Does pulmonary compliance optimization through PEEP manipulations reduce the incidence of postoperative hypoxaemia in bariatric surgery?

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Introduction

- ✓ In obese surgical patients (OP), the best intraoperative ventilation strategy remains to be defined¹.
- ✓ Dynamic pulmonary compliance (C_{dyn}) and dead space ratio are indicators for efficient ventilation at an optimal end-expiratory pressure (PEEP)².
- ✓ The aim of this prospective randomised controlled double blind study was to determine if intraoperative C_{dyn} optimization through PEEP manipulations affects the incidence of postoperative hypoxaemia (PH) in OP undergoing laparoscopic bariatric surgery.

Methods (figure 1)

- ✓ After IEC approval, 100 OP scheduled for elective laparoscopic gastric bypass or sleeve gastrectomy who gave written informed consent were randomized according to the level of PEEP maintained during the surgery.
- ✓ Anaesthesia technique, fluid volume and vasoactive agents administration were standardized.
- ✓ Patients were ventilated with a tidal volume of 8ml/kg ideal body weight and an inspired oxygen fraction of 0.5.

- ✓ In the control group, a PEEP of 10 cmH₂O was continuously applied.

- ✓ In the study group, the PEEP level was adapted to achieve the best C_{dyn} determined by the ventilator (Aisys CS2, GE Healthcare, USA).

- ✓ Recruitment manoeuvres were allowed when pulse oximetry saturation (SpO_2) was below 95%.
- ✓ Measurements were performed after induction of anaesthesia (T1), after pneumoperitoneum insufflation (T2) & after pneumoperitoneum exsufflation (T3).

- ✓ Patients received supplemental nasal O₂ (3L/min) from tracheal extubation up to the first postoperative day (D1) and were monitored up to D2 with a portable pulse oximeter (OxyTrue®, Blue Point Medical, Germany).
- ✓ Primary objective was the incidence of PH ($SpO_2 < 90\%$) during D1 and D2. Data between groups were compared using Mann-Whitney-U or Chi-square tests and presented as median [interquartiles] or percentage. A $p < 0.05$ was considered significant. NCT02579798.

Results

Table 1 – Demographics and primary endpoint results

	Control group (N=50)	Study group (N=50)	p
Age (years)	40 [27-47]	42 [31-48]	0.366
BMI (kg/m ²)	42 [39-45]	42 [40-45]	0.588
Procedure duration (min)	88 [65-135]	115 [79-160]	0.136
Mean SpO_2 D1 (%)	98 [97-99]	97 [95-98]	0.012
Mean SpO_2 D2 (%)	96 [94-97]	96 [93-97]	0.230
Hypoxaemia time D1 (%)	0.6 [0.2-2.0]	0.7 [0.2-3.0]	0.462
Hypoxaemia time D2 (%)	2.5 [0.6-5.5]	2.6 [0.8-10.0]	0.535
Total hypoxaemia time (%)	1.3 [0.5-3.7]	2.1 [0.8-8.5]	0.264

- ✓ C_{dyn} was significantly higher in the study group than in the control group although PEEP was not significantly different between groups (figure 2).
- ✓ PaO_2/FiO_2 ratio was not different between groups throughout the surgery.
- ✓ No patient developed pulmonary complication up to 30 day postoperatively.

Figure 2 – C_{dyn} variation throughout study protocol

Conclusions

- ✓ In the conditions of our study, C_{dyn} optimization through PEEP manipulations did not reduce the incidence of postoperative hypoxaemia.