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gen tension (PaO2) during OLV, leading to the recommendation that tidal volume (TV) during OLV should be as high as in two-lung ventilation (8-12 ml/kg). Recently data have demonstrated that protective lung ventilation (TV ≤ 5ml/kg, positive end-expiratory pressure-PEEP 5-10 mmHg and limit of the plateau airway pressures up to 20 cmH_2O) prevents acute lung injury (ALI). Use of pressure control ventilation (PCV) versus volume control ventilation (VCV) during OLV is considered to improve pulmonary oxygenation, to reduce intrapulmonary shunt and to lower airway peak pressure [1]. However, benefits of PCV implementation remain controversial not only in patients with pulmonary pathology but also in otherwise healthy patients [2]. In this study we investigated whether PCV or VCV can achieve the target of PLV during OLV in non-functionally impaired patients during thoracic surgery.

Methods. Twenty patients with good pre-operative pulmonary function (FEV1 > 75%, FEV1/FVC > 75%) scheduled for thoracic surgery, were prospectively enrolled in this study. Ten patients underwent OLV with VCV and ten patients with PCV for a similar period of time with the same settings (TV: 5ml/Kg, PEEP: 5 cmH_2O). Peak, Plateau airway pressure and arterial blood gases were obtained during OLV.

Results. Arterial PO_2 did not differ between two groups before OLV establishment. There were significant differences during OLV in arterial oxygenation between VCV and PCV (PO_2: 12.9 ± 0.72 kPa vs 18.4 ± 4.78 kPa respectively, $p = 0.031$). Peak airway pressure was lower with PCV than with VCV (P_{peak}: 20 ± 0 vs 36 ± 3.28 respectively $p = 0$). Plateau pressure up to 20 cmH_2O was achieved only with PCV; even though the low $P_{inspiration}$, PCO_2 was maintained less than 50 mmHg.

Discussion. The use of PCV during OLV leads to improved oxygenation compared with VCV also for patients with good pre-operative pulmonary function. Moreover PCV reduced peak airway pressures resulting to better distribution of ventilation to the lung, better ventilation/ perfusion matching and protection from barotraumas.

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Protective one lung ventilation for pulmonary resections: a pilot study

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Introduction. Postoperative pulmonary complications are still major causes of morbidity and mortality after pulmonary resection. The use of low tidal volume (VT) during one lung ventilation (OLV) has been recently evaluated to decrease the incidence of Acute Lung Injury (ALI) as part of ventilation strategy [1]. No study to evaluate the best VT during OLV has been designed so far. The primary endpoint of this study was to evaluate the feasibility of 6 vs. 4 ml/kg of VT during OLV for pulmonary resection and the impact of intra- and postoperative PaO_2/FiO_2. The secondary endpoints were the postoperative length of stay (LOS), cardiac and pulmonary complications and mortality.

Table 1

	6 ml/kg^{-1} (12 pts)	4 ml/kg^{-1} (12 pts)	*p* value
PaO_2 kPa (2SD) intraoperative OLV	21.9 ± 19.8	19.5 ± 19.3	0.28
$PaCO_2$ kPa(2SD) intraoperative OLV	5.2 ± 1.1	5.7 ± 1.4	< 0.0001
pH (2SD) intraoperative OLV	7.41 ± 0.1	7.37 ± 0.09	0.0004
PaO_2/FiO_2 < 13.3 (n) Intraoperative OLV	0	1	0.3
PaO_2/FiO_2 (2 SD) 1 hour postoperative	39.4 ± 20.5	40.9 ± 24.4	0.77
PaO_2/FiO_2 in POD1 (2SD)	45.9 ± 25.1	45.1 ± 18.6	0.87
PaO_2/FiO_2 in POD3 (2SD)	44.5 ± 13.8	42.9 ± 15.3	0.66
PaO_2/FiO_2 < 40 (n) in POD1	4	3	0.5
PaO_2/FiO_2 < 40 (n) in POD3	2	1	0.3
PaO_2/FiO_2 < 26.7 (n) postoperative	0	0	–
Pneumonia (n)	3	0	0.045
Atelectasis (n)	1	0	0.3
Arrhythmias (n)	1	2	0.3
Redo (n)	1	2	0.44
LOS_{days} (2 SD)	11 ± 14	12 ± 14	0.66
Mortality	0	0	–

Methods. Twenty four patients undergoing elective thoracotomy or thoracoscopic lobectomy were enrolled and randomly assigned to two different OLV groups. During two lung ventilation (TLV) both groups were ventilated with a VT of 8 ml/kg. The comparison, as an observational intermediate step for designing a pilot study, was directed to a VT of 6 ml/kg (group 6) vs. a "more" protective VT of 4 ml/kg (group 4), during OLV. Exclusion criteria were: history of heart and/or renal disease, pulmonary hypertension, severe COPD and pts with pre-operative PaO_2 < 8 kPa and/or $PaCO_2$ > 6 kPa. During TLV both groups were ventilated with a peak pressure (P_{peak}) ≤ 25 cmH_2O and I:E = 1:2. During OLV boyh group6 and group4 were ventilated with Ppeak ≤ 35 cmH_2O, I:E = 1:2, while ZEEP was set in group6 and a PEEP of 5 cmH_2O was set in group 4. Only in group4, lung recruitment manoeuvres (LRM) were performed every hour of OLV and in case of desaturation (SpO_2 < 92%), FiO_2 was increased to maintain SpO_2 > 93%. LRM were implemented as described by Tusman G. et al [2]. After LRM ventilation parameters were switched to baseline settings. After lung re-expansion, but before chest closure, PEEP of 5 cmH_2O was set in TLV. Intra-operatively arterial blood gas analysis, haemodynamic and ventilatory data were recorded. In the postoperative period, vital signs every 12 h for 2 days, arterial blood gas analysis in the first and third postoperative day (POD), pulmonary and cardiac complications, postoperative LOS, need for re-operation and mortality were recorded.

Results. Are reported in Table 1.

Discussion. There was no statistical differences between the two groups studied in terms of PaO_2/FiO_2 and LOS. Among the postoperative complications, there was a higher incidence of pneumonia in *group 6*. During OLV, hypercapnia was a side-effect in "more" protective ventilation *group 6* with minimal pH changes. In thoracic surgery, Yang at al [1] reported that OLV of 6 ml/kg strategy, despite the smaller VT,, was comparable to 8 ml/kg in terms of oxygenation, alveolar ventilation and postoperative outcomes. In conclusion, the design of the present "pilot" study to compare a VT during OLV of 6 vs. 4 ml/kg showed that both the protective ventilation strategies, during OLV, were safe with no difference in postoperative **Results.**

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Effect of ventilatory mode on arterial oxygenation during one-lung ventilation for thoracic surgery in patients with obstructive lung diseases

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Introduction. The effect of ventilation mode during one-lung ventilation (OLV) on arterial oxygenation in patients with obstructive lung diseases has not been clearly determined yet. The purpose of this study was to evaluate the effects of ventilation mode on arterial oxygenation, airway pressures and haemodynamic variables during one-lung ventilation.

Methods. Forty patients, who had obstructive lung diseases on pulmonary function tests, undergoing elective thoracic surgery in the lateral position, were included. They were randomly assigned to one of two groups. In group A, OLV was started by volume-controlled ventilation (VCV) and the ventilation mode was switched to pressure-controlled ventilation (PCV) after 30 min. In group B, ventilation modes were performed in the opposite order. OLV was performed with a tidal volume of 6 ml/kg based on predicted body weight, with positive end-expiratory pressure (PEEP) of 5 cmH_2O. During OLV with PCV, the inspiratory pressure was closely adjusted to obtain a tidal volume of 6 ml/kg with PEEP of 5 cmH_2O. Arterial blood gas analysis data, peak inspiratory pressures (Ppeak), mean airway pressure (Pmean), plateau inspiratory pressure (Pplateau), and haemodynamic variables were obtained at the end of each ventilatory mode during OLV. Statistical analysis was performed using paired t-test for numerical data and chi-squared test for non-numerical data between groups. Statistical significance was accepted for p-values of < 0.05.

Results. No significant difference was observed in arterial oxygenation during OLV with VCV ($PaO_2 = 194.3 \pm 43.7$ cmH_2O) or PCV ($PaO_2 = 200.8 \pm 58.3$ cmH_2O; $p = 0.722$). Compared to two-lung ventilation (18.8 ± 2.4 cmH_2O), peak airway pressure increased after the initiation of OLV with VCV (21.9 ± 2.5 cmH_2O; $p = 0.002$) or PCV (21.3 ± 4.1 cmH_2O; $p = 0.039$), but the airway pressures and haemodynamic variables were similar during OLV with each ventilation mode.

Discussion. In patients with obstructive lung disease, PCV provides no advantage over VCV in terms of respiratory and haemodynamic variables during protective OLV.