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Systemic stress and PEEP relationships during laparoscopic cholecystectomy: a new protective marker?

Estresse sistêmico e sua relação com PEEP durante colecistectomia laparoscópica: um novo marcador protetor?

Dear Editor,

The interaction of Positive End-Expiratory Pressure (PEEP) effects in gas exchange and lung mechanics during Mechanical Ventilation (MV) in intra and postoperative abdominal surgery are globally well known.[1] However, during laparoscopic cholecystectomy they remain untested. We have read with great interest the study by Oznur et al., on which they move forward testing the PEEP effects during laparoscopic cholecystectomy in two groups regarding to the PEEP level applied (5–10 cm H_2O). They registered hemodynamic (cardiac rate/systolic–diastolic pressure/mean arterial pressure), respiratory (arterial oxygen saturation/partial pressure of carbon dioxide at the end of expiration ($ETCO_2$), and metabolic parameters (glucose/insulin/cortisol/lactic), along three different treatment stages (before/during and after the surgery). The results showed a clear benefit on compliance and oxygenation, a reduction on post-surgical stress, and everything without hemodynamic nor respiratory deleterious effects, when higher peep levels were set. Higher PEEP levels recruit the lung, raising the compliance and improving the oxygenation, it also reduces the ventilation/perfusion mismatch and hence limiting the respiratory shunt.[1] On the hemodynamic point of view, the positive pressure on the lung mechanics rises the left cardiac output mainly through the after load reduction, but also reduces the right cardiac output due to the right after load elevation; so when the patient's hydratation level is adequate, the global cardiac performance improves. As a final result, the physiologic stress secondary to a certain clinical condition, is limited, due to the secured peripheral tissue oxygenation, and hence cortisol and lactic levels decline[2] as shown by authors.

Firstly, protective effects of PEEP need to be address in time. We know that abdominal condition and their derived surgical procedures, when needed, intra-abdominal pressure (Pabd) peaks, decreasing the lung compliance, and leading to a collapse on the lower pulmonary lobes alveoli. The atelectasis de-recruits the lung, dropping dramatically the Functional Residual Capacity (FRC) and worsening the pulmonary shunt and so the oxygenation and the CO_2 wash out. Previously papers, Pankaj et al.[3] had already concluded the same effect as Oznur et al., but not long-term outcome on stress (60 min after extubation), yet observed until this study. In our opinion associations between postoperative pulmonary complications and the protective stress use of PEEP need to be clarified. We do not have this key point and mainly pulmonary post-surgical complications (early or late) need also to be taken into account.

Secondly, associations of intrabdominal pressure and the intrathoracic pressure is a controversial determinant for post operatory pulmonary complications. Nevertheless some studies[4] did not reported an straight relation between the raise on the intrabdominal pressure and the intrathoracic pressure on patients undergoing laparoscopy surgery. On the other hand, there are also the severe pathophysiological effects occurring not only on the lung, but also on the liver, kidney and heart, which potentially lead to cardiorenal, hepatopulmonary or hepatorenal syndromes.[5] Higher peep, cautiously used, can fight back those deleterious conditions through the oxygenation and cardiac performance improvement.

Thirdly, sensibility and specific of variables used to define ''physiologic stress'' are limited for other determinants factors during surgery procedure (tissue oxygenation, cortisol and lactic levels). Additionally, no previous pathological conditions existed on the selected patients, so not chance to know if the outcomes on stress respond would be reproducible on patients with diabetes, cardiac, endocrine or respiratory disease.

Fourthly, PEEP levels shouldn't be static but dynamic, due the constant changing clinical condition, not even during short time period and minimal invasive surgery, as laparoscopy, because of the altered intrabdominal pressure while surgical procedures are delivered. The clinician must find the proper peep level according to the general condition, the surgical timing and of course the hemodynamic state, due to the positive pressure effects on the patients hemodynamics.[6]

Certainly further analysis is demanded, to elucidate the PEEP effects when intrabdominal pressure is elevated, especially during minimal invasive surgical procedures.

Conflicts of interest

The authors declare no conflicts of interest.

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