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## Anaesthesia for bariatric surgery as an element of perioperative treatment

## Znieczulenie w chirurgii bariatrycznej jako element leczenia okołoperacyjnego

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None

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### Summary

Surgical treatment of obesity is nowadays more frequent and available. Although the procedure is usually laparoscopic with minimal invasiveness, but the risk of complications is higher than as it results from surgery because of comorbid diseases. Obesity is a systemic disease that deteriorates cardiovascular and respiratory function and causes metabolic syndrome with diabetes and mental disturbances. Thus, severe obesity makes higher ASA (American Society of Anaesthesiologists) score and increases the risk of development of complications during perioperative period.

### Streszczenie

Leczenie chirurgiczne otyłości jest obecnie coraz częstsze i bardziej dostępne. Choć procedura chirurgiczna jest wykonywana laparoskopowo i mało inwazyjna, jednak ryzyko powikłań jest wyższe niż wynikające z samej procedury, z powodu chorób współistniejących. Otyłość jest chorobą systemową, która pogarsza czynność układu krążenia i oddechowego oraz powoduje rozwój zespołu metabolicznego z cukrzycą i zaburzeniami psychicznymi. Tak więc, ciężka otyłość zwiększa wskaźnik anestezjologicznej oceny przedoperacyjnej (ASA) oraz podwyższa ryzyko rozwoju powikłań w okresie okołoperacyjnym.

## INTRODUCTION

Seventeen years passed from the time when Professor Ken Fearon and Professor Olle Ljungqvist met in London at a nutrition symposia and decided to follow the Professor Henrik Kehlet's concept of multimodal surgical care. By this time the ERAS® (Enhanced Recovery After Surgery) Study Group comprised of leading surgical groups was changed to the ERAS Society that engaged anaesthetists, nurses, dieticians and physiotherapists. Thus, anaesthesia became an important element of peri-operative strategy which result in expedite recovery after surgery. The increasing number of bariatric surgical procedures created the need of consensus regarding optimal perioperative care in bariatric surgery. According ERAS Society Guidelines anaesthetic management contains treatment during pre-, intra- and postoperative period (1).

## REVIEW

### Preoperative anaesthetic interventions

Preoperative assessment by anaesthesiologist is belived to be a basic element of anaesthetic care. Psychological and pharmacological preparation of the patient called premedication is strongly recommended, as it reduces stress and anxiety and improve of compliance. It has been shown that the history of tobacco smoking and alcohol cessation is associated with increased risk of postoperative morbidity and mortality. Tobacco smoking should be stopped at least 4 weeks before surgery. When history of alcohol abuse is present, at least 2 years of abstinence should be strictly adhered. The large study reported that consumption of more than 2 alcohol equivalents per day within 2 weeks of surgery was an independent predictor of pneumo-

nia, sepsis, wound infection and length of hospital stay. Preoperative fasting does not differ from other patients. Obese patients may have clear fluids up to 2 h and solids up to 6 h prior to induction of anaesthesia (2). There is a strong recommendation to use glucocorticoids as anti-inflammatory and antiemetic medication. It has been shown that a dose from 2.5 to 5.0 mg dexamethasone given 90 min prior to induction of anaesthesia is necessary to achieve the effect on postoperative nausea and vomiting (PONV) (3). According to the guidelines 8 mg dexamethasone should be administered 90 minutes before the induction of anaesthesia in obese patients. Because of glucocorticoid-induced hyperglycaemia it is recommended to monitor blood glucose level intra- and postoperatively in patients undergoing bariatric surgery (1). There is a strong recommendation to use carbohydrate loading with iso-osmolar drinks 2-3 h before induction of anaesthesia in obese, non-diabetic patients. However, there is not enough evidence about clinical benefits and disadvantages of carbohydrate conditioning in morbidly obese and in patients with gastroesophageal reflux who are at risk of aspiration during anaesthetic induction (1).

### Intraoperative anaesthetic interventions

As an excessive intraoperative fluids may be associated with worse outcome there is a strong recommendation to provide maintenance not liberal fluid regimens in obstetric surgery (1). The difficulty with fluid dosing results from physiological differences, multiple comorbidities, inaccuracy of non-invasive monitoring and higher incidence of rhabdomyolysis in obese patients. The goal-directed fluid therapy based on stroke volume variation (SVV) monitoring should enable avoiding intraoperative hypotension and excessive fluid administration (4). The enteral route of postoperative fluid administration should be preferable as soon as possible. Prophylaxis of PONV as an element of anaesthesia should be continued in all patients. Multimodal approach consists of antiemetics, propofol for induction and maintenance of anaesthesia, avoidance of volatile anaesthetics, minimisation of opioids and avoidance of fluid overload. The recommended antiemetics for PONV prophylaxis are 5-hydroxytryptamine receptor antagonists, corticosteroids, butyrophenones, neurokinin-1 receptor antagonists, antihistamines and anticholinergics. The superiority of triple combination of haloperidol, dexamethasone and ondansetron over a single or double combination was demonstrated in laparoscopic sleeve gastrectomy (5).

Taking into consideration just anaesthesia the current evidence does not allow recommendation of specific anaesthetic agents and techniques (1). Anaesthetists should be aware of the specific problems with airway management in bariatric patients. There is a strong evidence that endotracheal intubation is the best choice for airway and that difficulties with bag and mask ventilation are frequent. For elective bariatric surgery lung

protective ventilation has strong recommendation. There were no benefits identified between volume control and pressure control modes of ventilation. Concurrent use of positive end expiratory pressure (PEEP) improved oxygenation and pulmonary mechanics during operation (6). It is suggested that deep neuromuscular blockade improve surgical conditions without the need to increase intraperitoneal pressure. Although deleterious cardiovascular consequences of high pressure pneumoperitoneum can be avoided, the recommendation for this is weak (1). Objective qualitative monitoring of neuromuscular blockade together with ensuring its full reversal has been found to improve patient recovery and is strongly recommended in bariatric patients. A nerve-stimulated train of four (TOF) ratio of 0.9 is associated with reduction in post anaesthesia care unit discharge time and higher patient satisfaction (7). BIS monitoring of anaesthetic depth should be considered where end tidal anaesthetic gas (ETAG) monitoring is not employed (1). Four studies compared BIS with ETAG monitoring as a guide to management of anaesthesia and they did not demonstrate any difference in terms of intraoperative awareness.

### Postoperative anaesthetic interventions

Postoperative hypoxaemia is common problem in obese patients in an early postoperative period, because of obesity, sedative drugs and pain compromised respiratory function. Adequate analgesia can prevent the development of respiratory problems. There are strong recommendations for combination of multimodal intravenous medication and local anaesthetic infiltration techniques (8). Multimodal pain management involves systematically used acetaminophen (paracetamol) and non-steroid anti-inflammatory drugs (NSAIDs). Dosage should be adapted according to ideal body weight. Dexmedetomidine is not recommended as for routine use. Patient-controlled analgesia with opioid can be used with increased refractory period between boluses. Continuous infusion is not recommended. Enteral route should be used as early as possible for opioids (9).

Local analgesia can be achieved with pre-incision wound infiltration or with ultrasound-guided transversus abdominal plane block (1). Thoracic epidural analgesia (TEA) should be considered only in laparotomy, however it is associated with a four-fold higher risk of wound infection in open gastric bypass. Intravenous morphine is also an acceptable strategy for postoperative analgesia and do not cause more adverse events in comparison with TEA. All obese patients should be considered as high risk irrespective in the presence of obstructive sleep apnoea (OSA), because of the atelectasis that persist for a long time than in non-obese patients (10). Preoperative incentive spirometry failed to show any benefit in preventing postoperative pulmonary complications and is not recommended routinely. Tissue oxygen saturation has been shown to be lower in obese patients, despite of normal pulse

oximetry values. Thus, prophylactic supplementation with oxygen in head-elevated or semi-sitting position is strongly recommended for every obese patient in the immediate postoperative period (1). The duration of oxygen supplementation should be individualised. Monitoring for apnoeic episodes should be conducted. Positive pressure support must be maintained in the presence of signs of respiratory distress, arterial desaturation, tachypnoea or hypercarbia. Prophylactic routine postoperative positive pressure support is not recommended in patients without OSA (1). In this group of obese patients non-invasive positive pressure (NIPP) support is strongly recommended and includes continuous positive airway pressure (CPAP), non-invasive ventilation and bi-level positive airway pressure (BiPAP). CPAP therapy should be considered in patients with BMI > 50 kg/m<sup>2</sup>, severe OSA or oxygen saturation ≤ 90% on oxygen supplementation. Obese patients with OSA on home CPAP therapy should use

their equipment in the immediate postoperative period. Patients with Obesity Hypoventilation Syndrome (OHS) should receive BiPAP or NIV prophylactically along with intensive care level monitoring for the first 24 hours (11).

## CONCLUSIONS

Each patient should be treated individually, however, there are some recurring critical points that can decide on the outcome in obstetric surgery. There was also a great discrepancy between the actual practices and what was already known to be best practice, based on the literature. This prompted the group to examine the process of change from tradition to best-practice. The adoption of presented guidelines to anaesthetic practice in cooperation with surgical procedures has resulted in reduced mortality, faster recovery and reduced length of hospital stay.

## BIBLIOGRAPHY

1. Thorell A, MacCormick AD, Awad S et al.: Guidelines for perioperative care in bariatric surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. *World J Surg* 2016; 40: 2065-2083.
2. Smith I, Kranke P, Murat I et al.: Perioperative fasting in adults and children: guidelines from the European Society of Anaesthesiology. *Eur J Anaesthesiol* 2011; 28: 556-569.
3. Wang JJ, Ho ST, Lee SC et al.: The use of dexamethasone for preventing postoperative nausea and vomiting in females undergoing thyroidectomy: a dose-ranging study. *Anesth Analg* 2000; 91: 1404-1407.
4. Jain AK, Dutta A: Stroke volume variation as a guide to fluid administration in morbidly obese patients undergoing laparoscopic bariatric surgery. *Obes Surg* 2010; 20: 709-715.
5. Benevides ML, Oliveira SS, de Aguiar-Nascimento JE: The combination of haloperidol, dexamethasone, and ondansetron for prevention of postoperative nausea and vomiting in laparoscopic sleeve gastrectomy: a randomised double-blind trial. *Obes Surg* 2013; 23: 1389-1396.
6. Futier E, Constantin JM, Paugam-Burtz C et al.: A trial of intraoperative low-tidal-volume ventilation in abdominal surgery. *N Engl J Med* 2013; 369: 428-437.
7. Sauer M, Stahn A, Soltesz S et al.: The influence of residual neuromuscular block on the incidence of critical respiratory events. A randomised, prospective, placebo-controlled trial. *Eur J Anaesthesiol* 2011; 28: 842-848.
8. Ziemann-Gimmel P, Hensel P, Koppman J et al.: Multimodal analgesia reduces narcotic requirements and antiemetic rescue medication in laparoscopic Roux-en-Y gastric bypass surgery. *Surg Obes Relat Dis* 2013; 9: 975-980.
9. Gaszyński T, Możański M: Zalecenia dotyczące opieki okołoperacyjnej i znieczulenia (w tym znieczulenia niskoopioidowego) u pacjenta otyłego. *Anest Ratow* 2016; 10: 67-77.
10. Eichenberger A, Proietti S, Wicky S et al.: Morbid obesity and postoperative pulmonary atelectasis: an underestimated problem. *Anesth Analg* 2002; 95: 1788-1792.
11. Rennotte MT, Baele P, Aubert G et al.: Nasal continuous positive airway pressure in the perioperative management of patients with obstructive sleep apnea submitted to surgery. *Chest* 1995; 107: 367-374.

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