The effect of deep versus moderate neuromuscular block on postoperative respiratory function in bariatric laparoscopic surgery: a randomized, double blind clinical study

Baete S, Vander Laenen M, De Vooght P, et al. ZOL Genk, Belgium

Introduction

Laparoscopic bariatric surgery poses special demands on both the surgeon and anesthesiologist. The surgeon requires good visualization of the surgical field while the anesthesiologist is concerned with the post-operative respiratory function of these morbidly obese patients. It has been suggested that deep neuromuscular block (NMB) improves surgical conditions during laparoscopy. However, deep NMB puts the patient at risk for residual postoperative NMB and associated respiratory complications. We tested the hypotheses that reversal of deep NMB with sugammadex could prevent postoperative respiratory impairment.

Methods

In this single centre, randomized, double-blind, clinical trial sixty patients were evenly randomized over a deep NMB-group and a moderate NMB-group. NMB-depth was monitored throughout the procedure by acceleromyography of the adductor pollicis muscle. Anesthesia was induced and maintained with propofol and remifentanyl. 15 Minutes prior to extubation a single dose of fentanyl 100 µg was administered. The postoperative pulmonary function was assessed by measuring peak expiratory flow (PEF), forced expiratory volume in 1 second (FEV1) and forced vital capacity (FVC) using an electronic portable peak flow meter. Baseline pulmonary function tests were performed during the preoperative anesthesiology consultation. Data are presented as mean $\pm$ SEM. Additionally the need for postoperative respiratory support and the level of sedation were evaluated. This study was funded by a grant from Merck, Sharp & Dohme.

Patient characteristics

11 Patients declined to participate, two were excluded because of prior gastric banding, one patient was excluded because of renal failure. All patients received the allocated medication and there was no loss to follow-up. Baseline characteristics between groups were similar:

	Deep NMB	Moderate NMB
Age	41 $\pm$ 2	41 $\pm$ 2
Sex: Male	8 (27%)	4 (13%)
Female	22 (73%)	26 (87%)
BMI	40 $\pm$ 1	41 $\pm$ 1

Results

After surgery, all the pulmonary function tests were considerably impaired in both groups when compared to baseline. There was no statistically significant difference in the decrease in PEF, FEV1 and FVC (expressed as % change from baseline) between the deep and the moderate NMB-group.

The modified observer’s assessment of alertness scale at the time of pulmonary function testing was similar between the 2 groups (4.9 $\pm$ 0.1 vs. 4.9 $\pm$ 0.1; P=0.76). In the deep NMB-group, 2 patients required postoperative non-invasive CPAP vs. 1 patient in the moderate NMB-group (P=0.6). No patient needed reintubation after surgery. The following tables compare pre- and post-operative pulmonary function for both groups. A similar decline in post-operative pulmonary function was found in both groups.

Pulmonary Function Tests

Deep NMB			
	Preoperative	Postoperative	P-value
PEF (l/min)	314 $\pm$ 20	141 $\pm$ 15	P<0.0001
FEV1 (l)	2.4 $\pm$ 0.2	1.1 $\pm$ 0.1	P<0.0001
FVC (l)	3.0 $\pm$ 0.2	1.4 $\pm$ 0.1	P<0.0001

Moderate NMB			
	Preoperative	Postoperative	P-value
PEF (l/min)	276 $\pm$ 15	126 $\pm$ 0.1	P<0.0001
FEV1 (l)	2.2 $\pm$ 0.1	1.1 $\pm$ 0.1	P<0.0001
FVC (l)	2.7 $\pm$ 0.1	1.2 $\pm$ 0.1	P<0.0001

Conclusion

Pulmonary function was significantly impaired after laparoscopic bariatric surgery in the deep as well as the moderate NMB-group. There was no difference between both groups with respect to the extent of impairment (45 to 52 % decrease from baseline) in PEF, FEV1 and FVC. These results are in line with previous research showing an important decrease in post-operative pulmonary function after laparoscopic surgery, irrespective of the NMB-protocol used, as long as NMB is adequately monitored and reversed at the end of surgery.