Association of Swiss Office Based Anesthesiologist; (Morbid) Obesity

Anesthetic management of the obese patient in the ambulant setting

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KSB

Anesthetic management of the obese patient in the ambulant setting; M. Siegemund

„To be corpulent ist not a physiological quality – that‘s a Weltanschauung."
– Kurt Tucholsky, in "Die Weltbühne", 10. Juni 1920,

ASOBA

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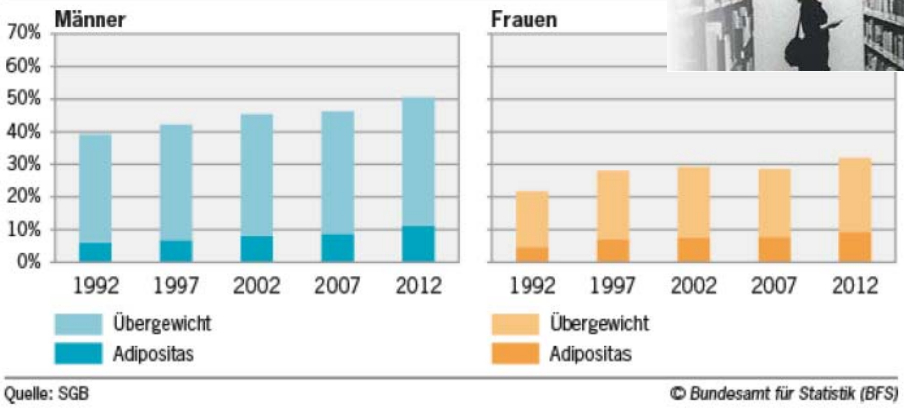


	Untergewicht (BMI<18.5)	Normalgewicht (18.5≤BMI<25)	Übergewicht (25≤BMI<30)	Adipositas (BMI≥30)
Total	**3.7**	**55.2**	**30.9**	**10.3**
Nach Geschlecht				
Männer	1.2	48.3	39.3	11.2
Frauen	6.2	61.9	22.6	9.3
Nach Altersklassen				
15-24-jährig	8.0	73.1	15.4	3.5
25-34-jährig	5.5	64.4	23.8	6.3
35-44-jährig	2.5	58.4	30.7	8.3
45-54-jährig	2.8	51.6	33.9	11.8
55-64-jährig	1.7	45.7	37.1	15.5
65-74-jährig	2.2	41.6	41.0	15.2
75+-jährig	3.5	47.1	36.7	12.8

http://www.bfs.admin.ch/bfs/portal/de/index/themen/14/02/02/key/02.html[05.11.2013 23:06:47]

Anesthetic management of the obese patient in the ambulant setting; M. Siegemund

WHO classification of obesity

Classification	BMI; kg.m^{-2}	Risk of co-morbidities
Normal	18.5–24.9	Average
Overweight	≥25	
Pre-obese	25–29.9	Increased
Obese class 1	30–34.9	Moderate
Obese class 2	35–39.9	Severe
Obese class 3	≥40	Very severe

Bauchumfang (cm) als Morbiditätsfaktor

- ♂ > 102
- ♀ > 88

Saravanakumar 2006, Anaesthesia;61:36-48

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‖

RESULTS: A literature search revealed 23 studies (13 prospective and 10 retrospective), and 1 systematic review assessing laparoscopic bariatric surgery. A total of 106,119 patients were included in the analysis with 62,476 patients included in the prospective trials and 43,643 patients included in the retrospective trials (not including the systematic review of laparoscopic bariatric surgery). Of these, 39,548 patients underwent bariatric surgery. The super obese (body mass index [BMI] >50 kg/m^2) appear to be at higher risk of complications. Patients undergoing nonbariatric surgery had a lower degree of obesity (BMI approximately 30 kg/m^2). Patients undergoing bariatric surgery were morbidly obese (BMI >40 kg/m^2), which is associated with a higher comorbidity burden. However, the lack of increase in unanticipated admission rate in this patient population may be related to thorough preoperative assessment and avoidance of patients with comorbid conditions.

Table 1. Prospective Observational Trials (Demographic Data)

Studies	No. of patients: Obese	Nonobese	Total	Age (y)	BMI (kg/m^2)	Male gender, (% of total)
Fortier et al.,[6] 1999	Not recorded	Not recorded	15,172	Discharged home = 46 ± 15 Unanticipated admission = 52 ± 20	Discharged home = 28 ± 5 Unanticipated admission = 24 ± 0.5	Discharged = 32% Unanticipated admission = 43.3%
Chung et al.,[7] 1999	2799 (15.9%)	14,839 (84.10%)	17,638	11–98	>30	32.90%
Nielsen et al.,[8] 2005	2166 (31.30%)	4754 (68.70%)	6920	48 ± 17	<25 = 34.8% 25–29 = 34.0% ≥30 = 31.3%	46.20%
Norman and Aronsohn,[9] 2007	51 (6.10%)	791 (93.90%)	842	Not available	Nonobese = 28.8 ± 5 Obese = 45.5 ± 8	Not recorded
Waisath et al.,[10] 2009	441 (36.50%)	764 (63.40%)	1205	No complications = 37.2 ± 14.9 Complications = 37.2 ± 14.9	No complications = 28.5 ± 7.8 Complications = 28.9 ± 7.8	Not recorded
Wani et al.,[11] 2014	286 (28%)	730 (72%)	1016	58 (49–68)	<30 = 72% 30–35 = 16% >35 = 12% 35–48.3	46.30%
De Waele et al.,[12] 2004	10 (100%)	0	10	45.2		10%
Kormanova et al.,[13] 2010	20 (100%)	0	20	34	37.2–50.1	10%
Ramaswamy et al.,[14] 2004	193 (100%)	0	193	42 ± 10	50 ± 8	12%
Sasse et al.,[15] 2009	248 (100%)	0	248	45.57 ± 11.18	43.79 ± 6.41	18.10%
Flum et al.,[16] 2009	1198 (100%)	0	1198	46 ± 12.5	44.1 (40.5–49.0)	23.10%
Dorman et al.,[27] 2012	26,002 (100%)	0	26,002	45.9 ± 11.9	44.2 ± 6.7	20.20%
Karkala et al.,[28] 2011	9649 (100%) Morbidly obese = 7889 Super obese = 1760	0	9649	Morbidly obese = 45.76 Super obese = 44.66	Morbidly obese >40 Super obese ≥50	Super obese group had significantly more men than morbidly obese group: 3:2

"Is there a weight limit above which ambulatory surgery may not be appropriate?"

None of the studies included in this review have directly addressed this question. Thus, at present, there is insufficient evidence to provide strong recommendations regarding a "cutoff" weight or BMI for patients undergoing ambulatory surgery.

Siegemund's rule of EBM

BMI >30

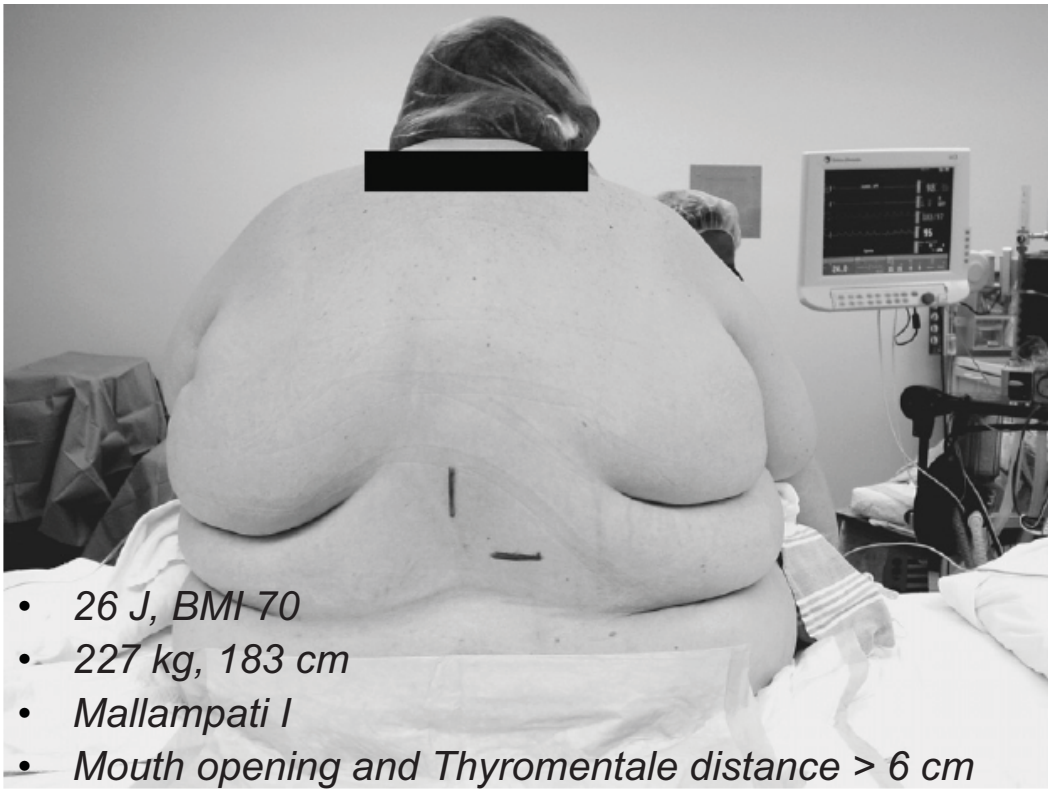
> published studies about ambulatory anesthesia and obesity

> published prospective randomized studies on selection of ambulant obese patients

≤ 0

= Eminence-Based-Medicine

The problem



- *26 J, BMI 70*
- *227 kg, 183 cm*
- *Mallampati I*
- *Mouth opening and Thyromentale distance > 6 cm*

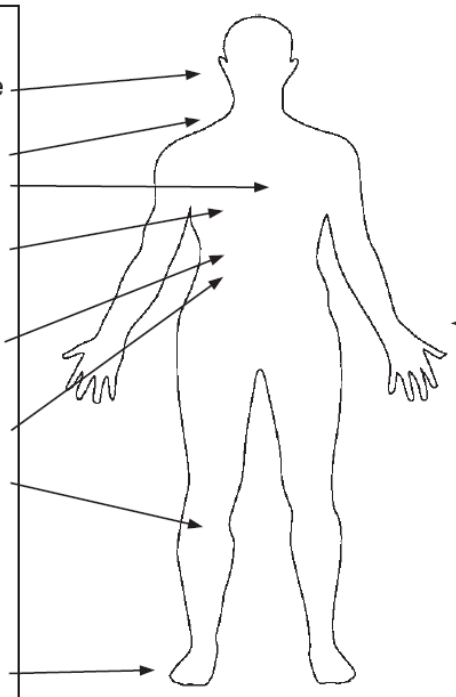
Whitty RJ (2007) Int J Obstet Anesth; 16: 139-144

More problems

Problems?

Chronic complications

Raised intracranial pressure
Cerebrovascular disease
Obstructive sleep apnoea
Ischaemic heart disease
Chest wall restriction
Obesity hypoventilation
Atelectasis
Non-alcoholic steatosis
Cholelithiasis
Pancreatitis
Glomerulosclerosis
Infertility
Venous stasis, phlebitis
Hypertension
Type 2 diabetes
Hyperlipidemia
Various cancers
Anxiety, depression
Osteoarthritis
Gout



Acute management issues

Transport and positioning

Procedural difficulties:
Vascular access
Tracheal intubation
Neural blockade
Surgery

Monitoring problems

Difficult airway maintenance

Impaired ventilation

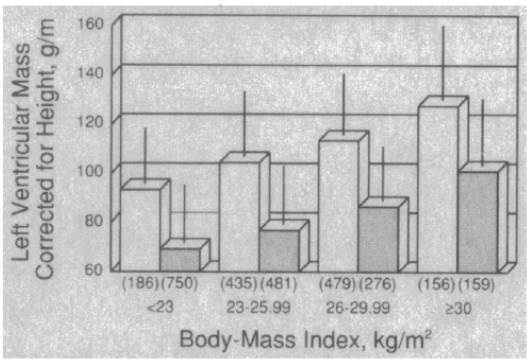
Disordered gas exchange

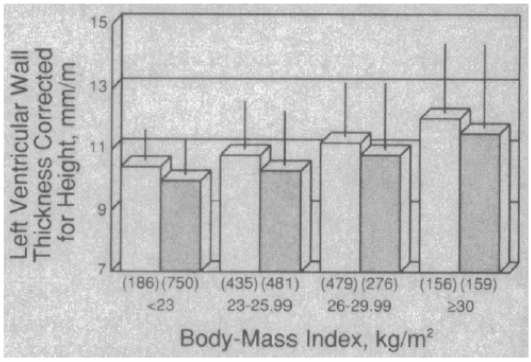
Altered pharmacokinetics

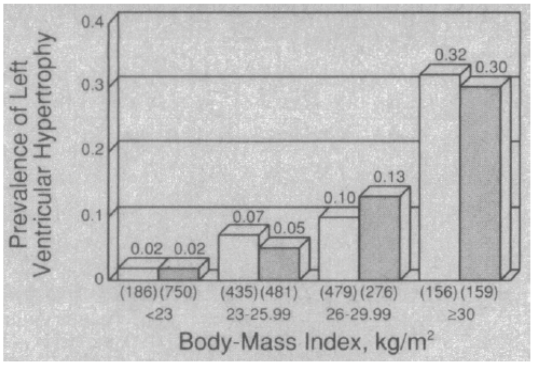
Haemodynamic instability

Aspiration risk

Cardiovascular changes





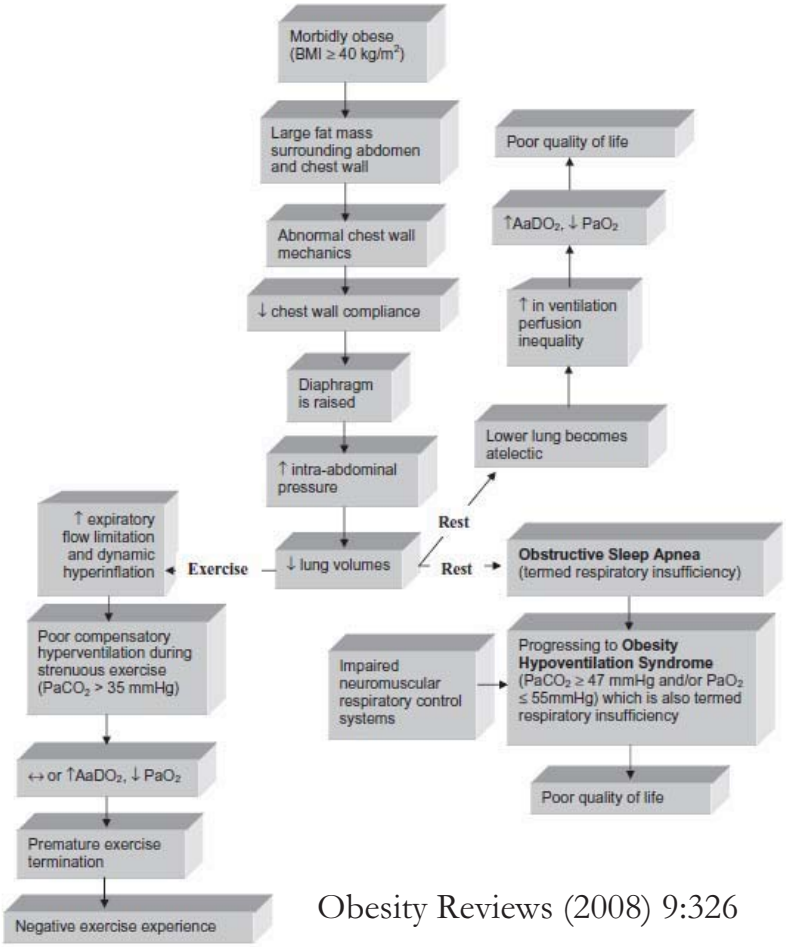


- More diastolic dysfunction
- Excentric hypertrophy
- Increased sympathetic tone
- An BMI increase 1 kg/m^2, CO increased 0.08 l/min or SV 1.35 ml
- No linear increase of blood volume
  $lnBV = 70 / (BMI / 22)^{1/2}$ ml/kg

(*JAMA*. 1991;266:231-236)

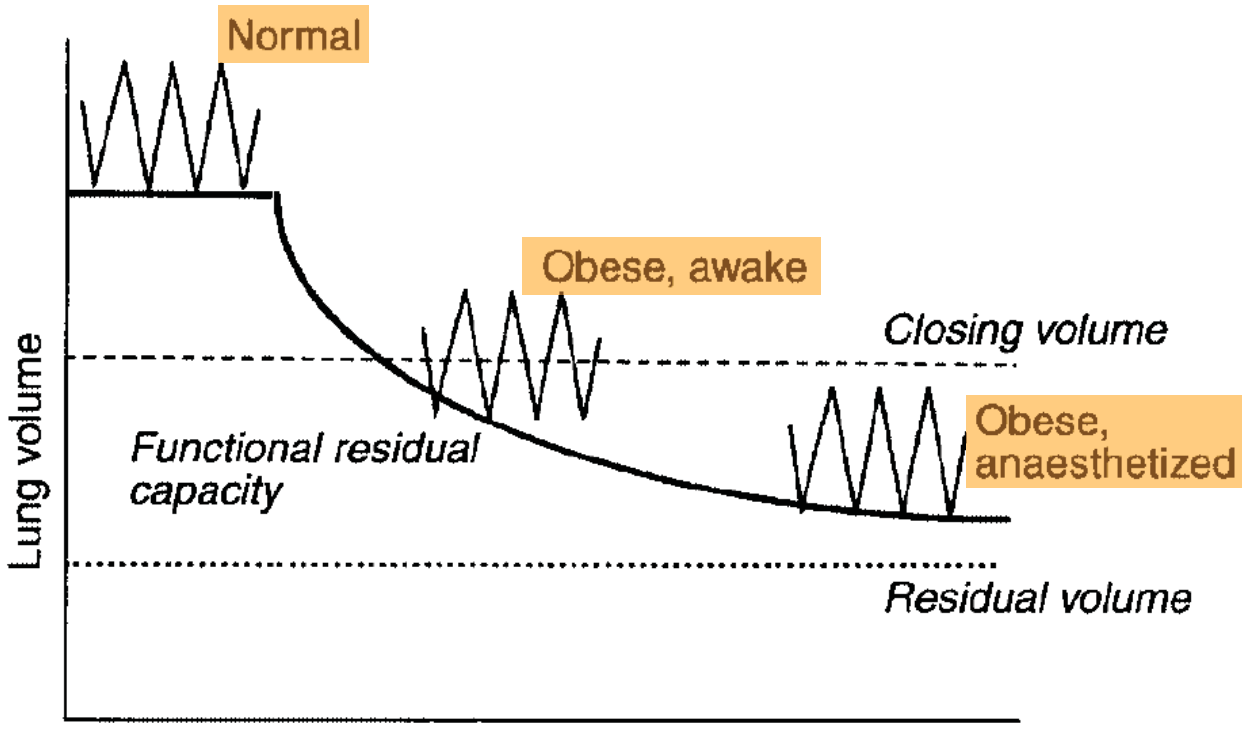
Pulmonary gas exchange in the morbidly obese

G. S. Zavorsky[1]



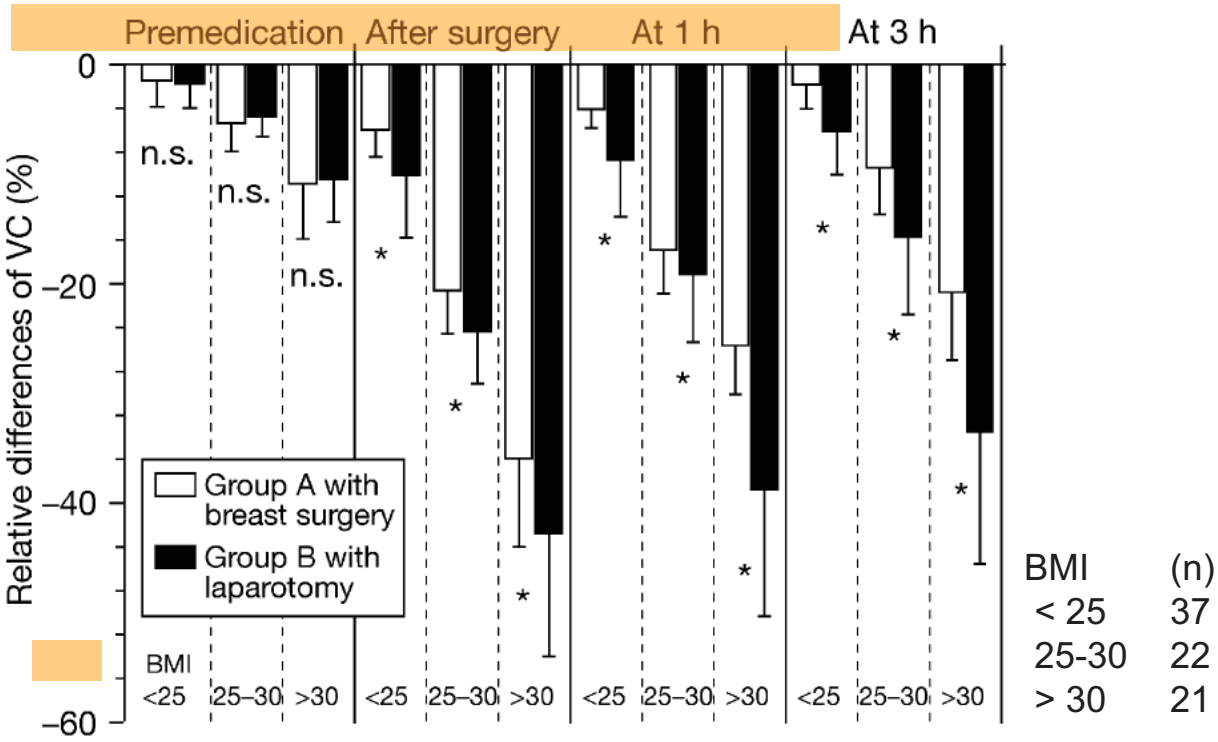
Obesity Reviews (2008) 9:326

Consequence of obesity on FRC



Adams JP & Murphy PG (2000) BJA; 85: 91-108

Influence of BMI on vital capacity

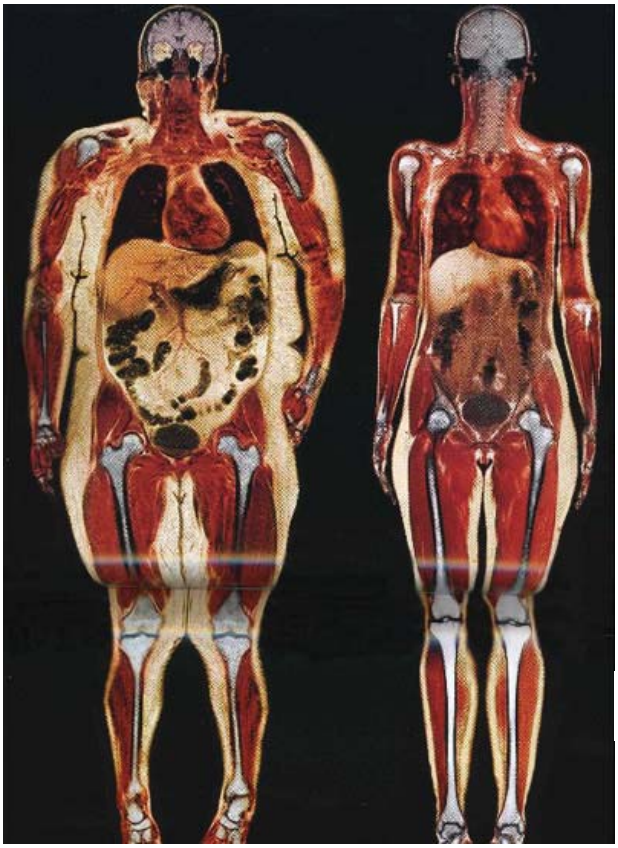


vUngern-Sternberg (2004) BJA; 92: 202-7

Respiratory changes

Parameter	Schwangerschaft	Adipositas	Kombination
Progesteronkonzentration	↑	↔	↑
CO_2-Sensitivität	↑	↓	↑
Tidalvolumen	↑	↓	↑
Insp. Reservevolumen (IRV)	↑	↓	↑
Exp. Reservevolumen (ERV)	↓	↓↓	↓
Residualvolumen (RV)	↓	↓ oder ↔	↑
FRC	↓↓	↓↓↓	↓↓
Vitalkapazität (VC)	↔	↓	↓
FEV1	↔	↓ oder ↔	↓
FEV1/ VC	↔	↔	↔
Compliance	↔	↓↓	↓
V / Q Fehlverteilung	↑	↑	↑↑
Resistance	↓	↑	↓
PaO_2	↓	↓↓	↓
$PaCO_2$	↓	↑	↓
DLCO	↑ oder ↔	↔	↔

The liver, not the lung



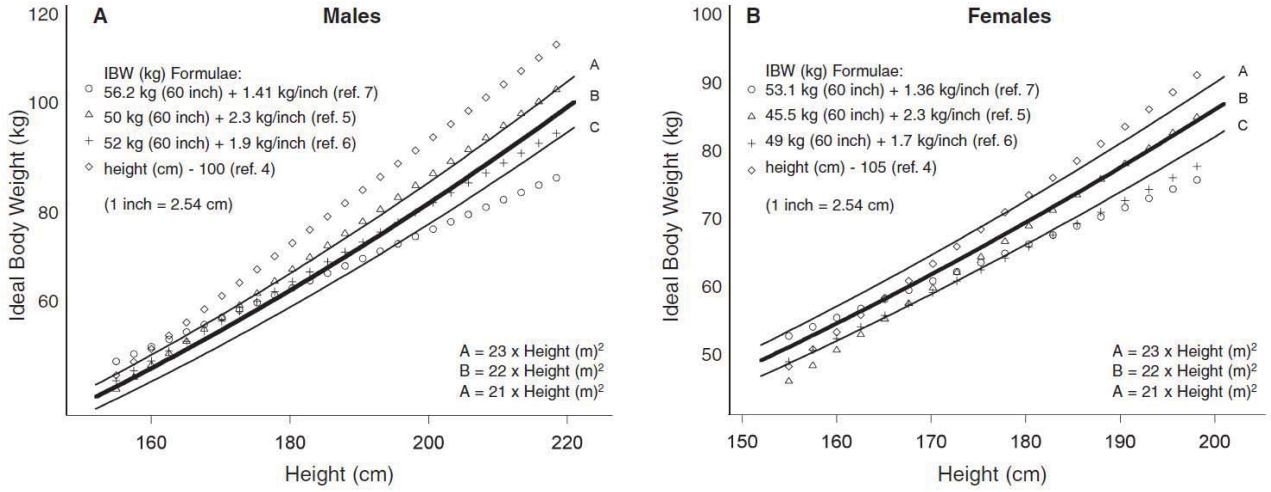
…develops with its tasks

Setup of the respirator allways according to the Ideal Body Weight (IBW)

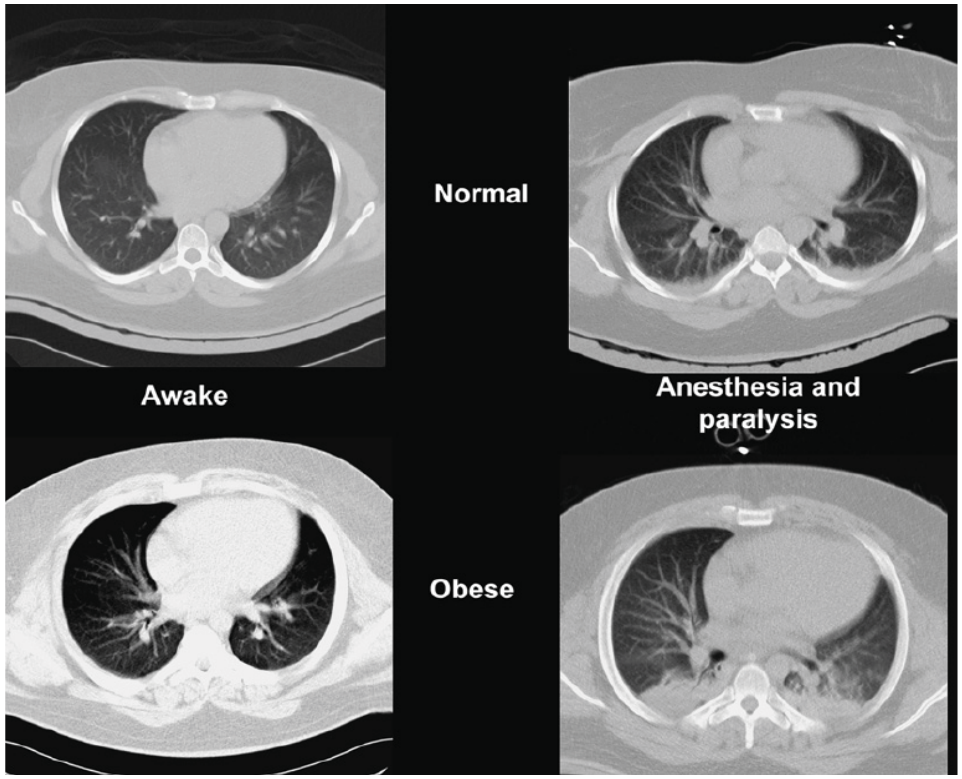
Males IBW (kg) = 50 + 0.91(height (cm) –152.4)
Females IBW (kg) = 45.5 + 0.91 (height (cm) –152.4)

Estimating ideal body weight

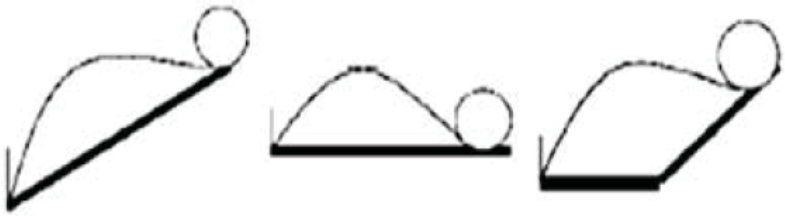
BMI = BW / Height^2 > 22 x Height^2 = IBW



PEEP… she sighed

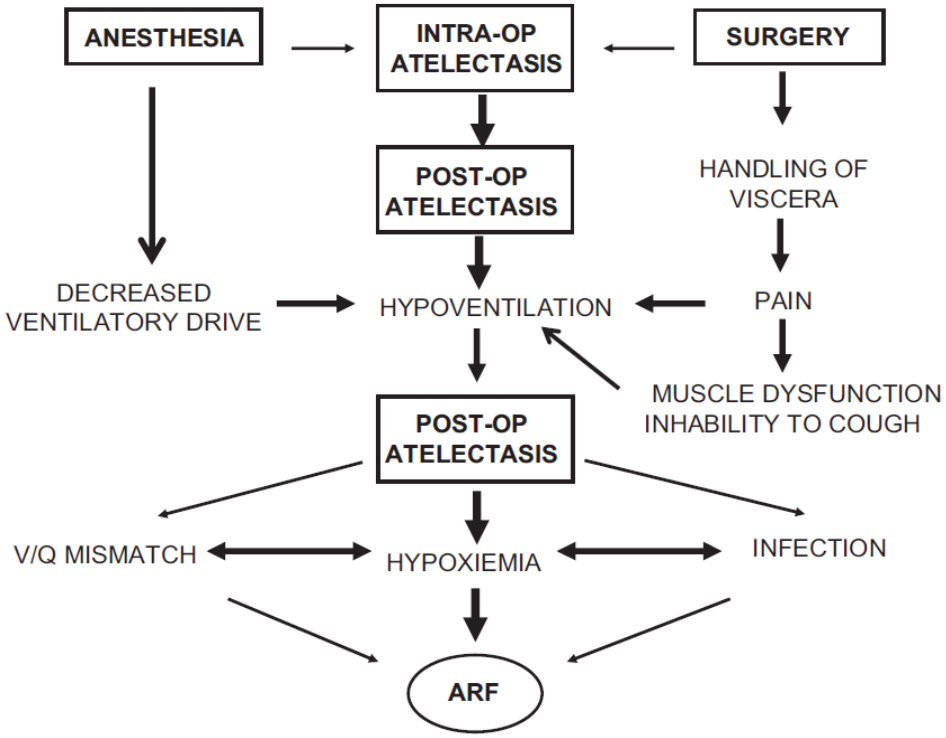


Ventilation

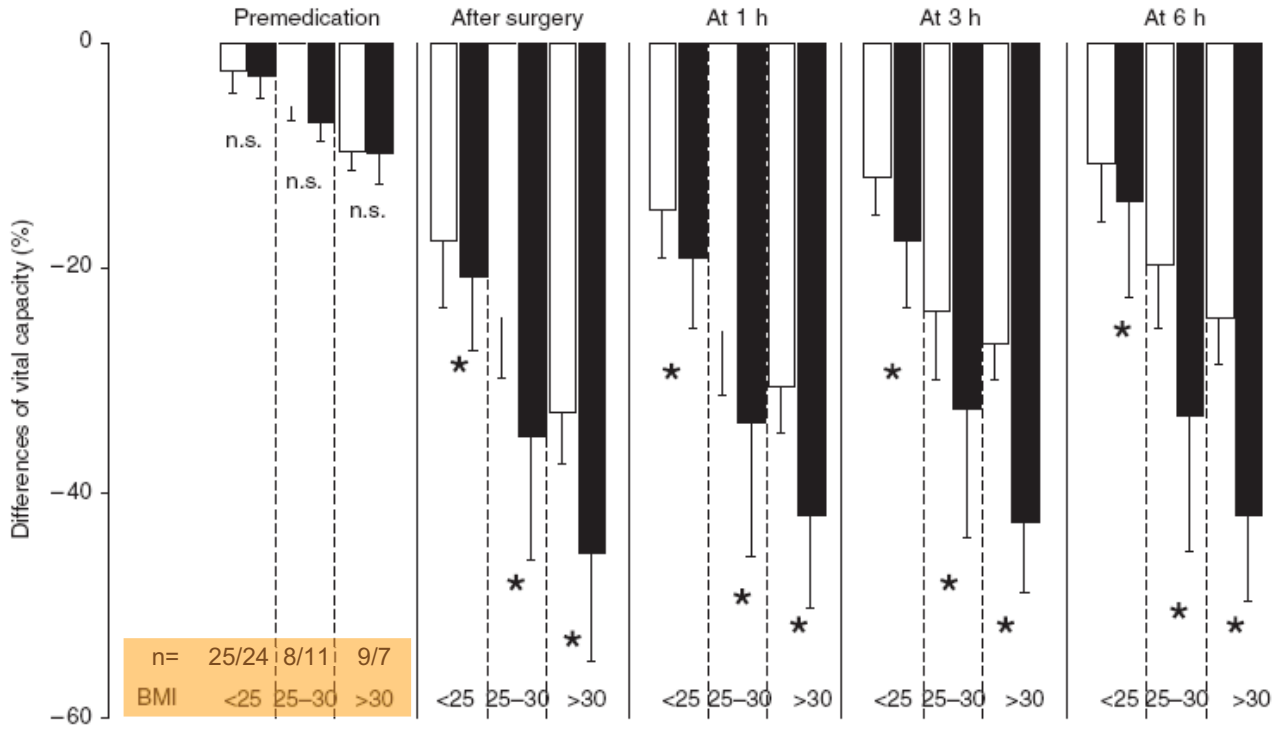


Safe Apnea Period (seconds)	178±55 (1 vs 3:p<.05)	123±24	153±63
Recovery Time (seconds)	80±30 (2 vs 1:*P*<.001)	206±64	97±41 (2 vs 3: *P*<.001)
Lowest SaO_2(%)	83±4	82±5	83±4

Pulmonary complications after surgery



Thoracic EA and Obesity



vUngern-Sternberg (2005) BJA; 94: 121-27

OSAS and ambulatory anesthesia

	Points
A. Severity of sleep apnea based on sleep study (or clinical indicators if sleep study not available). Point score _____ (0–3)*†	
Severity of OSA (table 1)	
None	0
Mild	1
Moderate	2
Severe	3
B. Invasiveness of surgery and anesthesia. Point score _____ (0–3)	
Type of surgery and anesthesia	
Superficial surgery under local or peripheral nerve block anesthesia without sedation	0
Superficial surgery with moderate sedation or general anesthesia	1
Peripheral surgery with spinal or epidural anesthesia (with no more than moderate sedation)	1
Peripheral surgery with general anesthesia	2
Airway surgery with moderate sedation	2
Major surgery, general anesthesia	3
Airway surgery, general anesthesia	3
C. Requirement for postoperative opioids. Point score _____ (0–3)	
Opioid requirement	
None	0
Low-dose oral opioids	1
High-dose oral opioids, parenteral or neuraxial opioids	3
D. Estimation of perioperative risk. Overall score = the score for A plus the greater of the score for either B or C. Point score _____ (0–6)‡	

Type of Surgery/Anesthesia	Consultant Opinion
Superficial surgery/local or regional anesthesia	Agree
Superficial surgery/general anesthesia	Equivocal
Airway surgery (adult, e.g., UPPP)	Disagree
Tonsillectomy in children less than 3 years old	Disagree
Tonsillectomy in children greater than 3 years old	Equivocal
Minor orthopedic surgery/local or regional anesthesia	Agree
Minor orthopedic surgery/general anesthesia	Equivocal
Gynecologic laparoscopy	Equivocal
Laparoscopic surgery, upper abdomen	Disagree
Lithotripsy	Agree

ASA Practice Guidelines; Anesthesiol (2005)

OSAS and ambulatory anesthesia

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

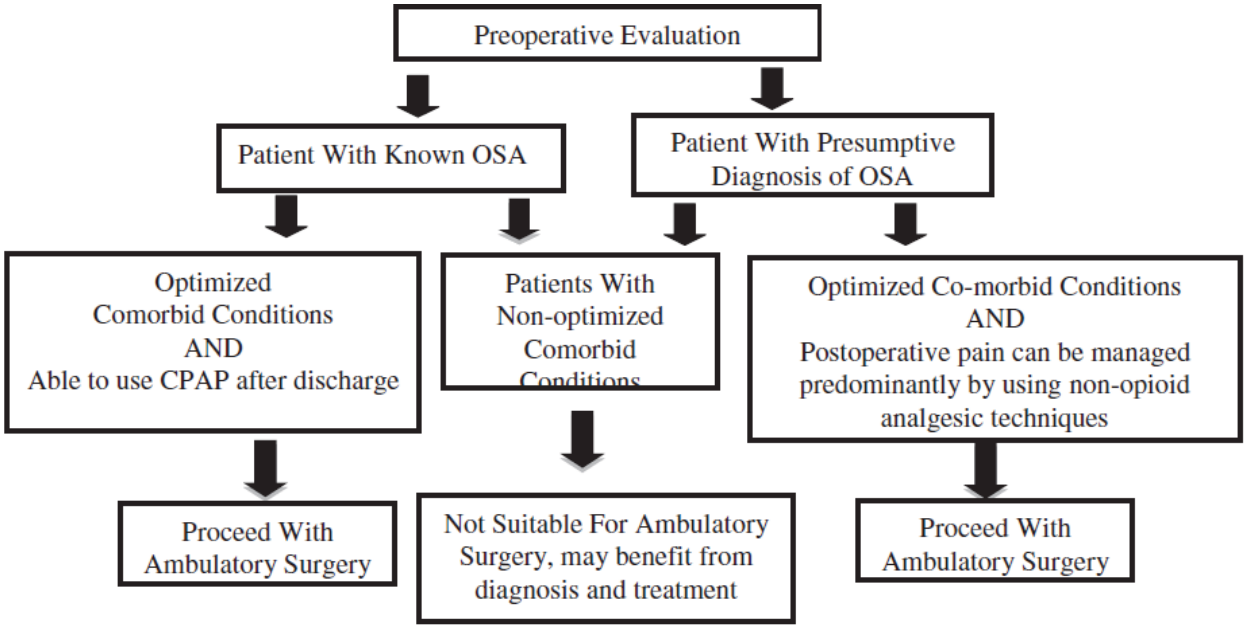
Table 6. STOP–Bang Questionnaire Used to Screen Patients to Determine the Risk of Obstructive Sleep Apnea (OSA)[8]

S = Snoring. Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?
T = Tiredness. Do you often feel tired, fatigued, or sleepy during daytime?
O = Observed apnea. Has anyone observed you stop breathing during your sleep?
P = Pressure. Do you have or are you being treated for high blood pressure?
B = BMI > 35 kg/m^2
A = Age > 50 years
N = Neck circumference > 40 cm
G = Male gender

From Hathaway, 2006.[15] Fewer than 3 questions positive = low risk of OSA; 3 or more questions positive: high risk of OSA; 5 to 8 questions positive: high probability of moderate-to-severe OSA.[11]

(Anesth Analg 2012;115:1060–8)

OSAS and ambulatory anesthesia



Comorbid conditions: hypertension, arrhythmias, heart failure, cerebrovascular disease, and metabolic syndrome.
If OSA is suspected during evaluation, one could proceed with a presumptive diagnosis of OSA albeit with caution.

Pharmakokinetics in Obesity

- *Which body weight is the best?*
- *TBW; IBW or ABW?*
  - *IBW = (Height cm – 100) – 5%(m) or -10% (w) in kg*
  - *ABW = (TBW-IBW)*0.4 + IBW*
- *Is more really more, or is less more – more or less?*
- *Organ dysfunction?*
- *Dosing according to effect?*
- *(drug monitoring)*
- *IBW according to the ARDS-Net Study*

Males IBW (kg) = 50 + 0.91(height (cm) –152.4)
Females IBW (kg) = 45.5 + 0.91 (height (cm) –152.4)

Anaesthetic drugs

Dosierungsempfehlungen für die gebräuchlichsten Anästhetika

Substanz	Verteilungsvolumen (L)		Clearance (ml/min)		Empfohlene Dosis
	schlank	adipös	schlank	adipös	
Thiopental	1,4	4,7	197,2–210	290–416,3	ID reduziert
Propofol	13	17,9	28,3	24,3	TBW (ID/AD)
Midazolam	114	311	530	472	TBW (ID); IBW (AD)
Fentanyl	n. d.	n. d.	718	986	PK = 52 × 1/ Korrektur-Faktor (≈2 > 140 kg)
Sufentanil	346	547	1780	1990	TBW (ID); AD unklar
Remifentanil	6,8	7,5	2700	3100	IBW
Rocuronium	0,14	0,09	0,45	0,03	IBW
Vecuronium	0,99	0,47	325	260	IBW
Cis-Atracurium	8,5	8,6	440	444	IBW
Succinylcholine	n. d.	n. d.	n. d.	n. d.	TBW

Linear dose to BW 100; above 140 kg plateau. Calculate with 110 kg

Pharmakokinetik bei Adipositas

	Loading / Maintenance	Note
Antibiotics -Beta-Laktames -Quinolones	 Max-dosis o. ABW Max-dosis o. ABW	Reduction of the dose intervals, no increase of dose amount
-Amiodaron -Digoxin -beta-Blocker	IBW / IBW IBW / IBW IBW / IBW	Dose according effect Drug monitoring Dose according to effect
Steroids	ABW or IBW	No studies
Vasoaktives	IBW	10 µg/kg (12-200 ng/ml), dose according to effect

Erstad BL (2004) ICM; 30: 18-32

Prediction of difficult intubation?

Predictions are very difficult, especially about the future.

Niels Bohr (1885-1962)

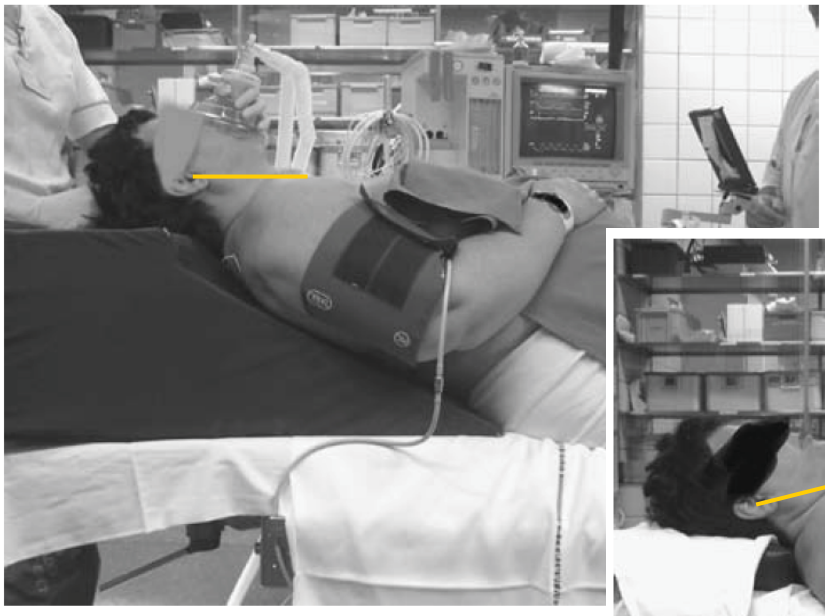
Morbid Obesity and Tracheal Intubation

Variable	Problematic intubation (n = 12) Median	25th pct	75th pct	Easy intubation (n = 88) Median	25th pct	75th pct	P value[a]
Age (yr)	44	39.5	49.5	44	36	51.5	0.9957[b]
Height (cm)	168	159.7	176.9	168	160.3	171.2	0.6471[b]
Weight (kg)	124.8	124	144.1	137	122.3	156.8	0.858
BMI (kg/m^2)	46.5	42.5	47.3	48.9	44.2	58.1	0.9393
Neck circumference (cm)	50.5	44.7	54	46	42	48	0.0326
Sternomental distance (cm)	13.5	12.7	16.2	12	14	17	0.4979
Thyromental distance (cm)	9.5	7.7	10	9.5	8	11	0.6556
Mouth opening (cm)	5	4.1	5.2	5.5	4	6.3	0.1284

Variable	Category	Problematic intubation (n)	Easy intubation (n)	P value
Sex	Male	4	18	0.4559[a]
	Female	8	70	
Sleep apnea	Yes	6	50	0.8915[b]
	No	6	38	
Mallampati	1	0	30	0.0305[a]
	2	5	32	
	3	7	25	
	4	0	1	

(Anesth Analg 2002;94:732–6)

Sniff or ramped?



Risk of aspiration

RSI remains important in the morbidly obese patients with gastrooesophageal reflux, diabetes mellitus, pregnancy, gastrointestinal disorders and before emergency surgery, all of which predispose to pulmonary aspiration. However, the application of RSI is probably not necessary in fasted patients with no risk factors other then obesity.

Freid EB. The rapid sequence induction revisited: obesity and sleep apnea syndrome. Anesthesiol Clin North Am 2005; 23:551–564; viii

Regional anaesthesia and obesity

Patel J (1999) Anaesth Intensive Care; 27: 216-19

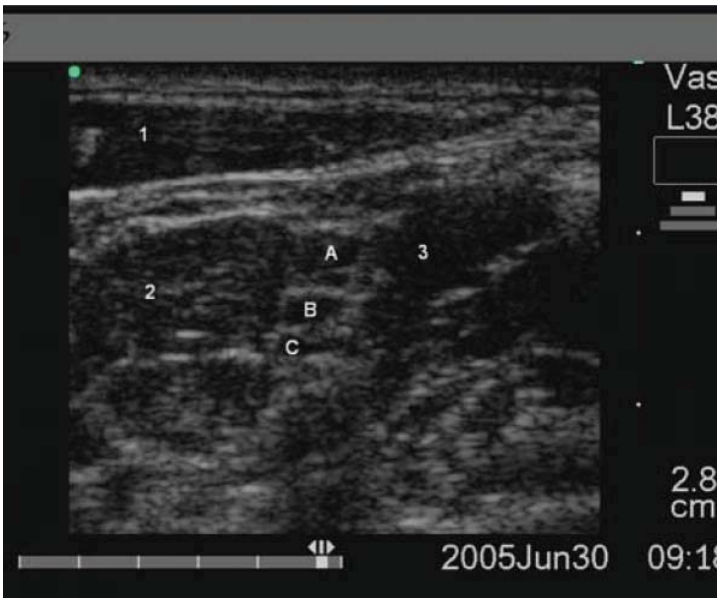
Supraclavicular Block

		Non-obese group and subgroups				Obese group and subgroups		
	Overall	Non-obese overall[a]	UW[b]	N[b]	OW[b]	Obese overall[a]	O[b]	MO[b]
Good, *n* (%)	1951 (96.6)	1522 (97.3)	44 (100)	738 (97.4)	740 (97.0)	429 (94.3)†	381 (94.5)*	48 (92.3)
Partial, *n* (%)	33 (1.6)	19 (1.2)	0	12 (1.6)	7 (0.9)	14 (3.1)†	12 (3.0)‡	2 (3.8)
Failure, *n* (%)	36 (1.8)	24 (1.5)	0	8 (1.1)	16 (2.1)	12 (2.6)	10 (2.5)	2 (3.8)
Accidental paresthesia, *n* (%)	49 (2.4)	34 (2.2)	2 (4.5)	13 (1.7)	19 (2.5)	15 (3.3)	10 (2.5)	5 (9.6)*
Blocks started by residents, *n* (%)	1586 (78.5)	1235 (78.9)	35 (79.5)	603 (79.6)	597 (78.2)	351 (77.1)	315 (78.2)	36 (69.2)
Blocks completed by residents, *n* (%)	1249 (78.8)	993 (80.4)	31 (88.6)	498 (82.6)	464 (77.7)	256 (72.9)†	231 (73.3)*	25 (69.4)

- *1565 blocks (77.5%) on non-obese patients and 455 blocks (22.5%) supraclavicular Blocks without US*
- *Success rate 97.3 % (BMI 18-30) vs. 94.3% (BMI >30) p <0.01*

Franco (2006) A & A; 102: 1252-1254

Interscalen-block and Ultrasound



- *70 Patients, BMI 23 vs. 30; Interscalen block with US*
- *4 ±2 u. 5 ±1 min >0.02*
- *Success rate 94 % (33) vs. 77% (27 Patients)*

Schwemmer (2006) Ultraschall Med; 27: 245-250

Influence of Obesity on Surgical Regional Anesthesia in the Ambulatory Setting: An Analysis of 9,038 Blocks

Table 4. Unadjusted Outcomes

Variable	Category	BMI <25	BMI 25–29	BMI ≥30	All Patients	*P* Value*
Block failure	Yes	9.5%	10.7%	12.7%	10.9%	0.002
	No	90.5%	89.3%	87.3%	89.1%	
Acute block complications	Yes	0.2%	0.1%	0.7%	0.3%	0.001
	No	99.8%	99.9%	99.3%	99.7%	
Pain requiring opioids in PACU	Yes	11.4%	10.2%	11.9%	11.2%	0.21
	No	88.6%	89.8%	88.1%	88.8%	
Pain score at rest on VAS ± SD	–	0.3 ± 1.4	0.3 ± 1.3	0.3 ± 1.4	0.3 ± 1.4	0.18
Pain score with movement on VAS ± SD	–	0.4 ± 1.5	0.3 ± 1.3	0.4 ± 1.5	0.4 ± 1.4	0.02
PONV requiring treatment in PACU	Yes	1.2%	0.7%	1.2%	1.0%	0.28
	No	98.8%	99.3%	98.8%	99.0%	
PACU length of stay ± SD (min)						
Unplanned admission to the 23 h observation unit or hospital						
Complete satisfaction with regional anesthesia procedure 24 h postoperatively						

Conclusions: **The present investigation shows that obesity is associated with higher block failure and complication rates in surgical regional anesthesia in the ambulatory setting. Nonetheless, the rate of successful blocks and overall satisfaction remained high in patients with increased BMI. Therefore, overweight and obese patients should not be excluded from regional anesthesia procedures in the ambulatory setting.**

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

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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)

PERI-OPERATIVE MANAGEMENT OF THE MORBIDLY OBESE PATIENT

ASOBA

KSB Kantonsspital Baden

- *"Man hat rausgefunden, dass Wale viel zu dick und zu fett sind, um schwimmen zu können. Da aber der Wal von dieser Wahrheit gar nichts weiß, schwimmt er schon irrtümlicherweise.„*

  – *Mathias Richling, Blick zurück nach vorn*