ORAL PRESENTATIONS

OP 1

Physiologically variable ventilation versus pressure-controlled ventilation for COPD: a randomized experimental study

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Introduction: Mechanically ventilation of patients with chronic obstructive pulmonary disease (COPD) is challenging due to the potential risks of lung overdistension and increases in driving pressure with subsequent lung injury. Recently, we demonstrated the beneficial effects of physiologically variable ventilation (PVV) on lung function, a ventilation mode that mimics the spontaneous breathing by incorporating tidal variations in volume and respiratory rate. Thus, we aimed at comparing lung function and lung aeration following ventilation with PVV or conventional pressure-controlled ventilation (PCV) in an experimental model of COPD.

Methods: Main features of COPD were induced in New-Zealand White rabbits (n = 15, mean weight 3.4 kg) by a 4-week long exposure to nebulized elastase and lipopolysaccharide. After 30 days, animals were anesthetized, tracheotomized and randomized to receive 6 hours of mechanical ventilation with either PVV or PCV. The PVV pattern replicated the spontaneous breathing of awake COPD rabbits, measured by whole-body plethysmography. Blood gases, respiratory mechanics and chest X-ray fluoroscopy were assessed during the 6 hours of ventilation. After sacrifice, lungs were excised for histological analysis.

Results: Ventilation parameters, including respiratory rate and mean driving pressure, were similar between PVV and PCV groups. However, after 6 hours of mechanical ventilation, animals receiving PVV exhibited significantly higher oxygenation index (PaO_2/FiO_2 441±37 (SD) mmHg vs. 354±61 mmHg, p <0.001) and lower $PaCO_2$ (44.1±3.3 mmHg vs. 55.8±6.5 mmHg, p <0.001) than animals ventilated with PCV. Additionally, we observed less derecruitment (decrease in lung aerated area, -3.4±9.9% vs. -17.9±6.7%, p <0.01), lower intrapulmonary shunt (9.6±4.1 vs. 17.0±5.8%, p <0.05) and lower respiratory elastance (359±36 cmH_2O/L vs. 463±81 cmH_2O/L, p <0.01) in animals ventilated with PVV. Ventilation modes had no significant differences in histological lung injury scores.

Conclusion: Prolonged ventilation with physiologically variable ventilation applied in a model of COPD prevents deterioration in gas exchange, pulmonary shunt, respiratory mechanics, and lung aeration. A recruitment effect along with a global reduction in lung shear stress may explain the benefits of PVV over PCV.

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OP 2

A comparison of intraoperative pain measurement with the PMD 200 in fentanyl-based and low opioid anaesthesia: a prospective monocenter pilot study

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Background: Intraoperative pain management is a challenge for the anaesthesia team. The CE-certificated Pain Monitoring Device (PMD-200) was developed for non-invasive intraoperative pain assessment using Nociceptive Levels (NOL). In this pilot study we tested the use and reliability of the PMD-200 in daily clinical practice comparing two different intraoperative analgesia regimens: a standard fentanyl-based regime and a multimodal low opioid anaesthesia approach.

Methods: Thirty-four ASA I-IV patients of either sex (18 f and 16 m), undergoing visceral, gynaecological or urological surgery with general anaesthesia were included. The patients were divided into a fentanyl-based and a multimodal (Lidocaine, Ketamin and Magnesium), low-opioid analgesia group. During anaesthesia preparation, operation and in the recovery room, the PMD-200 was attached to the patient's finger to measure the NOL.

The primary outcome of the study was the intraoperative NOL in the two analgesia groups. The secondary outcomes were non-measure/total time ratio for the NOL and the postoperative morphine consumption in the recovery room and on the ward.

Results: The mean fentanyl use was 379 µg (±119 µg) in the fentanyl-based group and 57 µg (±18 µg) in the multimodal, low-opioid group. NOL was similar and not statistically different for the two regimens. The postoperative morphine consumption in the first 24 hours after surgery was 6 (±12) mg in the low-opioid group and 6 (±11) mg in the fentanyl-based group (ns). The NOL-Index provided measures for 96% of total anaesthesia time. From these 96%, in 96% (92% in total) there was no error indication, in the other 4% there was a minor error indication. In 4% there were no data at all because of a major error indication.

Conclusions: The PMD-200 delivered reliable results for approximately 90% of the monitoring time. Most of the major error indications occurred during anaesthesia preparation. There was no indication that a low opioid technique is associated with more intra- or postoperative pain. Because of the small sample size a final conclusion is not possible, but our data support the concept, that for abdominal interventions, a multimodal low opioid anaesthesia approach may be a valid option to reduce intraoperative opioid use.

OP 3

Pancreatic adenocarcinoma surgery: No difference in circulating tumor cells and recurrence between desflurane and propofol anesthesia. A randomized controlled trial.

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Background: Several clinical trials have demonstrated the value of circulating tumor cells (CTC) to predict cancer recurrence [1, 2]. Little information is available for the perioperative phase and the impact of anesthesia on CTC. Since volatile anesthetics have immunomodulatory effects, we hypothesized that desflurane reduces the level of CTC vs. propofol anesthesia in the perioperative phase of resection of pancreatic ductal adenocarcinoma (PDAC), and thereby reduces PDAC recurrence.

Methods: A 1:1 randomization to either propofol or desflurane was performed in three Swiss centers with double blinding patients and research personal. Inclusion criteria were age 18-85 years, ASA I-III with a resectable PDAC undergoing primary surgery with the intent of complete tumor resection. Patients undergoing neoadjuvant radio- and/or chemotherapy were excluded. CTC were measured using the CellSearch® device before surgery, 3 and 7 days after surgery, prior to the start of adjuvant chemotherapy (1-3 months postoperatively), as well as at 6-and 12-month follow-up. Primary endpoint was the peak level of perioperative CTC, secondary endpoint long term levels of CTC and recurrence. This trial was registered with ClinicalTrials.gov (NCT02335151). Mixed models and cox regression with adjustments were calculated.

Results: Between October 2016 and September 2019, 83 participants were enrolled into the desflurane (n = 42) or propofol (n = 41) anesthesia arm. Patient characteristics were comparable in both groups. There was no difference in peak CTC count in the perioperative phase (incidence rate ratio (IRR) of desflurane compared to propofol 1.23 [95%CI 0.74−2.03], p = 0.40). CTC counts from pre-chemotherapy to 12-month follow-up were similar as well (IRR 0.91 desflurane compared to propofol [95%CI 0.55−1.52], p = 0.70). Time to recurrence was similar for both groups (adjusted HR 0.55 [95%CI 0.19−1.54], p = 0.30).