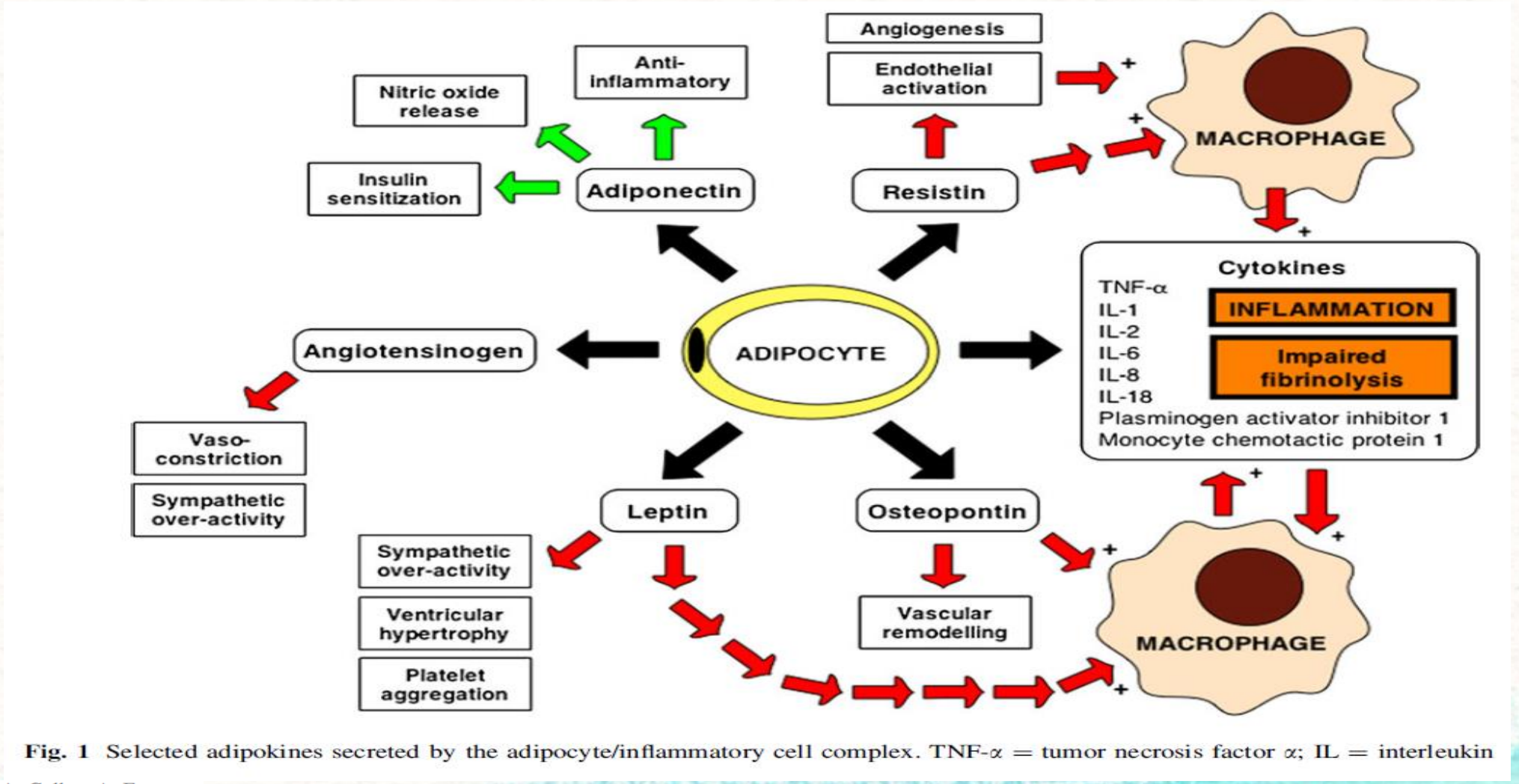


Fig. 1 Selected adipokines secreted by the adipocyte/inflammatory cell complex. TNF-α = tumor necrosis factor α; IL = interleukin

A. Cullen, A. Ferguson
Can J Anesth/J Can Anesth (2012) 59:974–996

Système cardiovasculaire

- Hypertension
- Volume circulant ↑
- Débit cardiaque ↑
- HVG
- Dysfonction cardiaque
  - Systolique et diastolique
  - G et D
- Lien indirect avec l'incidence de FA
- MCAS (obésité abdominale)
- +/- HTP (AOS, IC, SHO, EP chronique)

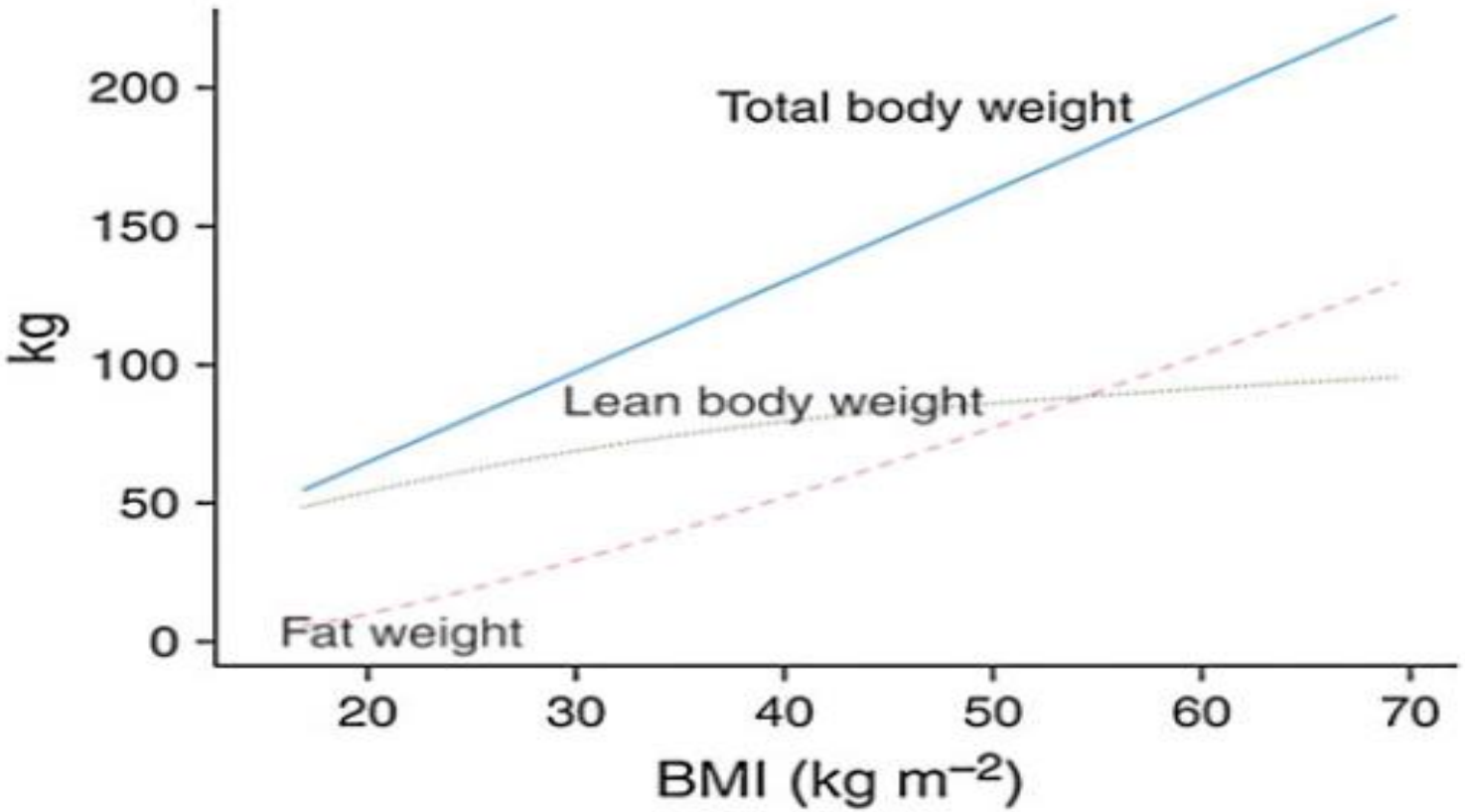


Fig. 2 Relationship of total body weight, fat weight, and lean body weight to body mass index in a standard height male. BMI = body mass index. Reproduced with permission from: *Ingrande J, Lemmens HJ.* Br J Anaesth 2010; 105: i16-i23. Oxford University Press on behalf of the British Journal of Anaesthesia

A. Cullen, A. Ferguson
Can J Anesth/J Can Anesth (2012) 59:974–996
DOI 10.1007/s12630-012-9760-2

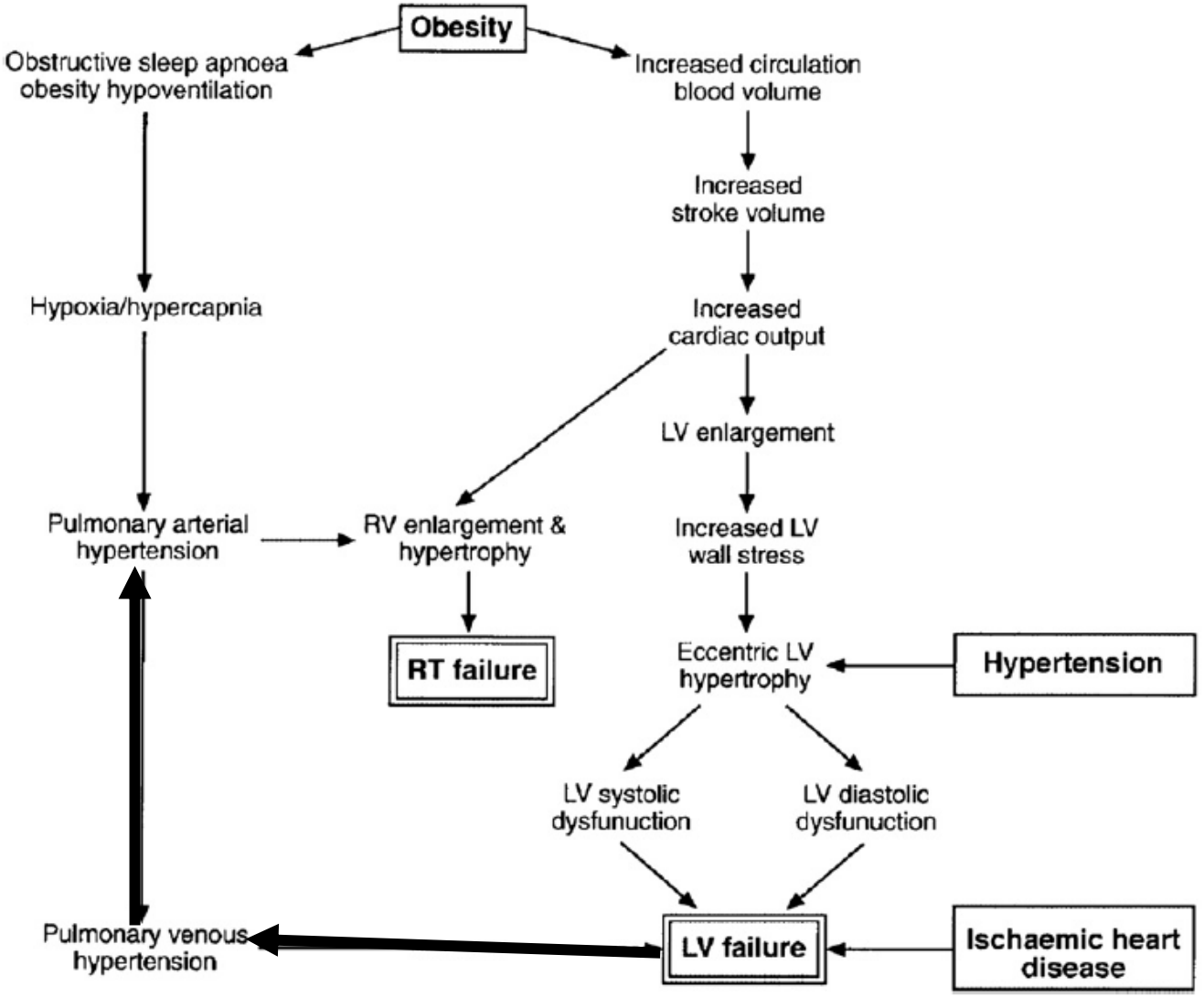


Fig. 2. Algorithm outlining the interaction between OSA, systemic hypertension and ischemic heart disease in the aetiology of obesity cardiomyopathy. LV, left ventricle, RV, right Ventricular (*adapted from* Adams JP, Murphy PG. Obesity in anaesthesia and intensive care. Br J Anaesth 2000;8592; with permission).

Système respiratoire

- Travail respiratoire ↑
  - Résistance VRS ↑
  - Demande métabolique ↑ (consommation O_2 ↑, production CO_2 ↑)
    - VM ↑
  - Masse adipeuse thoracique et abdominale
    - Syndrome restrictif
    - Volume sanguin pulmonaire ↑
- Facteur de risque pour l'asthme
  - Réactivité voies respiratoires
  - Mauvaise réponse aux inhalateurs

Fonction pulmonaire

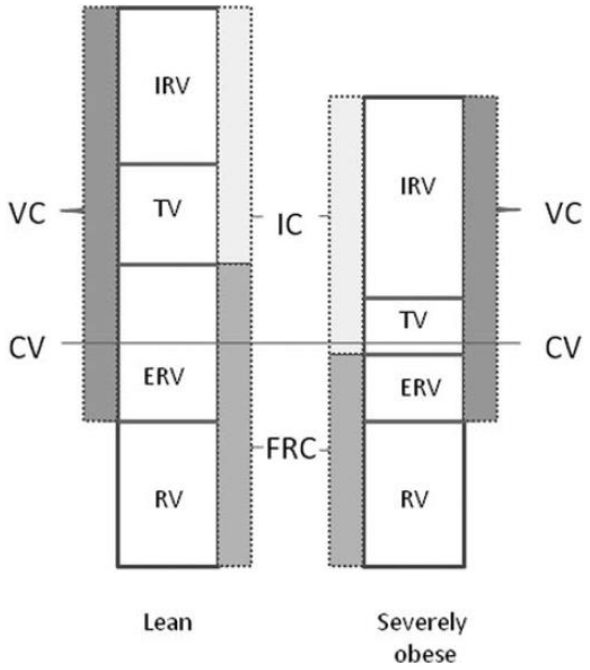


Figure 1. *Lung volumes and capacities between normal weight and severely obese subjects. CV is the volume above residual volume during expiration at which airway closure occurs. If RV exceeds ERV as in severe obesity, some airways close during the normal TV cycle resulting in hypoxemia. In the supine position, during administration of anesthesia and postoperatively, this situation worsens. CV indicates closing volume; ERV, expiratory reserve volume; FRC, functional residual capacity; IC, inspiratory capacity; IRV, inspiratory reserve volume; RV, residual volume; TV, tidal volume; VC, vital capacity.*

- FR ↑
- Mismatch V/Q
  - Gradient AaO_2 ↑

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Volume de fermeture

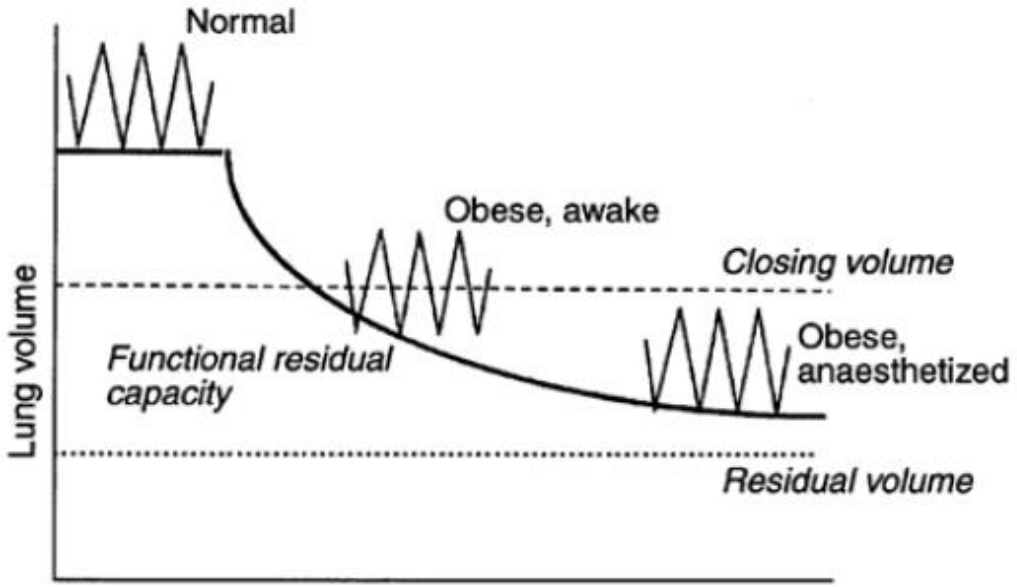

Figure 2. *Schematic representation of the effects of severe obesity on FRC. Under normal circumstances, the FRC (and therefore the tidal excursion) is clear of the closing volume of the lungs. Both anesthesia and obesity are associated with a reduction in FRC, resulting in airway closure and ventilation/perfusion mismatching during normal tidal ventilation. From Adams and Murphy,[13] with permission by Oxford University Press on behalf of the British Journal of Anaesthesia. FRC indicates functional residual capacity.*

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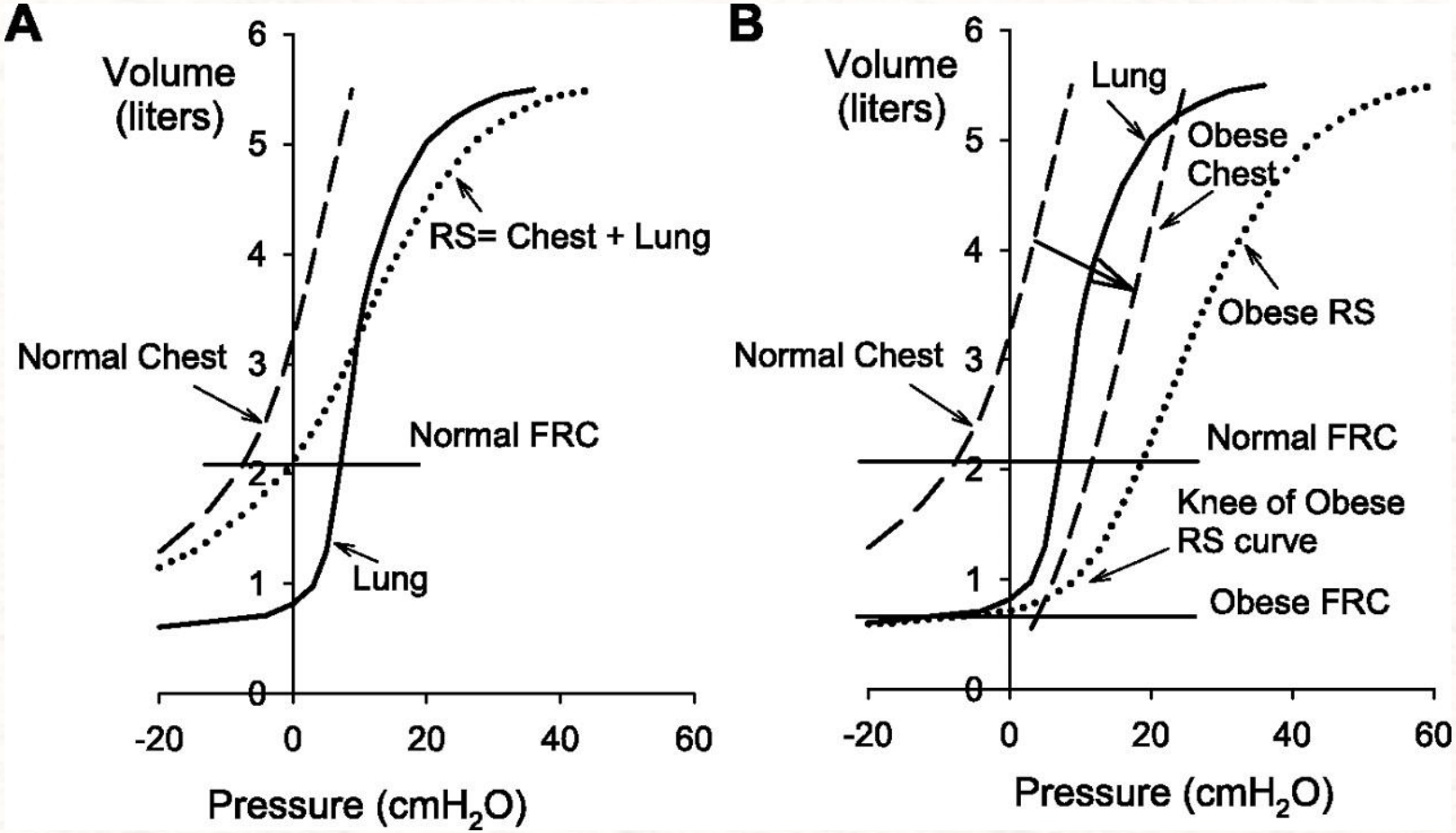
Volume 51, Number 3, 41–51

Compliance respiratoire



Negin Behazin, Stephanie B. Jones, Robert I. Cohen, Stephen H. Loring
Journal of Applied Physiology Published 1 January 2010 **Vol.** 108 **no.** 1, 212-218 **DOI:** 10.1152/japplphysiol.91356.2008

AOS

- Jusqu'à 70% des obèses morbides
- Index apnée/hypopnée (événements/h)
  - Léger: ≥ 5
  - Modéré: 15-29
  - Sévère: ≥ 30
- Augmentation résistance VRS (adiposité, oedème)
- Diminution du tonus des muscles VRS
- Altération du centre de contrôle respiratoire

AOS

- Multiples comorbidités
  - HTA
  - HTP
  - MCAS
  - MVAS (AVC)
  - IC
  - Contribue au développement/maintient de l'obésité

STOP BANG

- Snoring
- Tired (somnolence diurne)
- Observed (apnée/obstruction)
- Pressure (HTA)
- BMI (IMC > 35)
- Age (>50A)
- Neck circumference
  - ♂ > 43 cm
  - ♀ > 41 cm
- Gender (♂)

- 0-3: faible risque
- 4-5: risque intermédiaire
- 6-8: risque élevé

Syndrome d'hypoventilation de l'obèse

- Dx
  - IMC > 30
  - $PaCO_2$ > 45 mmHg (éveillé) sans autre cause
  - Hypoventilation à la PSG
- Hypoventilation alvéolaire
  - Alvéoles ne contribuant aux échanges gazeux (volume de fermeture)
  - Alcalose métabolique secondaire
  - Inhibition du contrôle central par la leptine?
- Hypoxémie à degré variable
- Phénomène exacerbé en décubitus (platydéoxie)

Autres comorbidités

- Diabète
  - Infection de plaie
  - Déhiscence anastomotique
- NASH
  - Cirrhose
- RGO, hernie hiatale
- Obésité ≠ ↑ risque d'aspiration
  - Volume gastrique résiduel ↑ lors du jeûne
- Hypercoagulabilité
  - Haut risque de TPP/EP
  - Cause importante de mortalité/morbidité périopératoire
    - Principale cause de mortalité en chirurgie bariatrique
- Déficits nutritionnels
  - D, Mg, PO_4, Fe, thiamine, B_{12}

Gestion périopératoire des obèses

Gestion des voies respiratoires

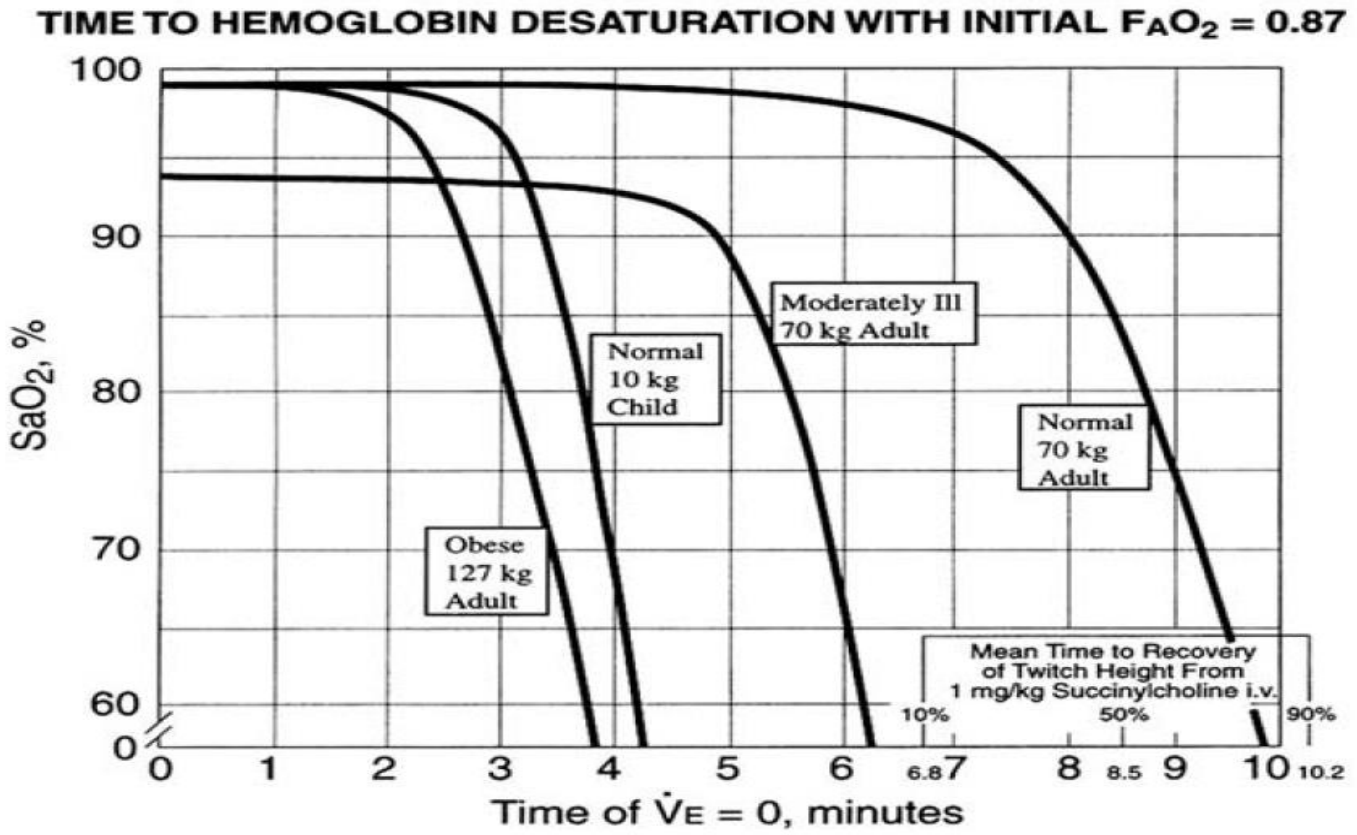


Figure 3. *SaO_2 versus time of apnea for various types of patients. The SaO_2 versus time curves were produced by a computer apnea model referenced in the original article. The mean times to succinylcholine recovery represent composite data from several studies referenced in the original article. From Benumof et al,[16] used with permission. SaO_2 indicates oxygen saturation.*

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Préoxygénation

- Positionnement
  - Hémicorps supérieur 30°
  - Anti-Trendelenburg
  - Oreillers, couvertures
  - Coussin de l'obèse

- Objectif
  - Manubrium aligné avec le conduit auditif externe

Fig. 1. Reverse Trendelenburg position with use of head support to facilitate neck flexion and head extension at atlanto-occipital joint. The height of head support (i.e. number of blankets or uncompressible head rest) needed to achieve adequate neck flexion will vary from one patient to another depending on head and neck anatomy and relationship to chest diameter. A good approximation of optimal positioning for laryngoscopy is achieved when an imaginary line can be drawn from the sternal notch to the external auditory meatus. Note foot-board support to prevent the patient from sliding down.

V. E. Ortiz et al. / Surgery for Obesity and Related Diseases 11 (2015) 721–728

Préoxygénation

- ↓ CRF 50% à l'induction (vs 20% chez non obèse)

- PEEP/CPAP 10 cm H_2O x 5 minutes
- BiPAP 7 + 7 cm H_2O x 5 minutes
- LN O_2 ≥ 5L/min en phase d'apnée

- Durée apnée non-hypoxique ↑
- PaO_2 ↑

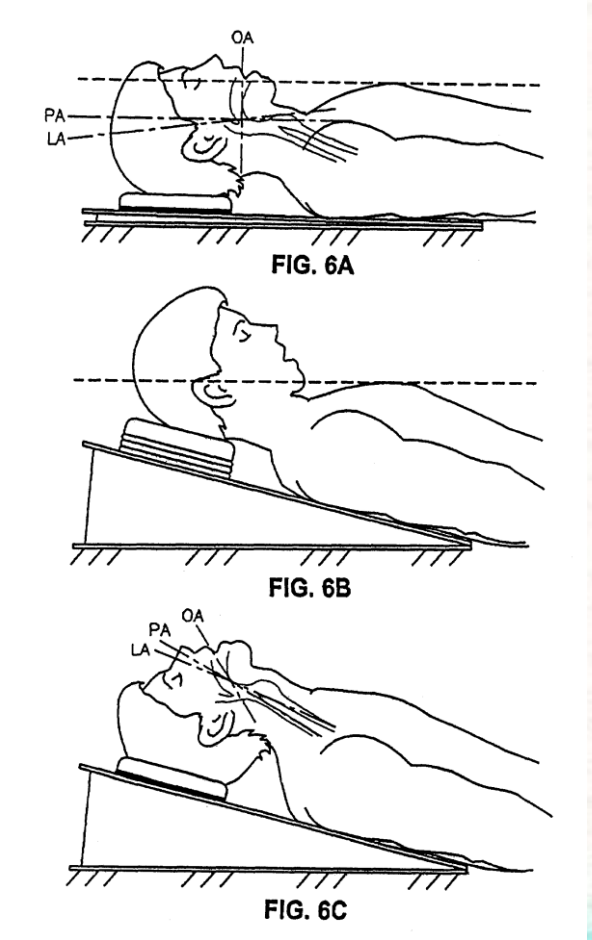
Ventilation au masque

- Critères de ventilation difficile associés
  - Obésité
  - AOS/ronflement
  - MP ≥ 3

- PEEP 10 cm H_2O
  - Minimiser ↓ CRF (formation d'atélectasie)
- Guedel, trompette nasale
  - Minimiser insufflation gastrique
- Utilisation du ventilateur (VPC)
  - ↓ P_{pointe} (vs à la main)

Intubation

- Pas un facteur de risque indépendant d'intubation difficile
- Critères d'intubation difficile associés
  - MP ≥ 3
  - Circonférence cervicale ≥ 40 cm
  - AOS
- Positionnement améliore les conditions d'intubation
  - Intubation difficile 14% → 1% (beach chair en chx bariatrique)
- A/W chirurgical
  - Techniquement plus difficile
  - Plus de complications



http://patentimages.storage.googleapis.com/US7383599B2/US07383599-20080610-D00005.png

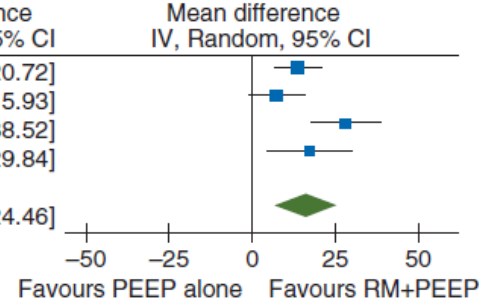
Ventilation mécanique

- VC 6-8 mL/kg IBW
- FR titrée
  - Cibler normocapnie
  - Hypercapnie permissive PRN
  - Attention gradient A-a ↑
  - Attention à $PaCO_2$ de base ↑ (SHO, …)
- Minimiser FiO_2
  - Atélectasie de résorption
  - Stress oxydatif
- $P_{plateau} \leq 30$ cm H_2O

A

Study or Sub-group	RM+PEEP Mean	SD	Total	PEEP alone Mean	SD	Total	Weight	Mean difference IV, Random, 95% CI
Chalhoub 2007	60.7	10.8	26	46.9	14.4	26	29.4%	13.80 [6.88, 20.72]
de Souza 2009	43.2	12.1	16	35.5	10.9	14	27.0%	7.70 [–0.53, 15.93]
Futier 2011	62.3	20	22	34.1	14.5	22	23.4%	28.20 [17.88, 38.52]
Reinius 2009	52.5	16.1	10	35	11.7	10	20.2%	17.50 [5.16, 29.84]
Total (95% CI)			74			72	100.0%	16.26 [8.07, 24.46]

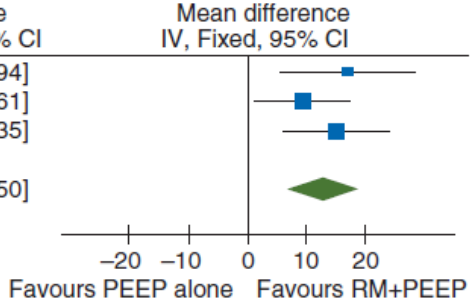
Heterogeneity: $\tau^2 = 47.02$; $\chi^2 = 9.57$, df = 3 ($P = 0.02$); $I^2 = 69\%$
Test for overall effect: $Z = 3.89$ ($P = 0.0001$)



B

Study	RM+PEEP Mean	SD	Total	PEEP alone Mean	SD	Total	Weight	Mean difference IV, Fixed, 95% CI
Futier 2011	67	25	22	49	14	22	21.9%	18.00 [6.03, 29.94]
Reinius 2009	57	12	10	47	7	10	42.3%	10.00 [1.39, 18.61]
Tafer 2008	52	14	13	36	10	13	35.8%	16.00 [6.65, 25.35]
Total (95% CI)			45			45	100.0%	13.90 [8.30, 19.50]

Heterogeneity: $x^2 = 1.43$, df = 2 ($P = 0.49$); $I^2 = 0\%$
Test for overall effect: $Z = 4.87$ ($P = 0.00001$)



C

Study	RM+PEEP Mean	SD	Total	PEEP alone Mean	SD	Total	Weight	Mean difference IV, Fixed, 95% CI
Chalhoub 2007	92	12	26	88	11	26	45.2%	4.00 [–2.26, 10.26]
Futier 2011	70	13	22	73	12	22	32.3%	–3.00 [–10.39, 4.39]
Reinius 2009	77	28	10	74	10	10	5.2%	3.00 [–15.43, 21.43]
Tafer 2008	67	11	13	71	15	13	17.3%	–4.00 [–14.11, 6.11]
Total (95% CI)			71			71	100.0%	0.30 [–3.90, 4.50]

Heterogeneity: $x^2 = 2.89$, df = 3 ($P = 0.41$); $I^2 = 0\%$
Test for overall effect: $Z = 0.14$ ($P = 0.89$)

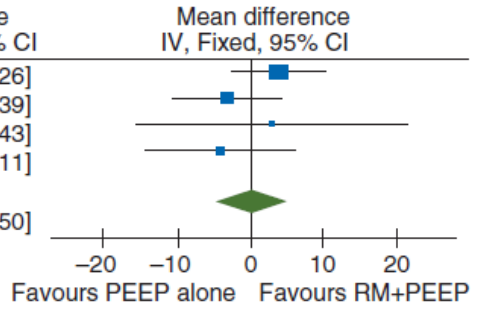


Fig 2 PEEP plus RM *vs* PEEP alone. (A) Impact on intraoperative $Pa_{O_2}/F_{I_{O_2}}$ ratio (kPa). (B) Impact on intraoperative respiratory compliance (ml cm H_2O^{-1}). (C) Impact on intraoperative mean arterial pressure (mm Hg).

British Journal of Anaesthesia **109** (4): 493–502 (2012)
doi:10.1093/bja/aes338

PaO_2/FiO_2

Compliance

PAM

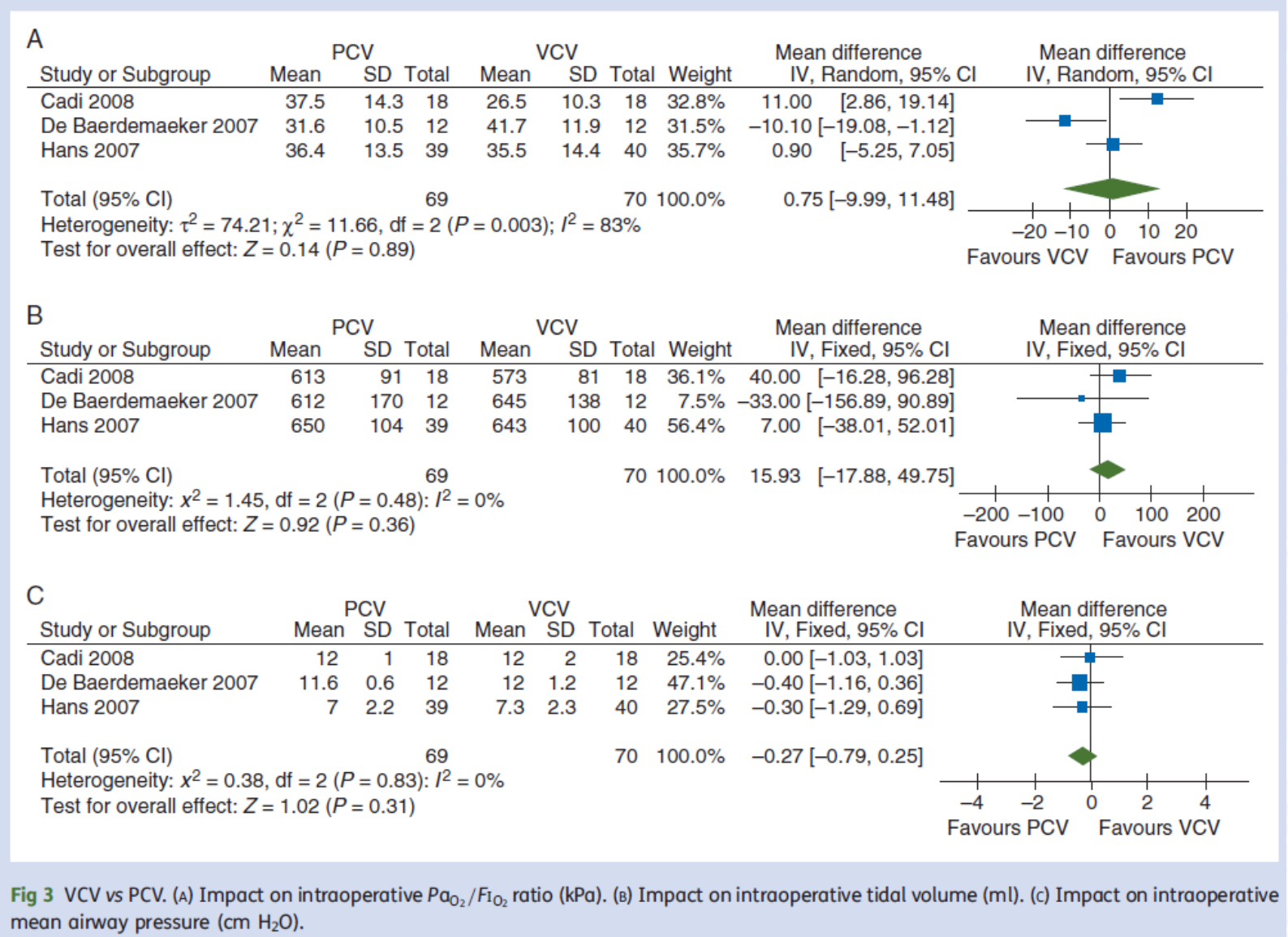
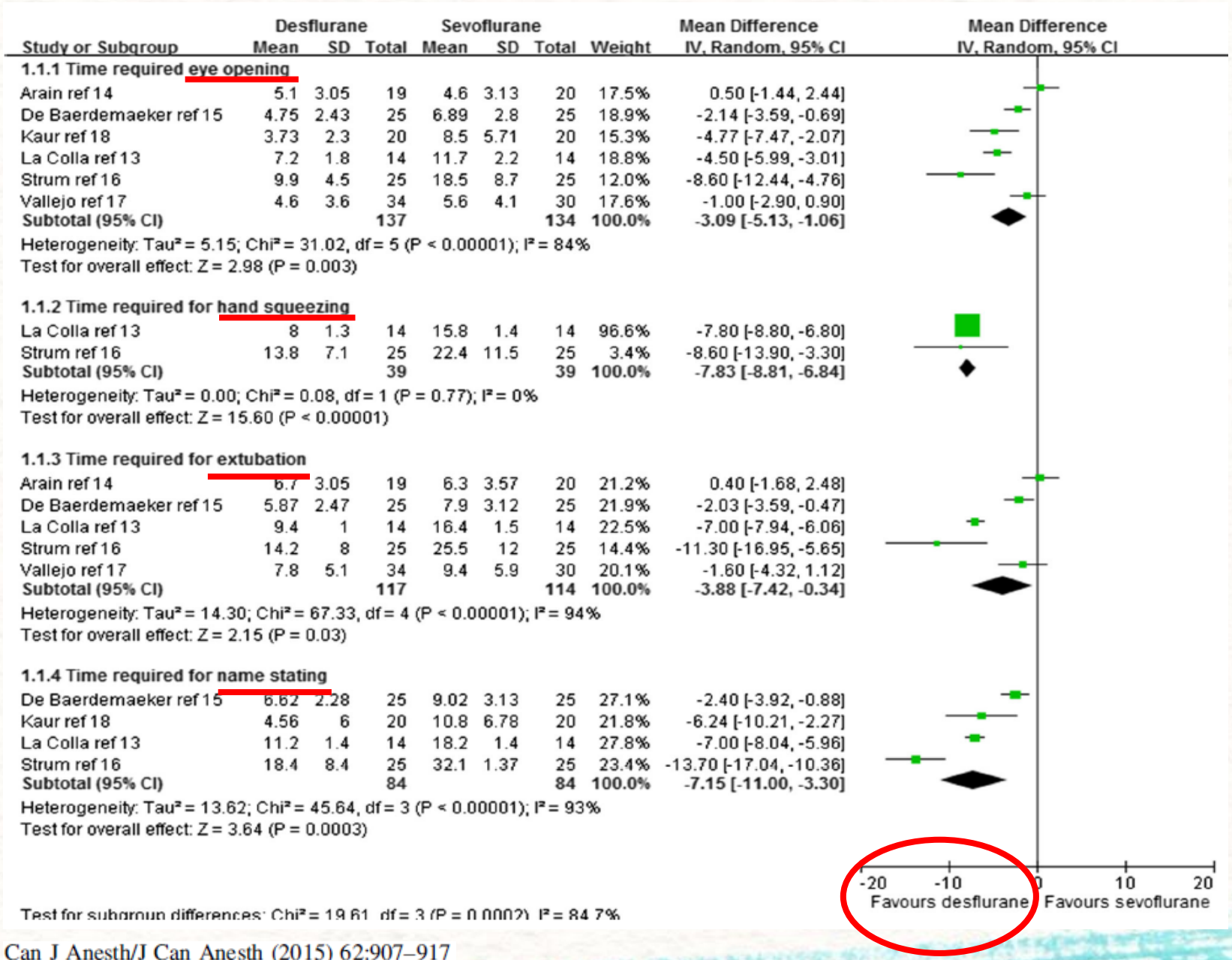


Fig 3 VCV *vs* PCV. (A) Impact on intraoperative $Pa_{O_2}/F_{I_{O_2}}$ ratio (kPa). (B) Impact on intraoperative tidal volume (ml). (C) Impact on intraoperative mean airway pressure (cm H_2O).

PaO_2/FiO_2

Volume courant

P ventilation



Can J Anesth/J Can Anesth (2015) 62:907–917
DOI 10.1007/s12630-015-0405-0

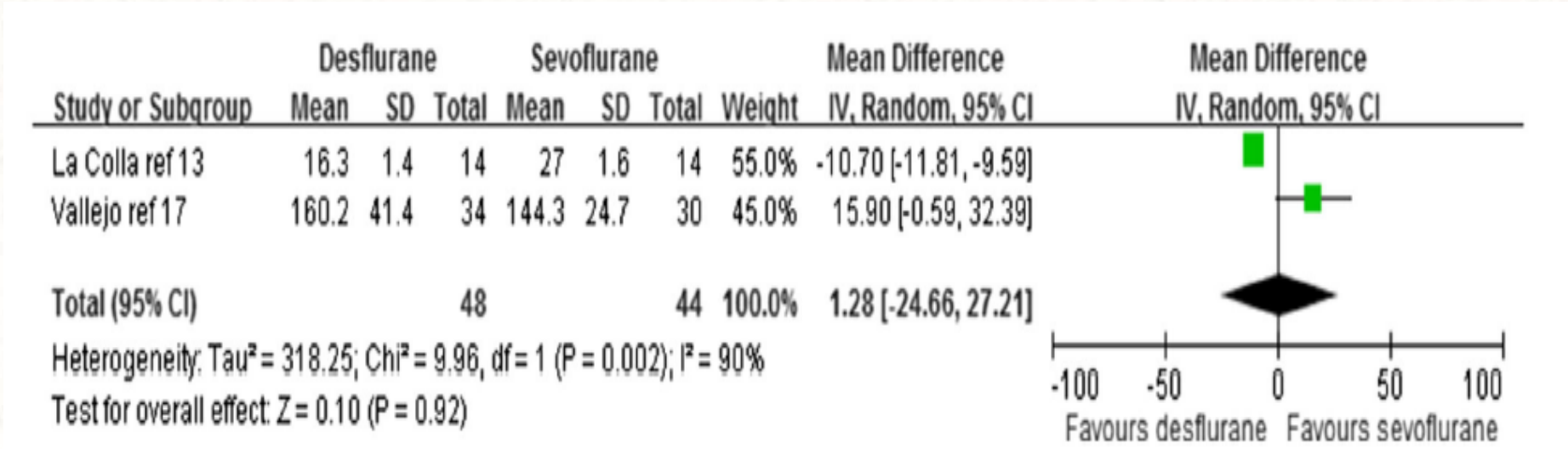


Fig. 5 Forest plot comparing the isoflurane with the sevoflurane groups regarding the PACU discharge time (min). PACU = postanesthesia care unit

Can J Anesth/J Can Anesth (2015) 62:907–917
DOI 10.1007/s12630-015-0405-0

TIVA

Comparing Perioperative Outcomes of Total Intravenous Anesthesia (TIVA) With Volatile Anesthesia in Patients With Obesity: A Systematic Review

Faiza A. Kamal , Lucas Y. Fernet , Naofal K. Da Silva , Gabriela Briceño , Nusrath Iyoob , Kenneth Aleman Paredes , Marily Martinez Ramirez, Victor S. Arruarana

February 12, 2024

Cureus 16(2): e54094. DOI 10.7759/cureus.54094

- Hémodynamie: aucune différence
- Émergence:
  - Favorise légèrement halogénés (Des < Sevo)
  - Écart atténué ou non significatif avec études plus récentes
- Congé SDR: aucune différence

Pharmacologie

Table 4 Body weight adjustment equations

Dosing Weight	Calculation method (weights in kg)
Ideal Body Weight (IBW)	45.4 + 0.89 × (height in cm - 152.4) for females
	49.9 + 0.89 × (height in cm - 152.4) for males
Lean Body Weight (LBW)	*Classical equation:*
	(1.07 × TBW) - (0.0148 × BMI × TBW) for females
	(1.10 × TBW) - (0.0128 × BMI × TBW) for males
	Alternative ("modern") equation:
	(9,720 × TBW)/(8,780 + (244 × BMI)) for females
	(9,270 × TBW)/(6,680 + (216 × BMI)) for males
Predicted Normal Weight	(1.57 × TBW) - (0.0183 × BMI × TBW) - 10.5 for females
	(1.75 × TBW) - (0.0242 × BMI × TBW) - 12.6 for males

BMI = body mass index; TBW = total body weight

Table 3 Dosing weight scalars for common perioperative medications

Medication	Dosing Weight
Thiopental sodium	Lean body weight (more rapid awakening)
Propofol	Lean body weight (induction bolus)
	Total (actual) body weight (maintenance infusion)
Etomidate	Lean body weight
Succinylcholine	Total (actual) body weight
Pancuronium	Ideal body weight
Rocuronium	Ideal body weight
Vecuronium	Ideal body weight
Cisatracurium	Ideal body weight
Fentanyl	Lean body weight
Alfentanil	Lean body weight
Remifentanil	Lean body weight
Midazolam	Total (actual) body weight (bolus dose)
	Ideal body weight (infusion)
Paracetamol	Lean body weight
Neostigmine	Total (actual) body weight
Sugammadex	Total (actual) body weight or ideal body weight + 40%

A. Cullen, A. Ferguson
Can J Anesth/J Can Anesth (2012) 59:974–996

Héparines

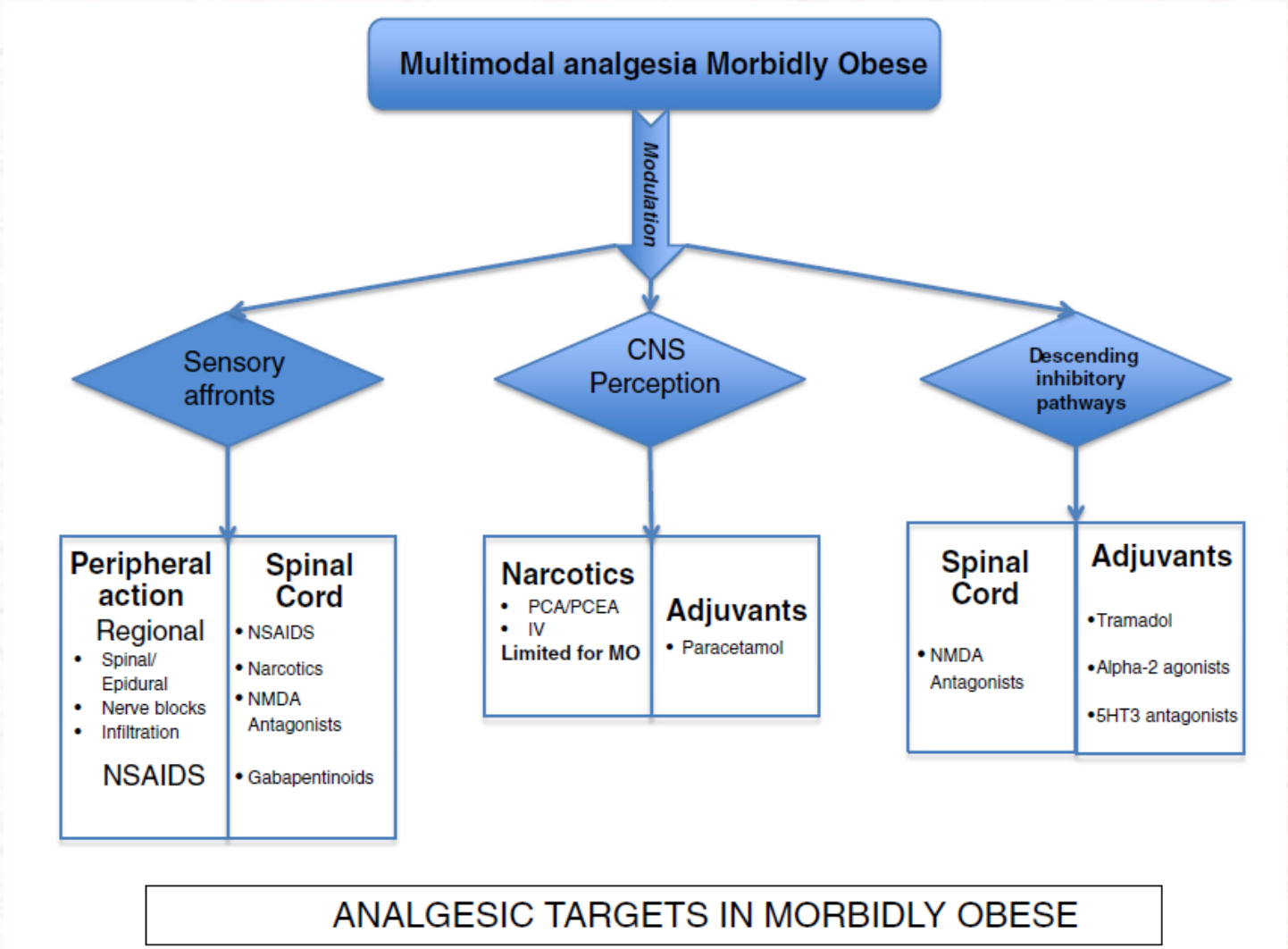
- Peu/pas d'étude pharmacologique de qualité chez les obèses
- Courbe dose-réponse mal définie
- Héparine non-fractionnée
  - LBW
- HBPM
  - TBW
  - > 120 kg → surveillance anti-Xa

Dexmedetomidine

- Agoniste α-2
- Sédation/analgésie avec dépression respiratoire minimale
  - Potentialisation dépression respiratoire associées aux narcotiques/BZD
- Bénéfice potentiel important pour ce type de population
- Dose selon TBW

- Sédation procédurale: bolus 1 mcg/kg sur 10 minutes + perfusion 0,2-1 mcg/kg/h
- Adjuvant à l'AG: bolus 0,5 mcg/kg sur 10 minutes + perfusion 0,2-0,4 mcg/kg/h
  - Éveil accéléré, consommation narcotique ↓, NVPO ↓

Analgésie post-opératoire



ANALGESIC TARGETS IN MORBIDLY OBESE

OBES SURG (2014) 24:652–659
DOI 10.1007/s11695-014-1185-2

Anesthésie régionale

- Neuraxiale
  - Éviter narcotiques si suspicion AOS
  - Possibilité de migration céphalade exagérée
- Bloc inter-scalénique/supra-claviculaire
  - Attention au bloc du nerf phrénique
    - Minimiser concentration
    - Bolus de faible volume
    - Privilégier approche distale
- Difficulté technique augmentée
- Risque d'échec augmenté

AOS

- Dépistage et instauration du tx (CPAP) précoce souhaitable
  - Surtout si modéré-sévère
  - Tx CPAP préop
    - ↓ complications
    - Pas ↓ mortalité (Cochrane 2014)
- CPAP empirique en post-opératoire
  - 10-12 cmH_2O
- Éviter AG
- Minimiser narcotiques, sédatifs
- Surveillance prolongée en SDR PRN
- Surveillance accrue en post-opératoire
  - Saturométrie continue
  - Soins intermédiaire/unité de surveillance respiratoire

Strategies in Postoperative Analgesia in the Obese Obstructive Sleep Apnea Patient

Jahan Porhomayon, MD, FCCP, Kay B. Leissner, MD, PhD,†‡ Ali A. El-Solh, MD, MPH,§ and Nader D. Nader, MD, PhD, FCCP‖*

Clin J Pain • Volume 29, Number 11, November 2013

TABLE 1. Outcome of Analgesics and Sedatives in Obstructive Sleep Apnea Patients

References	N	Study	Surgery/Medical	Medication	Outcome
Ramachandran et al[54]	32	Chart review 6 y	All surgeries	Opioids	Increase respiratory events
Guilleminault et al[58]	88	Prospective	Medical	Opioids	Increase in apnea episodes
Mogri et al[59]		Case reports	Medical	Opioids	Increase in apnea episodes
Blake et al[55]	63	Prospective	All surgeries	Opioids	Increase respiratory events
Bernards et al[57]	19	Prospective	Medical	Opioids	Marked increase in apnea
Esclamado et al[60]	135	Retrospective	All surgeries	Opioids	Increase apnea and desaturation

TABLE 2. Outcomes of Alternative Analgesic and Sedative Agents in Obstructive Sleep Apnea Patients

References	N	Study	Surgery/ Medical	Medications	Outcome
Patel et al[65]	122	Prospective	ENT	Dexmedetomidine vs. fentayl	Less desaturation
Plunkett et al[67]	1	Case report	Thyroid surgery	Dexmedetomidine/ketorolac fentanyl (low dose)	Adequate pain control/calm
Chawla et al[61]	268	Retrospective	All surgeries	Dexmedetomidine/fentanyl	Less polypharmacy Better hemodynamic
Luscri and Tobias[68]	3	Case reports	MRI sedation	Dexmedetomidine/ketamine	No respiratory complication
Aspinall and Mayor[63]	50	Prospective	ENT surgeries	Ketamine/fentanyl	Ketamine was safe in OSA patient
Raghavendran et al[72]	292	Retrospective	ENT surgeries	Dexamethasone	Reduction in opioids and respirtory events
Catley[78]	32	Prospective	All Surgeries	Morphine/RA	Less apnea/desaturation in RA group
Pellecchia et al[75]	1	Case report	Urology	E narcotic	Opioids in E not advisable
Kapala et al[74]	1	Case report	GI surgery	Edpidural anesthesia and ketamine	No respiratory events
Hendolin et al[76]	44	Prospective	ENT surgeries	P/thiopentone	Faster recovery of respiration with P

E indicates epidural; ENT, ear nose throat; GI, gastrointestinal; MRI, magnetic resonance imaging; OSA, obstructive sleep apnea; P, propofol; RA, regional anesthesia.

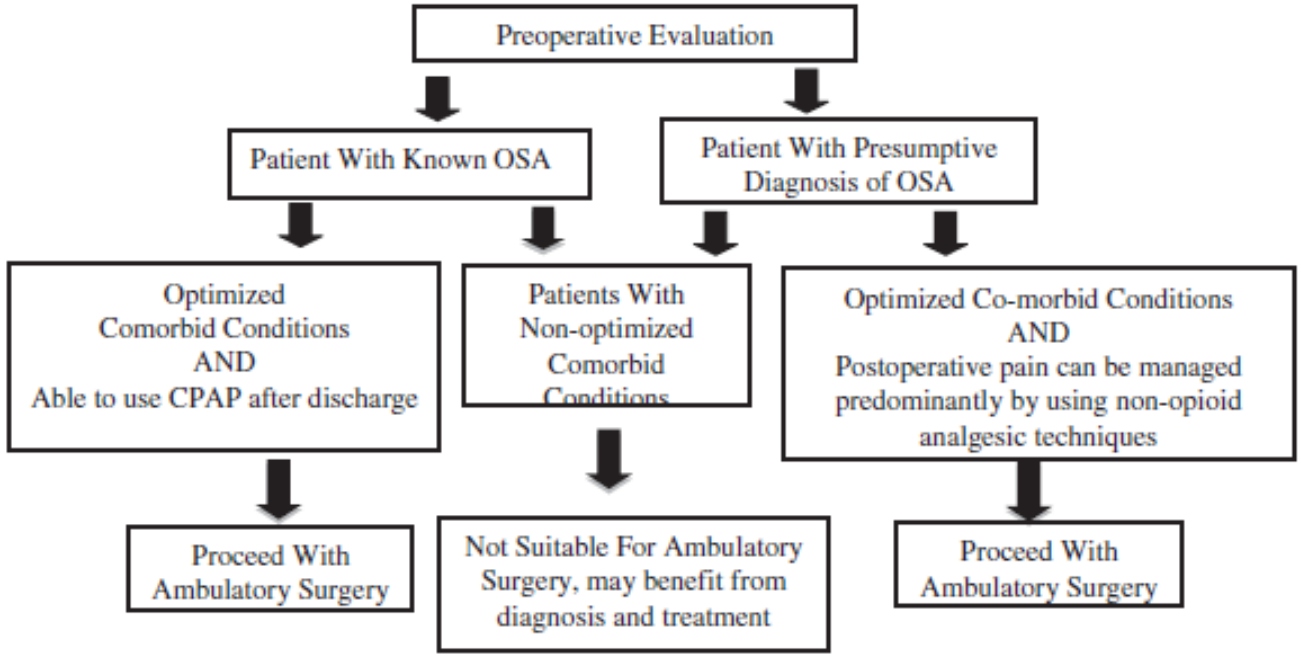
Society for Ambulatory Anesthesia Consensus Statement on Preoperative Selection of Adult Patients with Obstructive Sleep Apnea Scheduled for Ambulatory Surgery

Girish P. Joshi, MBBS, MD, FFARSCI,* Saravanan P. Ankichetty, MD, DA, MBA,†
Tong J. Gan, MD, MHS, FRCA,‡ and Frances Chung, MBBS, FRCPC†

Anesth Analg 2012;115:1060–8

Table 1. Concerns with Obstructive Sleep Apnea Patients Undergoing Ambulatory Surgery

Intraoperative	Difficult/failed mask ventilation and/or tracheal intubation.
	Difficulty maintaining adequate oxygen saturation.
Immediate postoperative	Delayed extubation.
	Obstruction and/or desaturation after extubation.
	Postobstructive pulmonary edema.
	Need for tracheal reintubation.
	Exacerbation of cardiac comorbidities: hypertension, arrhythmias, myocardial ischemia and infarction, pulmonary hypertension, heart failure.
	Cerebrovascular disorders (e.g., stroke).
	Prolonged postanesthesia care unit stay.
	Delayed discharge home.
	Unanticipated hospital admission.
Postdischarge	Readmission after discharge.
	Hypoxic brain death and death.



Preoperative Considerations:

- Comorbid conditions include hypertension, arrhythmias, heart failure, cerebrovascular disease, and metabolic syndrome.
- If OSA is suspected during the preoperative evaluation, one could proceed with a presumptive diagnosis of OSA albeit with caution.
- Educate surgeon, patient and family (see the text for details)

Intraoperative Considerations:

- Non-opioid analgesic techniques, when possible.

Postoperative Considerations:

- Exercise caution in OSA patients who develop prolonged and frequent severe respiratory events (e.g., sedation analgesic mismatch, desaturation, and apneic episodes) in the postoperative period.

Selection of Obese Patients Undergoing Ambulatory Surgery: A Systematic Review of the Literature

Girish P. Joshi, MB BS, MD, FFARSCI,* Shireen Ahmad, MD,† Waleed Riad, MSc, AB, MD (PhD), SB, KSUF,‡ Stanley Eckert, MD,§ and Frances Chung, MBBS, FRCPC‖

DISCUSSION: The literature lacks adequate information to make strong recommendations regarding appropriate selection of the obese patients scheduled for ambulatory surgery. The literature does indicate that the super obese (BMI >50 kg/ m^2) do present an increased risk for perioperative complications, while patient with lower BMIs do not seem to present any increased risk as long as any comorbidities are minimal or optimized before surgery. This review also identifies knowledge gaps and recommends future research required to guide optimal selection of obese patients scheduled for ambulatory surgery. (Anesth Analg 2013;117:1082–91)

Chirurgie bariatrique

Sélection des patients

- Obésité morbide
  - IMC ≥ 40
  - IMC ≥ 35 avec comorbidité importante
- Chirurgie métabolique
  - IMC ≥ 30 avec comorbidité réfractaire au traitement médical
- Prise en charge par équipe multidisciplinaire essentielle
- Évaluation préopératoire complète
- Optimisation préopératoire des comorbidités

- Expertise et volume: ↓ mortalité/morbidité

Obesity Surgery Mortality Risk Score

- IMC ≥ 50
- ♂
- HTA
- Facteurs de risque d'EP
- ≥ 45 ans

- 0-1: faible risque
  - Mortalité 0,31%
- 2-3: risque intermédiaire
  - Mortalité 1,9%
- 4-5: risque élevé
  - Mortalité 7,56%

DeMaria EJ, Portenier D, Wolfe L. Obesity surgery mortality risk score: proposal for a clinically useful score to predict mortality risk in patients undergoing gastric bypass. Surg Obes Relat Dis 2007;3:134–40.

Bande gastrique

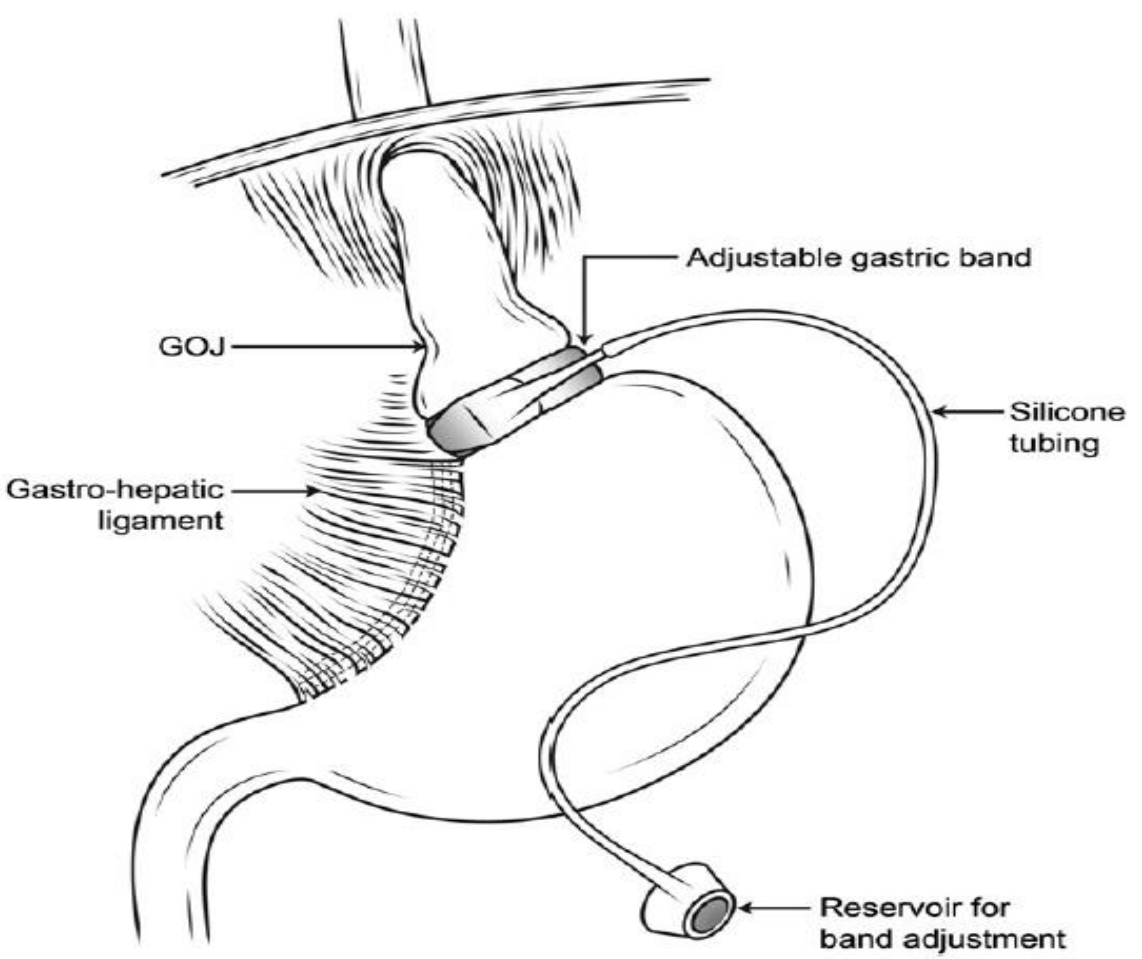


Fig. 1. Diagram of adjustable gastric band *in situ*.

H.A. Khwaja, G. Bonanomi / Current Anaesthesia & Critical Care 21 (2010) 31–38

- Procédure restrictive
- Suivi (diététiste/chx) à long terme
- Ajustement agressif de la bande
- LSC
- Souvent en ambulatoire
- Taux mortalité très faible (TPP/EP)
- Morbidités
  - Surtout mécaniques
  - RGO, obstruction, dysmotilité, dysphagie
  - Dilatation oesophagienne, dilatation de la poche gastrique

RYGBP

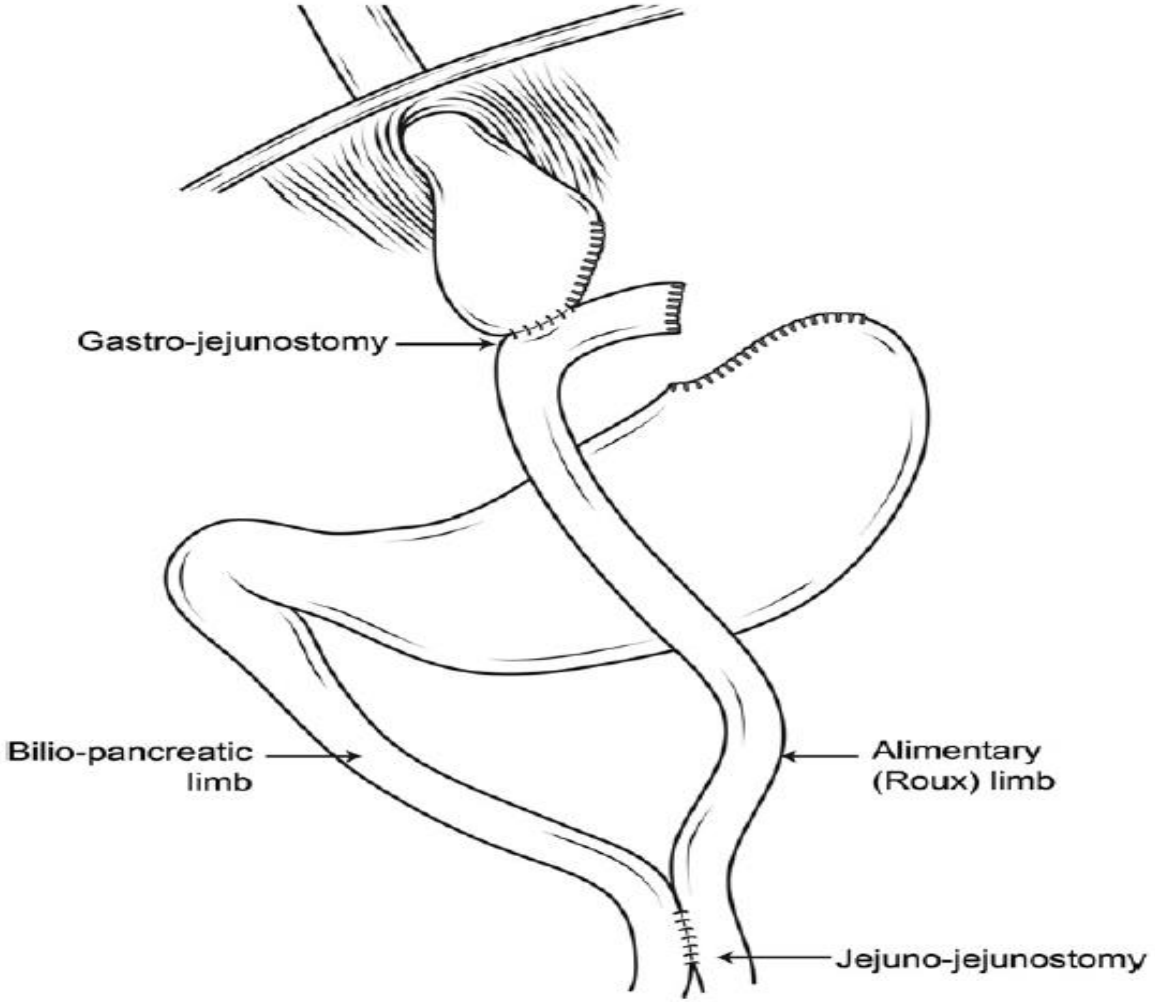


Fig. 2. Diagram of Roux-en-Y gastric bypass.

H.A. Khwaja, G. Bonanomi / Current Anaesthesia & Critical Care 21 (2010) 31–38

- Procédure restrictive et légèrement malabsorptive
- LSC (vs ouverte)
  - ↓ temps hospitalisation 50%
  - ↓ infection plaie x 7
  - ↓ hernie incisionnelle x 20
  - ↓ admission USI
- Taux mortalité très faible
- Morbidités
  - Fuites anastomotiques
  - Saignement GI
  - TPP
  - Obstruction/stricture
  - Déficits nutritionnels

Dérivation bilio-pancréatique + switch duodénal

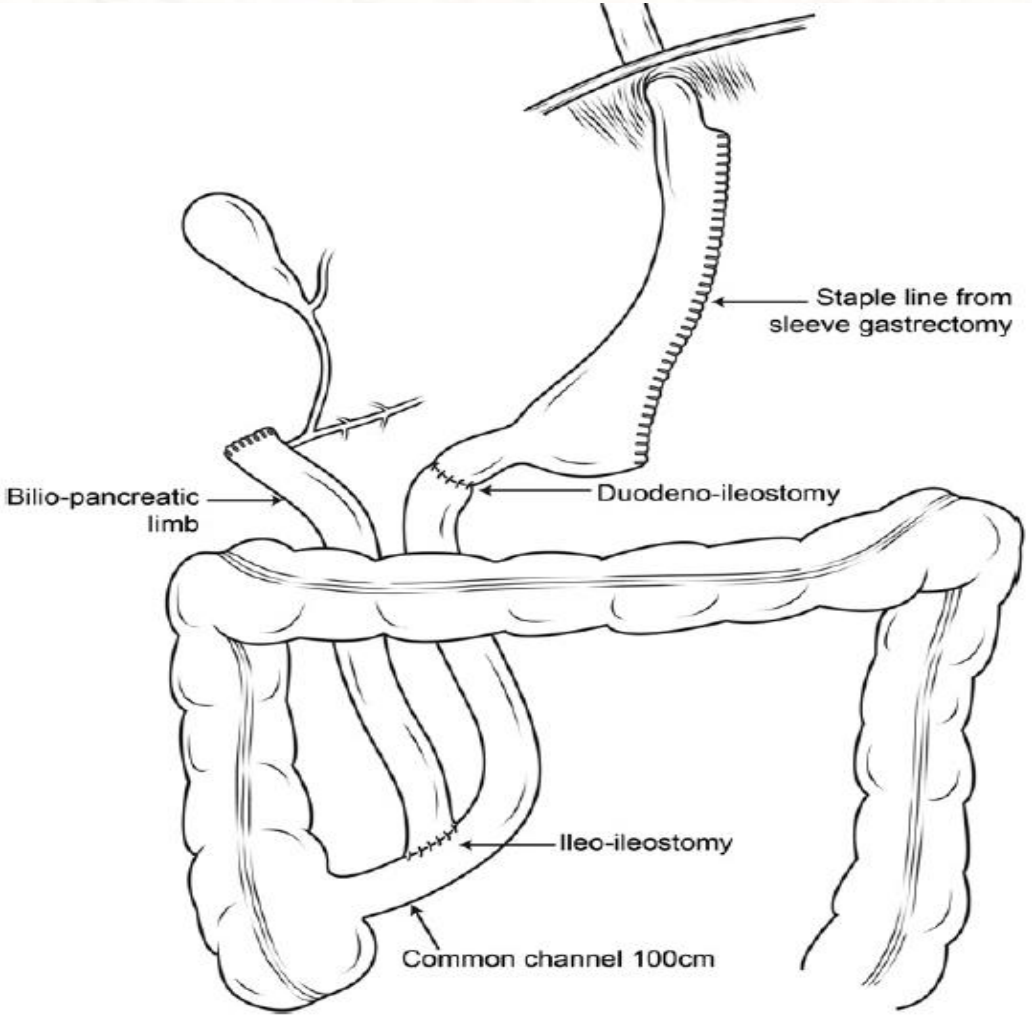


Fig. 4. Diagram of bilio-pancreatic diversion and duodenal switch.

H.A. Khwaja, G. Bonanomi / Current Anaesthesia & Critical Care 21 (2010) 31–38

- Procédure malabsorptive
- Complexité ↑
- Souvent en 2 chx différentes
- Mortalité plus élevée (0,5%)
  - ↑ si IMC > 60 (1,11%)
- Morbidités
  - Déficits nutritionnels importants
    - Suppléments à vie
  - Fuites anastomotiques
  - Obstructions

Gastrectomie verticale

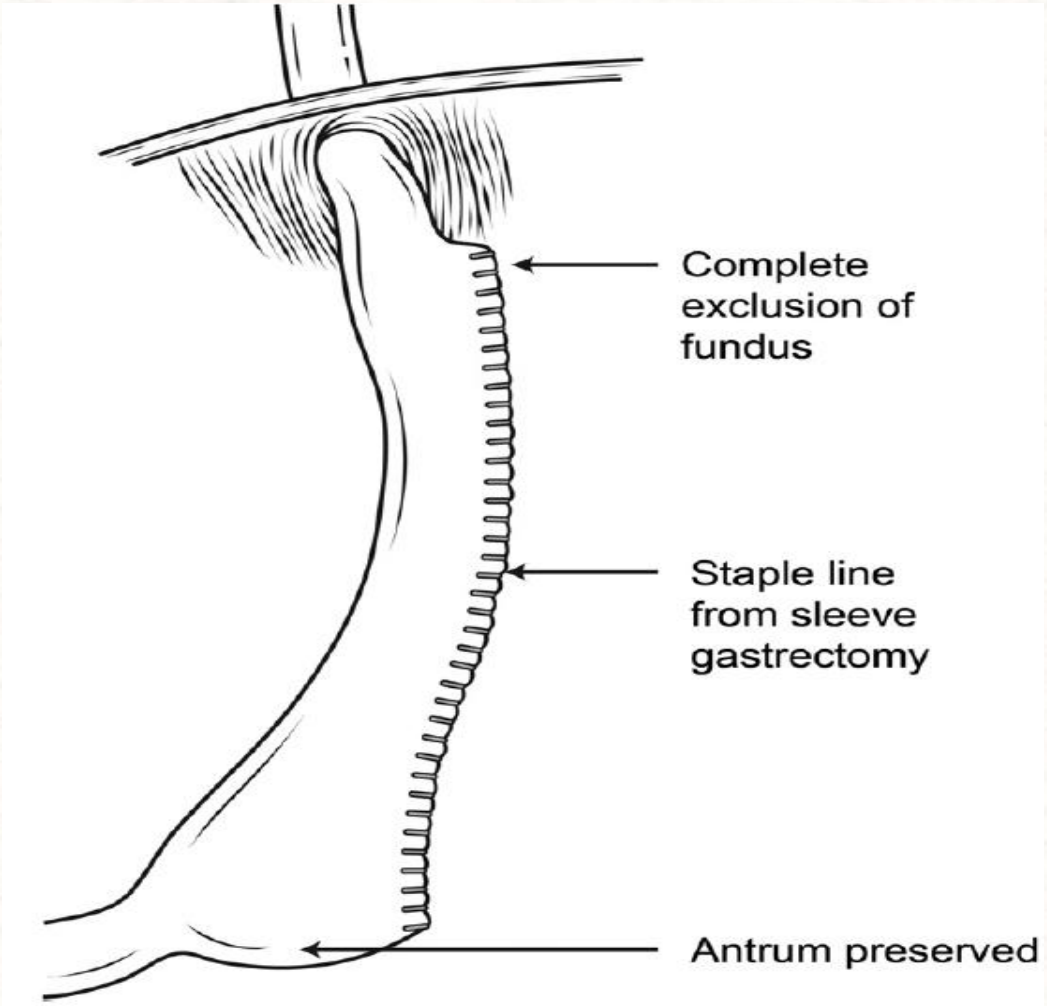


Fig. 5. Diagram of sleeve gastrectomy.

H.A. Khwaja, G. Bonanomi / Current Anaesthesia & Critical Care 21 (2010) 31–38

- Procédure restrictive
- Techniquement plus facile
- Moins de complications
- Taux de mortalité très faible
- Morbidités
  - Fuites

Considérations anesthésiques relatives la chirurgie bariatrique

Positionnement extrême

- Effet hémodynamique
- Points de pression
  - Neuropathie périopératoire
  - Plaies de pression
- Rhabdomyolyse
  - > 240 minutes
  - IMC > 50
- Matériel adapté
- LSC: pression insufflation ≤ 15 mmHg

Fig. 1. Reverse Trendelenburg position with use of head support to facilitate neck flexion and head extension at atlanto-occipital joint. The height of head support (i.e. number of blankets or uncompressible head rest) needed to achieve adequate neck flexion will vary from one patient to another depending on head and neck anatomy and relationship to chest diameter. A good approximation of optimal positioning for laryngoscopy is achieved when an imaginary line can be drawn from the sternal notch to the external auditory meatus. Note foot-board support to prevent the patient from sliding down.

V. E. Ortiz et al. / Surgery for Obesity and Related Diseases 11 (2015) 721–728

Aspiration

- ATCD chirurgie bariatrique
  - Modifications anatomiques/fonctionnelles
  - Obstruction
  - Séquestration proximale de solides/liquides

GLP-1

- Guide pratique clinique 29 octobre 2024
  - ASA, American Gastroenterological Association, American Society for Metabolic and Bariatric Surgery, International Society of Perioperative Care of Patients with Obesity, and the Society of American Gastrointestinal and Endoscopic Surgeons
- Facteurs de risque d'aspiration:
  - Phase d'escalade
  - Dose plus élevée
  - Dose hebdomadaire
  - Sx GI
  - Conditions médicales affectant le transit GI

GLP-1

- Arrêt
  - 1 jour pour dose quotidienne sans facteur de risque
  - 7 jours pour dose hebdomadaire
- Considérer
  - Diète liquide pour 24h
  - Échographie gastrique
  - ISR

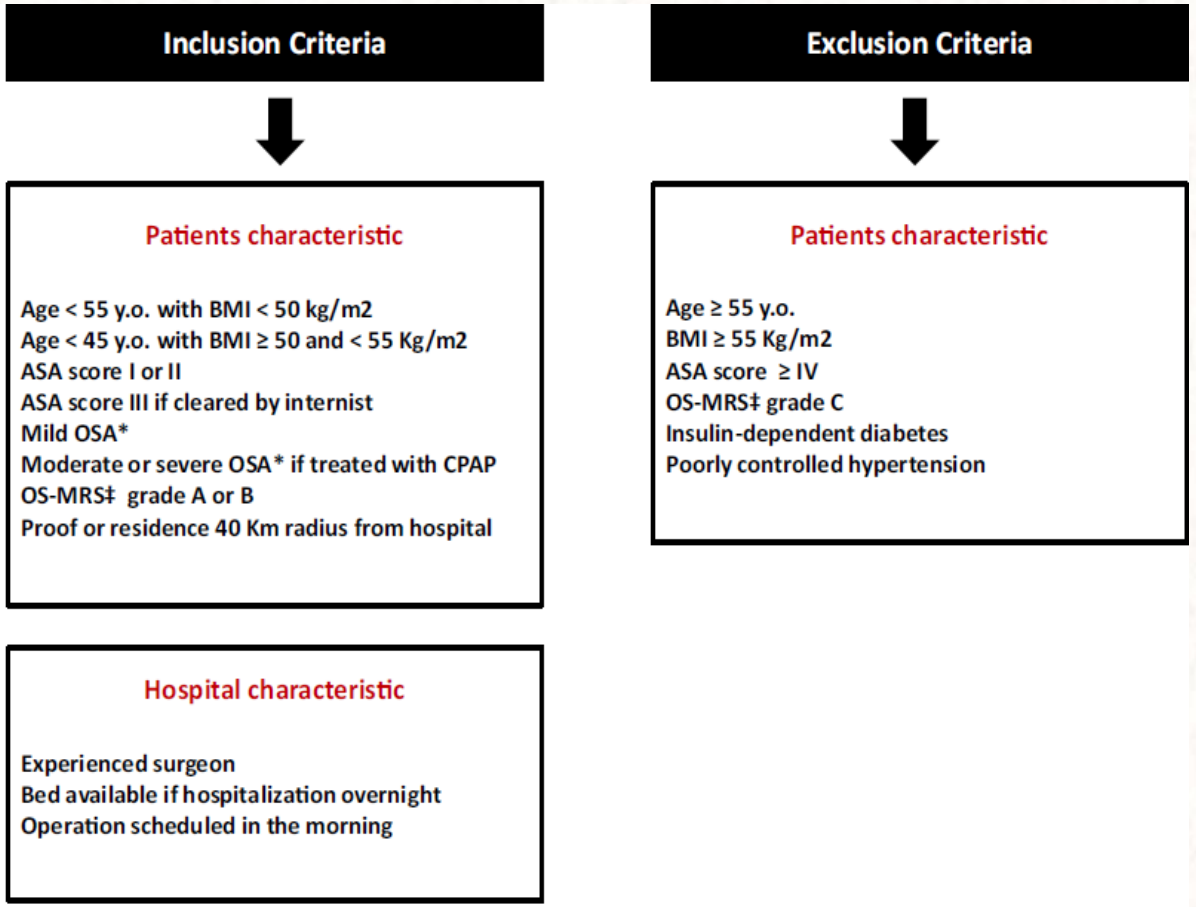
Gestion périopératoire des patients en chirurgie bariatrique

Fully Ambulatory Laparoscopic Sleeve Gastrectomy: 328 Consecutive Patients in a Single Tertiary Bariatric Center

Fabio Garofalo[1] · Ronald Denis[1] · Omar Abouzahr[1] · Pierre Garneau[1] · Radu Pescarus[1] · Henri Atlas[1]

OBES SURG
DOI 10.1007/s11695-015-1984-0

Fig. 1 Selection criteria



* Obstructive sleep apnea, ‡ Obesity Surgery Mortality Risk Score

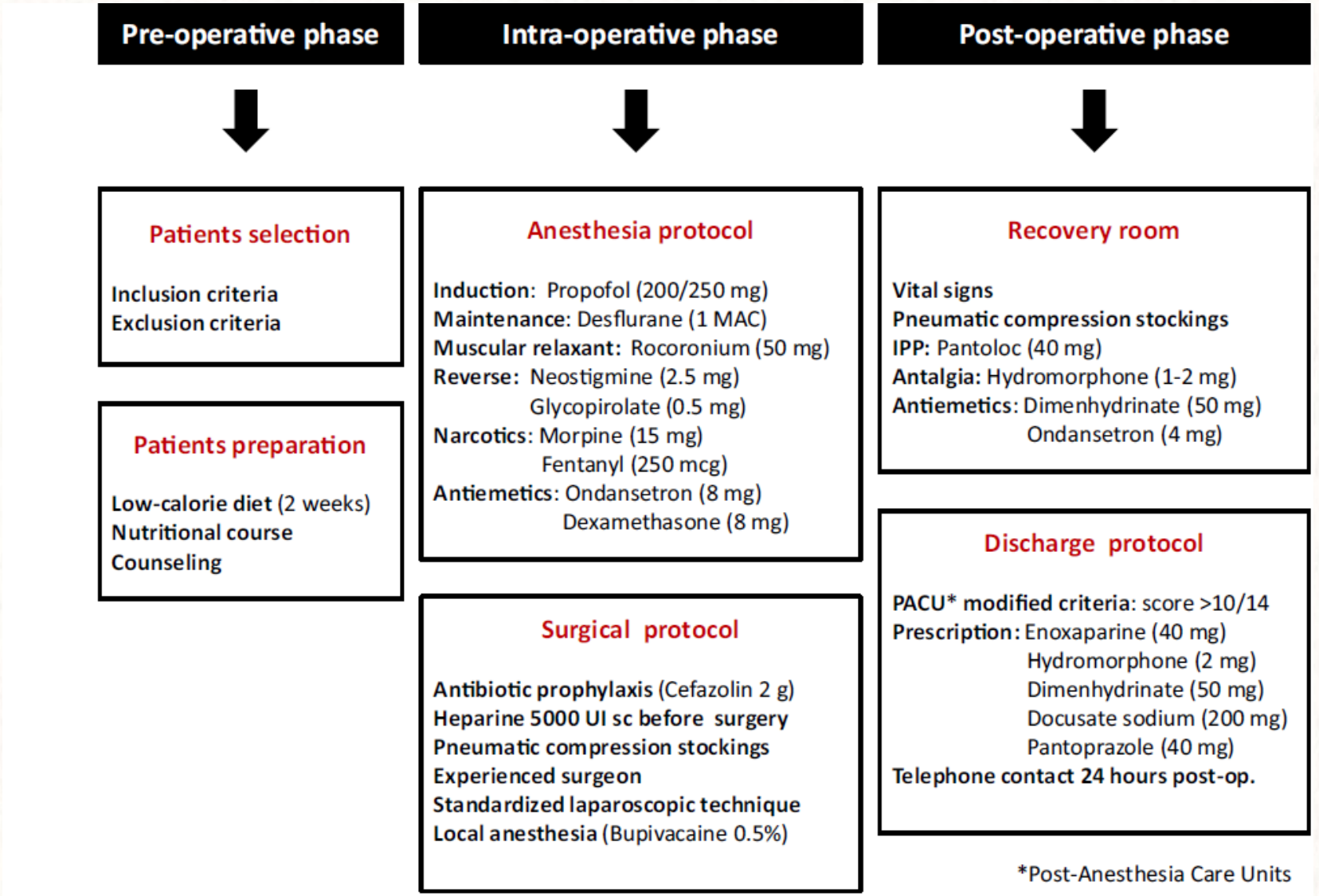


Fig. 2 Institution's ambulatory surgery protocol

Table 1 Patient characteristics

Characteristics	Patients (n=328)
Age (year)	38.4 (±8.5)[a]
Body mass index (kg/m^2)	44.5 (±5.6)[a]
ASA score	2.3 (±0.5)[a]
Women (%)	86.6
Female/male ratio	6/1
Comorbidities (%)	54.3
Hypertension (%)	21.6
Type II diabetes (%)	12.5
Sleep apnea (%)	10.1
Hyperlipidemia (%)	6.4
Ambulatory surgery	
Length of stay (hours)	8.1 (6–10)[b]
Overnight hospitalization (%)	1.8
Readmission (%)	8.5

[a] Mean±standard deviation

[b] Mean and range

Table 2 Cause for readmissions within 30 days postoperatively

Cause of readmission	Number of patients
Nausea/vomiting	13 (3.9 %)
Abdominal pain	7 (2.1 %)
Pneumonia	2 (0.6 %)
Pancreatitis	1 (0.3 %)
Urinary tract infection	1 (0.3 %)
Pain related to intra-abdominal hematoma	3 (0.9 %)
Gastric staple line leak	2 (0.6 %)

Original article

Perioperative management of obstructive sleep apnea in bariatric surgery: a consensus guideline

Surgery for Obesity and Related Diseases 13 (2017) 1095–1109

Table 1
Recommendations and statements concerning OSA preoperative screening in bariatric surgery

Question	Recommendation	% consensus	Quality of evidence	Strength of recommendation
1.1	The prevalence of OSA in bariatric surgery patients varies between 35% and 94%	-	☒☒☒☒	Statement
1.2	Clinically relevant perioperative complications seem more frequent in OSA patients	93	☒☐☐☐	Statement
1.3	CV, neuromuscular, and pulmonary outcomes are improved after bariatric surgery and this may be related to treatment of OSA	100	☒☐☐☐	Statement
1.4	CPAP is advisable to reduce the incidence of perioperative complications and CV risks	64*	☒☐☐☐	Weak
1.5	The gold standard for diagnosis of OSA is an overnight laboratory polysomnography	86	☒☒☒☒	Strong
1.6	Type 3 polygraphy can be used to screen for OSA in the bariatric population with high pre-test probability; its use is most reliable when moderately severe OSA is suspected	100	☒☒☐☐	Strong
1.7	The STOP-Bang score can be used as a screening tool to stratify high risk OSA	93	☒☒☒☐	Strong
1.8	The ESS should not be used as a screening tool for OSA	100	☒☒☐☐	Strong
1.9	The Berlin Questionnaire can be used to stratify risk of OSA	93	☒☐☐☐	Weak
1.12	A portable monitor is a useful adjunct to questionnaires in OSA screening	100	☒☒☒☐	Weak
1.14	$PaCO_2$ does not indicate the risk of OSA. However, elevated $PaCO_2$ is important for perioperative risk stratification and is a diagnostic tool for OHS in a patient with OSA	100	☒☐☐☐	Strong

1.15	CO_2 measurements assessing the relation of OSA with perioperative complications should be implemented in future prospective trials to evaluate its role in risk stratification	100	☒□□□	Statement
1.16	Venous HCO_3^- should be part of the routine screening tool for coexistence of OHS	100	☒☒☒☒	Strong
1.17	The ODI is a useful non-invasive severity measure; other measures need further evaluation	80	☒☒☒□	Statement
1.18	OHS should be screened for in bariatric surgery patients with OSA (coexistence 20%)	100	☒☒☒☒	Strong
1.19	More research is needed to evaluate and introduce additional AHI cutoffs, i.e., ≥60/hr	80	☒□□□	Statement
1.20	Length of operation, open or laparoscopic approach and level of expertise of a center may be of influence on OSA related outcome	93	☒□□□	Weak
1.21	The presence of neuromuscular disorders or obstructive lung diseases should be considered as this might increase the perioperative risk of hypoventilation and upper airway obstruction	100	☒☒□□	Strong
1.22	There is no evidence that patients should specifically be investigated for VTE risk, unless they have a history of prior deep VTE and/or coagulation disorders	100	☒□□□	Weak
1.23	The ODI seems reliable and clinically useful in detection OSA	93	☒☒☒□	Strong

OSA = obstructive sleep apnea; CV = cardiovascular; CPAP = continuous positive airway pressure; ESS = Epworth sleepiness scale; OHS = obesity hypoventilation syndrome; ODI = oxygen desaturation index; AHI = apnea hypopnea index; VTE = venous thromboembolisms.

Table 3
Recommendations and statements concerning postoperative monitoring of OSA patients in bariatric surgery

Question	Recommendation	% consensus	Quality of evidence	Strength of recommendation
3.1	Continuous monitoring is recommended in patients with OSA in the early postoperative period until they are no longer at risk of respiratory depression	100	☒☒☒□	Strong
3.2	Patients who are either male, aged >50 or have a BMI >60 kg/m^2 and/or had open surgery are at higher risk of postoperative complications	100	☒☒☒□	Statement
3.3	Routine admission of OSA patients to the ICU is not necessary	93	☒☒☒□	Strong
3.7	Monitoring recommendations are independent from CPAP usage as CPAP compliance is not guaranteed; CPAP usage should go along with monitoring	93	☒☒☒□	Strong
3.9	There is a role for prolonged stay in the PACU to identify high risk patients and to determine subsequent appropriate management	93	☒□□□	Statement
3.12	Absence of a suitable home caregiver is an absolute contraindication to outpatient surgery in morbidly obese OSA patients	100	☒□□□	Strong
3.13	There is no absolute AHI cutoff that would be a contraindication to outpatient surgery in OSA patients compliant with CPAP, without severe co-morbidities and not requiring opioids or sedatives	79	☒□□□	Weak
3.14	Postoperative care should not be different for different bariatric procedures	100	☒□□□	Strong
3.15	The minimum required monitoring is a pulse oximeter, but there may be a role for additional monitoring, especially in patients receiving postoperative narcotics	100	☒☒□□	Strong

OSA = Obstructive sleep apnea; BMI = body mass index; ICU = intensive care unit; CPAP = continuous positive airway pressure; PACU = post-anesthesia care unit; AHI = apnea hypopnea index.

Incidence and risk factors for intensive care unit admission after bariatric surgery: a multicentre population-based cohort study

D. J. R. Morgan[1,*], K. M. Ho[1,3,4], J. Armstrong[2] and S. Baker[5]

British Journal of Anaesthesia, 115 (6): 873–82 (2015)

Table 1 Baseline comparison of 12 062 bariatric patients stratified by need for intensive care unit admission after bariatric surgery in Western Australia between 2007 and 2011. ICU, intensive care unit; IQR, interquartile range; LOS, length of stay. [a]Patients re-admitted to hospital with unresolved bariatric issues

Characteristic	Bariatric patients requiring ICU (*n*=590)	Bariatric patients not requiring ICU (*n*=11 472)	P-value
Patient numbers per yr [*n* (%)]			
2007	80 (4.0)	1901 (96.0)	
2008	168 (6.8)	2293 (93.2)	
2009	138 (5.1)	2574 (94.9)	
2010	101 (4.2)	2316 (95.8)	
2011	104 (4.2)	2388 (95.8)	
Characteristics [SD, median, IQR]			
Age (mean; yr)	48 [11.3, 49, 40–57]	43 [11.65, 43, 34–52]	<0.001
Gender (male) [*n* (%)]	294 (49.7)	2021 (20.2)	
Weight (mean; kg)	136 [31.6, 133, 114–156]	Not available	
BMI (mean; kg m^{-2})	46.6 [9.2, 46, 39.8–52.2]	Not available	
Funding for surgery [*n* (%)]			
Private	515 (87.3)	10 966 (95.6)	
Public	75 (12.7)	506 (4.4)	<0.001
Type of surgery [*n* (%)]			
Laparoscopic	555 (94.1)	11 122 (96.9)	
Open	35 (5.9)	350 (3.1)	<0.001
Original	505 (85.6)	10 665 (92.9)	
Revisional	85 (14.4)	817 (7.1)	<0.001
Bariatric re-hospitalizations[a]	216 (36.6)	686 (6.0)	<0.001
Hospital LOS (mean; days)	8.6	2.6	
[SD, median, IQR]	[14.7, 4, 3–8]	[1.5, 2, 2–3]	<0.001
Deaths to December 2012 [*n* (%)]	14 (2.4)	8 (0.1)	<0.001

4,9%

Table 2 Patient characteristics, co-morbidities, preoperative consultation and initial bariatric operation for 590 bariatric patients undergoing 650 admissions to an ICU between 2007 and 2011. CPAP, continuous positive airway pressure; COPD, chronic obstructive pulmonary disease; ICU, intensive care unit; IQR, interquartile range; LAGB, laparoscopic adjustable gastric band. [a]Specialist review before day of surgery. [b]Includes internal physician, haematologist, nephrologist, immunologist, endocrinologist, clinical microbiologist, psychiatrist, or vascular surgeon. [c]Based on 650 ICU admissions in 590 patients. [d]Roux-en-Y, mini gastric bypass, pancreatobiliary bypass, gastroplasty, and gastric balloon procedures. [e]Index hospitalization was the hospitalization related to the first bariatric surgery and excludes patients admitted to the ICU upon hospital re-admission for ongoing bariatric complications

Characteristics	Elective ICU patients (*n*=414)	Emergent ICU patients (*n*=176)	*P*-value
Patient characteristics [SD, median, IQR]	69,1%	30,9%	
Age (mean; yr)	48.2	47.1	0.28
	[11.4, 49, 40–57]	[11.1, 48, 39–55]	
Gender (male) [*n* (%)]	231 (55.9)	62 (35.2)	<0.001
Weight (mean; kg)	142	120	<0.001
	[30, 140, 122–160]	[30, 118, 98–139]	
BMI (mean; kg m^{-2})	48.2	42.3	<0.001
	[9.1, 47.6, 41–54]	[8.1, 41.4, 36–49]	
Premorbid co-morbidities [*n* (%)]			
Obstructive sleep apnoea	151 (36.6)	41 (23.3)	0.002
CPAP	162 (39.2)	28 (15.9)	<0.001
Asthma/COPD	83 (20.1)	30 (17.0)	0.43
Smoker	51 (12.3)	33 (18.8)	0.05
Ischaemic heart disease	44 (10.7)	9 (5.1)	0.04
Hypertension	227 (55.0)	67 (38.1)	<0.001
≥3 Antihypertensive drugs	54 (13.0)	11 (6.2)	0.01
Diabetes mellitus	140 (33.9)	36 (20.5)	0.001
Preoperative consultation[a] [*n* (%)]			
Cardiologist review	23 (5.1)	24 (11.9)	0.002
Pulmonologist review	44 (9.8)	5 (2.5)	0.001
Anaesthetist review	113 (25.2)	33 (16.4)	0.02
Other specialist review[b]	10 (2.2)	3 (1.5)	0.76
ASA classification[c] [SD, median, IQR]	3.2 [0.7, 3, 3–4]	3.8 [2.2, 3, 3–4]	<0.001
Primary bariatric operation [*n* (%)]			
LAGB	231 (55.9)	95 (54.0)	0.72
Sleeve gastrectomy	174 (42.1)	71 (40.3)	0.72
Other bariatric surgery[d]	8 (2.0)	10 (5.7)	0.03
Revisional surgery	43 (10.4)	42 (23.9)	0.001
Open surgery	17 (4.1)	18 (10.2)	0.007
Total ICU admissions (*n*)	449	201	
ICU during index hospitalization[e] [*n* (%)]	393 (87.5)	92 (45.8)	<0.001

Table 3 Bariatric complications associated with 650 ICU admissions between 2007 and 2011 stratified by urgency of ICU admission.[a] AKIN, acute kidney injury network; DVT, deep vein thrombosis; GIT, gastrointestinal tract; ICU, intensive care unit; PE, pulmonary embolism. [a]590 bariatric patients, of whom 51 patients had multiple ICU admissions. [b]Fifteen patients admitted emergently to the ICU had no defined complications but had unpredictably prolonged or technically difficult operations, or unappreciated co-morbidities before surgery. [c]Complications occurring after theatre and before initial hospital discharge. [d]Complications requiring subsequent re-hospitalization. [e]Complications including gastric band malfunction, port infection, or failure to lose weight. [f]Unplanned additional surgical interventions. [g]Complications are as follows: obstructed airway, difficult intubation, hypoventilation, hypoxia, anaphylaxis, bronchospasm, gas embolism, cardiac arrest, respiratory arrest, poorly controlled hypertension, and hypotension. [h]Complications are as follows: non-cardiac chest pain, neurological, metabolic, hepatic, hypertension, congestive cardiac failure, disseminated intravascular coagulopathy, diabetic ketoacidosis, pancreatitis, severe eczema, diarrhoea, narcotization, undiagnosed sleep apnoea, and undiagnosed cancer

Characteristic	Elective ICU admission (n=449)	Emergent ICU admission (n=201)[b]	P-value
Surgical complications (timing) [n (%)]			
Intraoperative complication	42 (9.4)	22 (10.9)	0.57
Postoperative complications[c]	19 (4.2)	63 (31.3)	<0.001
Delayed complications[d]	55 (12.2)	97 (48.5)	<0.001
Surgical complications (type) [n (%)]			
Admission with any complication	95 (21.2)	149 (74.1)	<0.001
GIT obstruction	19 (4.2)	21 (10.4)	0.004
GIT perforation, leak, abscess	23 (5.1)	94 (46.8)	<0.001
Haemorrhage	21 (4.7)	43 (21.4)	<0.001
Other surgical complications[e]	29 (6.5)	30 (14.9)	0.001
Positive microbiology cultures	8 (1.8)	66 (32.8)	<0.001
Surgical interventions[f] [n (%)]			
Drain (unplanned)	8 (1.8)	35 (17.4)	<0.001
Endoscopy	22 (4.9)	34 (16.9)	<0.001
Laparoscopy	61 (13.6)	89 (44.3)	<0.001
Laparotomy	34 (7.6)	85 (42.3)	<0.001
Thoracotomy	2 (0.4)	7 (3.5)	0.005
Anaesthetic complications [n (%)]			
Any anaesthetic complication[g]	8 (1.8)	55 (27.4)	<0.001
Medical complications [n (%)]			
Admissions with any complication	64 (14.3)	128 (63.7)	<0.001
Cardiac arrhythmia	13 (2.9)	19 (9.5)	<0.001
Left pleural effusion	2 (0.4)	27 (13.4)	<0.001
Lower respiratory tract infection	4 (0.9)	3 (1.5)	0.68
Aspiration pneumonitis	0 (0)	2 (1.0)	0.10
Empyema	0 (0)	8 (4.0)	<0.001
Asthma	6 (1.3)	8 (4.0)	0.04
Septic shock	2 (0.4)	30 (14.9)	<0.001
Acute coronary syndrome	3 (0.7)	5 (2.5)	0.11
AKIN stage 3	0 (0)	16 (8.0)	<0.001
DVT, PE, or both	2 (0.4)	7 (3.5)	0.005
Other medical complications[h]	34 (7.6)	47 (23.4)	<0.001

89%

8,8%

2,2%

Gestion anesthésique

- Extubation
  - Bien éveillé
  - Décurarisé
  - Semi-assis
- Analgésie multimodale
- Gestion liquidienne selon LBW
  - Approche restrictive vs libérale?
- Surveillance accrue en salle de réveil
  - Soins intensifs, soins intermédiaires, saturométrie continue, CPAP empirique PRN

Enhanced recovery after bariatric surgery

Adrian Alvarez[a], *Basavana G. Goudra*[b], *and Preet Mohinder Singh*[c]

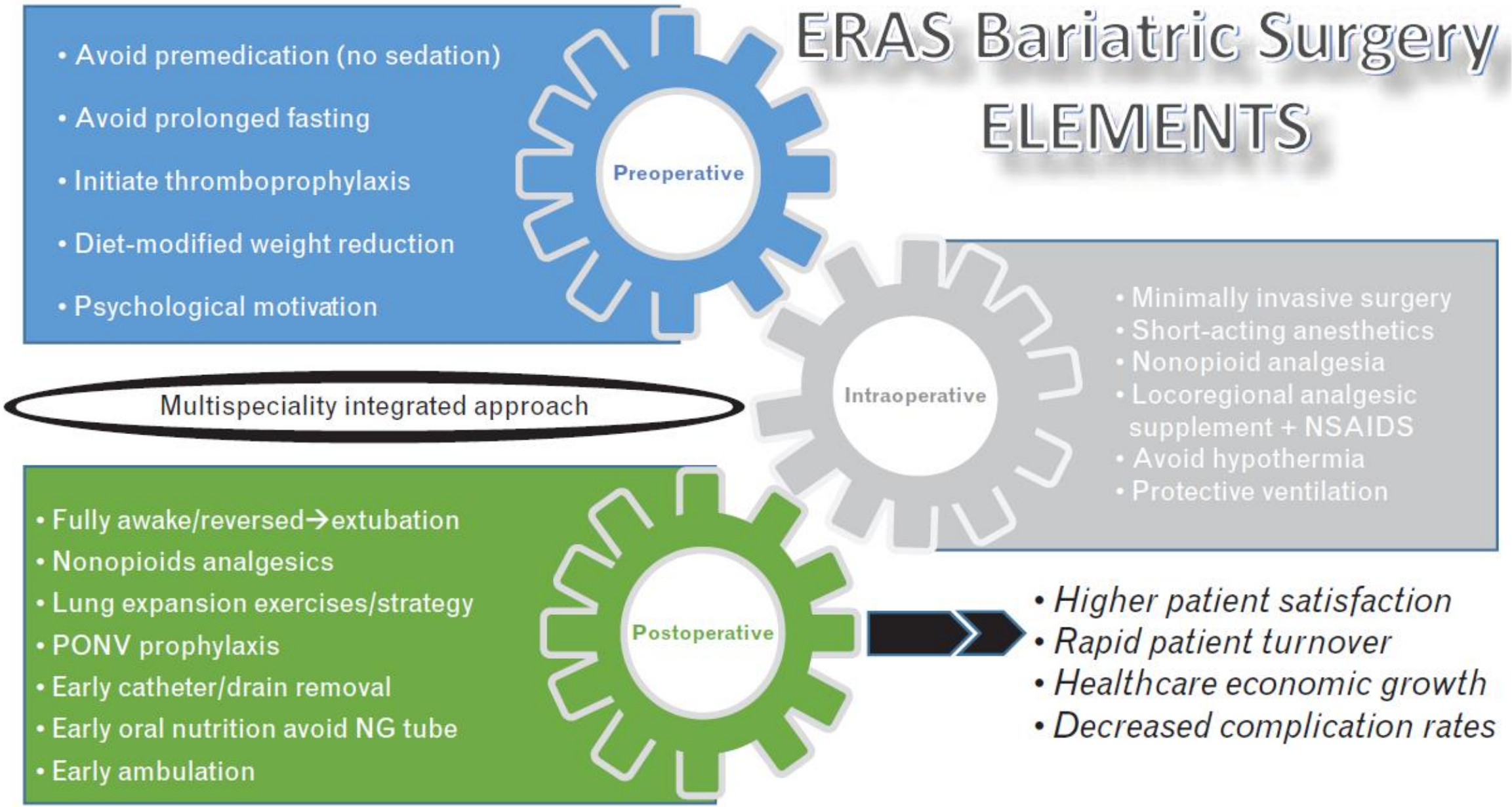
Curr Opin Anesthesiol 2017, 30:133–139

Table 1. Table showing Red Flags wherein enhanced recovery after surgery protocol may be omitted for patients undergoing bariatric surgery

Red Flags to avoid ERAS in patients	
Patient characteristics	**Medical/surgical conditions**
Extremes of ages (age< 18 or age>60) years	Resurgery or surgical complication or prolonged surgery
Uncooperative or not motivated patient	Moderate-to-severe OSA, OHS
Inability to follow instructions Mental impairment	Patients on anticoagulant therapy or known coagulopathy
Poor social support/no-caregiver	Comorbidities warranting prolonged observation (uncontrolled diabetes, hypertension and CAD)
Residing in far outreach from hospital	Previous history of severe postoperative nausea vomiting

CAD, coronary artery disease; ERAS, enhanced recovery after surgery; OHS, obesity hypoventilation syndrome; OSA, obstructive sleep apnea.

ERAS Bariatric Surgery ELEMENTS



Conclusion

- Comorbidités associées
  - Évaluation préopératoire complète
  - Consultations
  - Optimisation préopératoire
- Surveillance post-opératoire serrée
- Ambulatoire possible
  - Patients sélectionnés
- Expertise et volume
  - Diminue mortalité/morbidité

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