

# Perioperative management of 195 consecutive bariatric patients

doi: 10.1017/S0265021507002505

## EDITOR:

Implications for anaesthetic and perioperative care of severely obese patients are considerable and escalate in the presence of comorbidities [1]. However, a review of anaesthetic perioperative care and pain management over a 10-yr period (1994–2004) concluded that outcome data are scarce and that literature evaluating the impact of specific care plans on short- and long-term perioperative outcome in bariatric surgical patients is lacking [2].

The objective of the present study was to review in a retrospective manner the anaesthetic and perioperative data from 195 consecutive patients admitted to our Medical Centre for weight loss surgery between May 2000 and March 2006 (72 months). Our institutional Ethics Committee considered the study as an audit of service development, and therefore not requiring formal permission.

All the obese patients were evaluated before surgery (between 10 and 30 days) in the anaesthetic assessment clinic. Anticipated difficulties in airway management were based on the following clinical sings: Mallampati score  $>3$ , neck circumference  $>40$  cm, thyromental distance  $<6.5$  cm, large tongue or limitations in cervical or mandibular movements. In addition to routine intraoperative monitoring, neuromuscular transmission was assessed using acceleromyography of the adductor pollicis muscle (TOF-Guard; Organon Teknica, BV, The Netherlands). Since 2004 a bispectral index monitor was routinely introduced (BIS Monitor Model A 2000, Aspect Medical System Inc., Newton, MA, USA). For super-obese patients (body mass index (BMI)  $>50$ ) non-invasive haemodynamic monitoring was performed by HemoSonic transoesophageal echo-Doppler (HemoSonic™ 100, Arrow International Everett, MA, USA).

At the end of the surgery, trocar sites were infiltrated with ropivacaine. Extubation was performed only on fully awake patients with a train-of-four ratio of 0.9 and in  $30^\circ$  reverse Trendelenburg position. The anaesthetic management,

postoperative care, intraoperative and postoperative complications were evaluated and recorded. The same surgeon performed all surgical procedures while anaesthetic pre-, intra- and postoperative management was by members of our anaesthesiology staff.

In order to evaluate the evolution of the surgical and perioperative management between these dates, the patients were divided into three consecutive and equal groups (Group A, B and C each with 65 patients) and compared. One-way analysis of variance was used to compare continuous variables among three groups. We used  $\chi^2$  test or, when necessary, Fisher exact test, for testing univariate association between socio-demographic or clinical variables and  $\chi^2$  test for trend to assess the linear trend when comparing proportions. The null hypothesis was rejected with  $\alpha < 0.05$ . Data are presented as mean  $\pm$  standard deviation (SD).

Of the 195 obese patients, 28.2% ( $n = 55$ ) were male and 71.8% ( $n = 140$ ) were female. Mean age was  $44 \pm 11$  yr, mean BMI  $44.8 \pm 6.8$  and mean weight excess at the first interview was of  $55 \pm 21$  kg. Concomitant disease was present in 56% of patients ( $n = 109$ ). Arterial hypertension was the main associated disease (21%,  $n = 41$ ), followed by chronic gastritis (16%,  $n = 24$ ), while diabetes was diagnosed in only 4% of patients ( $n = 7$ ). There were no laboratory test abnormalities in 80.6% of patients ( $n = 157$ ). Chest X-ray examination was positive for mild cardiomegaly only in two patients; the remaining films were unremarkable. Results of pulmonary function tests were moderately abnormal in 6.7% ( $n = 13$ ): 2 obstructive, 10 restrictive and 1 combined. Liver steatosis was present in 16% of patients ( $n = 31$ ), while chronic gastritis and gastroesophageal reflux were diagnosed by direct gastroscopy in 15% ( $n = 29$ ). Using our criteria for preoperative airway assessment, we classified 5% of patients ( $n = 10$ ) as at risk for problematic tracheal intubation. Preoperative evaluation did not lead in any case to delay or cancellation of scheduled surgery.

Laparoscopic adjustable gastric banding was performed in 64.6% of patients ( $n = 126$ ) and laparoscopic Roux-en-Y gastric bypass in 35.4% ( $n = 69$ ). The average surgical time for gastric banding was of  $90 \pm 12$  min and that for gastric bypass

Correspondence to: Yigal Leykin, Department of Anaesthesia and Intensive Care, Santa Maria degli Angeli Hospital, via Montereale 24, Pordenone 33170, Italy. E-mail: yigal.leykin@aopn.fvg.it; Tel: +390434399216; Fax: +390434399180

Accepted for publication 1 August 2007 EJA 4255  
First published online 26 September 2007

was  $241 \pm 23$  min. In four cases conversion to open surgery was required due to surgical difficulties. Other intraoperative complications included intra-abdominal adhesions (3.6%), hypoxia (2%), tooth damage (1%), severe bradycardia (1%), soft palate lesions (1%) and bronchospasm (0.5%).

In patients with anticipated high risk of a problematic tracheal intubation, awake fiberoptic intubation was performed. No difficult intubation by direct laryngoscopy occurred in the remainder 95% following rapid sequence induction. In all patients, tracheal intubation was performed in the 'ramped' position as suggested by Collins and colleagues [3]. Narcosis was maintained with propofol infusion (44%), sevoflurane inhalation (44%), desflurane (9%) or nitrous oxide in oxygen and sevoflurane (3%); neuromuscular blockade with cisatracurium (56%), rocuronium (23%) or vecuronium (21%). Analgesia was provided by continuous infusion of remifentanyl (88%) or boluses of fentanyl (12%). Extubation was performed in 96% of cases ( $n = 187$ ) in the operating theatre. Neuromuscular blockade was reversed in 59% ( $n = 115$ ) of patients, the others recovered spontaneously.

Direct ICU admission from the operating theatre occurred in 3.6% of patients ( $n = 7$ ). The remaining 96.4% were monitored in the post-anaesthesia care unit (PACU). The mean ICU stay was  $1.5 \pm 0.5$  days, whereas in PACU it was  $213 \pm 62$  min. Mechanical ventilation was protracted in PACU for an average of  $30 \pm 7$  min in 4% of patients due to extreme obesity, delayed recovery and severe hypoxia. The mean visual analogical pain score on admission to PACU was  $3 \pm 2$ , while before discharge to the surgical ward it was  $1 \pm 1$ . Post-operative analgesia was managed with meperidine (56%), ketorolac (22%), continuous infusion of remifentanyl (11%), or the association of ketorolac and meperidine (9%) or morphine (2%). The most frequent complications observed in PACU were gastrointestinal (6.6%), respiratory (4.6%), cardiovascular (4.1%), bleeding (3.6%) and agitation (3.1%). Subsequently, on the surgical ward, the predominant problems encountered were pain (15%) and nausea (12%), followed by fever (8%) and persistent reflux (5%).

In patients who underwent gastric banding, mean hospitalization was  $3.2 \pm 1.6$  days, while in patients who underwent laparoscopic Roux-en-Y gastric bypass it was  $9.1 \pm 3.1$  days. A decreasing trend was observed for the duration of surgery of the laparoscopic gastric banding procedures (Group A  $103 \pm 35$  vs. Group B  $88 \pm 31$  vs. Group C  $71 \pm 18$ ;  $P < 0.01$ ), and also their PACU stay (Group A  $313 \pm 100$  vs. Group B  $217 \pm 63$  vs.

Group C  $200 \pm 57$ ;  $P < 0.01$ ). There was a progressive decrease in the gastric banding group ( $P < 0.01$ ) with an increase in Roux-en-Y gastric bypass ( $P < 0.01$ ) group. There were no other significant differences among the three groups.

With the growing experience over the years of the surgical and anaesthesiological staff, we observed a reduction in the duration of laparoscopic gastric banding procedures and PACU length of stay. Probably the most important contributing factor to the observed outcome is the concept of 'perioperative medicine' as stressed by Dahl and Kehlet [4], according to which the end result is determined by the management and strict interdependence among the pre-, intra- and post-operative periods. Several studies looking at the relationship between obesity and perioperative complications in patients undergoing laparoscopic surgery have reported no increased risk [5]. The principal risk factor is the presence of co-morbidities, particularly cardiorespiratory disease, and not obesity *per se*.

In different studies, routine laboratory pre-operative tests have shown a low incidence of abnormal results (0.3–6.5%) with an even lower proportion of these results leading to modifications in patient management (0–2.6%) [6]. Indeed, laboratory tests were abnormal in 20% of our population of obese and did not influence our perioperative management in any patient. We therefore agree with Ramaswamy and colleagues [6] that chest X-ray examination, coagulation studies, cardiac stress tests and pulmonary function tests should be selectively performed on the basis of morbidly obese patient history and clinics. Moreover, Brodsky and colleagues [7] demonstrated that only obesity with clinical signs such as large neck circumference and a high Mallampati score are predictors of potentially difficult intubation, whereas BMI or weight *per se* were not. Our experience is in line with such evidence since awake fiberoptic endotracheal intubation was performed in only 5% of patients and no difficult intubation occurred in the remaining patients.

Although specific anaesthetic maintenance agents have been recommended, there is insufficient evidence to support one agent or technique over another [2]. In fact, several different anaesthetic approaches were used over the study period, and none were associated with any increased morbidity or worse outcome.

In conclusion, anaesthesia for these patients can be safely performed when understanding that morbidly obese patients are not at risk *per se* due to their BMI but based on the existence and severity of co-morbidities. The concept of perioperative medicine

with the strict interdependence of pre-, intra- and post-operative management is the key to a rational approach to morbidly obese patients.

Y. Leykin, T. Pellis, E. Del Mestro  
Department of Anaesthesia and Intensive Care  
Santa Maria degli Angeli Hospital  
Pordenone, Italy

G. Fanti, B. Marzano  
Department of Surgery  
Santa Maria degli Angeli Hospital  
Pordenone, Italy

## References

1. Ogunnaike BO, Jones SB, Provost D, Whitten C. Anesthetic considerations for bariatric surgery. *Anesth Analg* 2002; 95: 1793–1805.
2. Schumann R, Jones SB, Ortiz VE *et al.* Best practice recommendations for anesthetic perioperative care management in weight loss surgery. *Obes Res* 2005; 13: 254–266.
3. Collins JS, Lemmens HJM, Brodsky JB, Brock-Utne JG, Levitan RM. Laryngoscopy and morbid obesity: a comparison of the 'sniff' and 'rampted' positions. *Obes Surg* 2004; 14: 1171–1175.
4. Dahl JB, Kehlet H. Perioperative Medicine – a new sub-speciality, or a multi-disciplinary strategy to improve perioperative management and outcome? *Acta Anaesthesiol Scand* 2002; 46: 121–122.
5. Birgisson G, Park AE, Mastrangelo MJ, Witzke DB, Chu UB. Obesity and laparoscopic repair of ventral hernias. *Surg Endosc* 2001; 15: 1419–1422.
6. Ramaswamy A, Gonzalez R, Smith CD. Extensive preoperative testing is not necessary in morbidly obese patients undergoing gastric banding. *J Gastroint Surg* 2004; 8: 159–164.
7. Brodsky JB, Lemmens HJ, Brock-Utne JG, Vierra M, Sidman LJ. Morbid obesity and tracheal intubation. *Anesth Analg* 2002; 94: 732–736.

## The perioperative implications of khat use

doi: 10.1017/S026502150700258X

### EDITOR:

Khat (*Catha edulis*) is a herb native to East Africa and Southern Arabia that is chewed recreationally by the people of these regions to reduce fatigue and appetite. The social habit of khat chewing is increasingly prevalent in the East African and Southern Arabian communities in Europe [1]. Khat contains the pyrrolizidine alkaloids cathinone, cathine and cathidine, which are sympathomimetic amines. The euphoric, energetic and other effects derived from chewing khat are attributed to cathinone, its major active ingredient, which has a very similar structure and pharmacologic profile as amphetamine [2]. The use of cathinone and amphetamine is restricted in Europe, but khat use is not. The chronic or acute use of khat is associated with adverse cardiovascular and amphetamine-like effects [3,4]. These effects may impact negatively on anaesthesia and perioperative outcome. This is a clinical report and discussion of the perioperative

course of three adult patients who chewed khat habitually.

*Case 1:* A 24-yr-old female of South Asian origin presented for septorhinoplasty. She had no co-morbidities, was a teetotaler, but smoked tobacco. Preoperative airway inspection on the day of surgery revealed particles and discoloration on her tongue, which she attributed to khat chewing from the previous night. Perioperative cardiorespiratory parameters were normal. Anaesthesia was induced with propofol – 200 mg and fentanyl – 100 µg; and a laryngeal mask inserted for airway management. Anaesthesia was maintained with 2% sevoflurane in 65% nitrous oxide. Surgery lasted 1 h. Recovery from anaesthesia was delayed: she woke up 1 h after discontinuation of sevoflurane. The 24-h postoperative course was uneventful.

*Case 2:* A 33-yr-old Caucasian male presented for eye surgery. He suffered from depression, used antidepressants, smoked tobacco and cannabis, and drank 10 units of alcohol weekly. He had previously abused amphetamine. He chewed khat habitually, with the last chewing session about 8 h before surgery. Perioperative cardiorespiratory parameters were normal. Anaesthesia was induced with propofol – 300 mg and fentanyl – 200 µg; and a

There was no financial involvement in the writing of this article. There was no conflict of interest in the writing of this article.

Correspondence to: Olumuyiwa A. Bamgbade, Department of Anaesthesia, Central Manchester University Hospital, Manchester M13 9WL, UK. E-mail: mubitim@yahoo.co.uk; Tel: +44 161 2764551; Fax: +44 161 2768027

Accepted for publication 24 July 2007 EJA 4650  
First published online 13 September 2007