

Three-trocar laparoscopic cholecystectomy under spinal anesthesia in a patient with asthma

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SUMMARY: Three-trocar laparoscopic cholecystectomy under spinal anesthesia in a patient with asthma.

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Introduction. *Laparoscopy is perceived as the state-of-the-art technique for a wide variety of operations but is contraindicated by comorbidities such as respiratory diseases. We present the case of a patient affected by asthma who underwent a successful three-trocar low-pressure pneumoperitoneum under spinal anesthesia.*

Case report. *A 58-year-old male with symptomatic gallstones had partly-controlled asthma and respiratory allergies. Potential bronchospasm was avoided by a less invasive laparoscopic technique. Under spinal anesthesia open pneumoperitoneum was achieved at the umbilicus. Two more trocars were inserted. A cholecystectomy was performed in 90 minutes keeping the patient in a supine position and the*

pneumoperitoneum at 8 mmHg. The post-operative course was uneventful. Discharge to home occurred on day two.

Discussion. *Laparoscopy is contraindicated in the presence of hemodynamic instability and inability of the patient to tolerate laparoscopic surgery. Asthma is caused by bronchoconstriction from a myriad possible stimuli requiring a specific anesthetic plan. Spinal anesthesia under low pressure pneumoperitoneum is a safe alternative to general anesthesia in high risk candidates. In experienced hand, a three-trocar cholecystectomy is safe and feasible.*

Conclusion. *Our patient represented a challenging case due to a partly-controlled asthma. Bronchospasm under general anesthesia was prevented by spinal anesthesia to keep a spontaneous physiologic respiration, irrigation of the right subdiaphragmatic surface with lidocaine to control right shoulder pain, safe dissection by three trocars, a pneumoperitoneum at 8 mmHg, the supine position to prevent significant physiologic changes and minimize diaphragmatic irritation.*

KEY WORDS: Three-trocar laparoscopic cholecystectomy - Low-pressure pneumoperitoneum - Spinal anesthesia - Asthma.

Introduction

Laparoscopy is perceived as the state-of-the-art technique for a wide variety of operations, including cholecystectomy. The evident advantages are post-operative minimal pain and scarring, faster recovery, comparable outcomes to laparotomy. Still cases occur where laparoscopy is risky and contraindicated, such as hemodynamic instability, inability of the patient to tolerate the pneumoperitoneum, comorbidities such as respiratory diseases. We present the case of a patient affected by asthma who underwent a successful three-trocar low-pressure pneumoperitoneum under spinal anesthesia.

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Case report

The patient is a 58-year-old male, B.M.I. 23, suffering from biliary colics due to gallstones in the last 15 months. Past surgical history was significant for open appendectomy, open left inguinal hernia repair, removal of nasal polyps. Past medical history showed persistent obstructive airway disease from asthma, respiratory allergies, peptic ulcer disease previously cured by P.P.I.'s, G.E.R.D. Chronic therapy included Omeprazole 20 mg daily, Beclomethasone Nasal Spray 100 mcg once daily, Beclomethasone/Formoterol Oral Inhalation 100/6 mcg twice daily, Ebastine one tablet at nighttime. His pre-operative cardio-pulmonary function was assessed by EKG, normal, pulmonary auscultation showing expiratory and inspiratory wheezing, oxy-hemoglobin saturation with room air at 96%, spirometry significant for air trapping, obstructive

pattern, positive post-bronchodilator response (FEV₁/P 66%, FEV₁/FVC 57%), chest X-ray, normal. Arterial blood gas measurement was omitted due to the good oxygen saturation. The above said tests were consistent with an A.S.A. II patient affected by persistent moderate partly-controlled asthma. In order to prevent a potentially serious attack of intra-operative bronchospasm it was deemed prudent to both avoid general anesthesia and also adopt an alternative less invasive laparoscopic technique. Spinal anesthesia was obtained by injecting 12.5 mg of hyperbaric bupivacaine and 20mcg of fentanyl through a 29G Sprotte needle at T10-T11 level. A Foley catheter was then inserted. No naso-gastric tube was placed. Pneumoperitoneum was achieved in an open fashion at the umbilicus where a 30° optics was inserted through a reusable 10mm trocar. Two more disposable trocars were inserted both slightly above the junction between the midclavicular line and the transverse umbilical line, a 5mm one in the right upper quadrant and a 10mm trocar in the left upper quadrant. After irrigating the inferior surface of the right hemidiaphragm with 10 cc of 2% lidocaine a cautious blood-free cholecystectomy was performed in 90 minutes keeping the patient in a supine position and the pneumo at low pressure, 8 mmHg. IV sedation required a total of 4 mgs of midazolam and 40 mgs of ketamine. The patient remained stable throughout the procedure spontaneously breathing with the aid of a nasal cannula at 4 L/min with oxygen saturation @ 99%, arterial pressure ranging between 130/70 and 110/50. The post-operative course was uneventful and required the administration of i.v. Ranitidine, Ketorolac, Piperacillin twice daily. On post-operative day one a slight right shoulder pain was noticed that didn't preclude ambulation, gas was passed, the Foley catheter was removed and a soft light diet was started. Discharge to home occurred on day two. Subsequent 3 post-operative visits were unremarkable.

Discussion

Laparoscopy is perceived as the state-of-the-art technique for cholecystectomy (1). Contraindications to laparoscopy are hemodynamic instability and inability of the patient to tolerate a laparotomy (2). In fact, several physiological changes are generated during laparoscopic surgery. Extreme Trende-

lenburg or reverse Trendelenburg positions cause cerebral and upper airway oedema, lower limbs' compartment syndrome, rhabdomyolysis, myoglobin-associated acute renal failure, hypotension, myocardial and cerebral ischaemia. The increased abdominal volume and pressure from insufflation of carbon dioxide increase systemic vascular resistance from mechanical compression of the abdominal aorta, stimulates vasopressin and the renin-angiotensin-aldosterone axis. Compression of the inferior vena cava and the cephalad displacement of the diaphragm reduce preload, decrease cardiac output and arterial pressure. Compression of pulmonary parenchyma and increased intra-thoracic pressure increase pulmonary vascular resistance, reducing cardiac output, pulmonary compliance, functional residual capacity, and causes pulmonary atelectasis, altered V/Q relationships, and hypoxaemia. Increased PCO₂ and V/Q mismatch result from absorbed CO₂ (3). Asthma is typified by sentinel symptoms, airway obstruction, inflammation, and hyperresponsiveness. Bronchoconstriction results from contraction of bronchial smooth muscle due to a myriad possible stimuli such as airway instrumentation, various drugs, aspiration, infection, trauma. Emergence from anaesthesia presents a constant risk of laryngospasm and bronchospasm. Pain, fluid shifts, and delayed mobilization can contribute to an increased risk of postoperative pulmonary complications in these patients. Therefore, a history of asthma has several implications in the perioperative setting (4). According to the Global Initiative for Asthma (GINA) classification asthmatics are subdivided into controlled, partly controlled or uncontrolled (5). The anaesthetic plan regarding a patient with asthma should balance suppression and avoidance of bronchospasm with patient safety, comfort, and a quiet surgical field. It seems prudent to avoid direct instrumentation of the airway if at all possible. Even anxiety or pain during regional anaesthesia could themselves precipitate an attack of bronchospasm. Pulmonary function tests (PFTs) help stratify the severity of the disease (4). An obstructive defect is diagnosed by a forced expiratory volume in one second/forced vital capacity ratio lower than 70% (FEV₁/FVC). The FEV₁ percentage of predicted grades the severity of the obstruction: mild >70%, moderate 60-69%, moderately severe 50-59%, severe 35-49%, very severe <35%. An increase of more than 200 ml in FEV₁ or FVC after bronchodilator

treatment confirms the obstruction's reversibility (6). Spinal anesthesia under low pressure pneumoperitoneum (< 10mmHg) has been reported as a safe alternative to general anesthesia for laparoscopic cholecystectomy in high risk candidates. Pre-anaesthetic hydration prevents hypotension from pneumoperitoneum, significant retention of CO₂ and hypoxemia is not observed, local anaesthetic agents to bathe the subdiaphragmatic surface immediately after creating pneumoperitoneum reduces the incidence of referred pain to the right shoulder. Low pressure pneumoperitoneum allows for reduced post-operative pain, less use of analgesics, preservation of pulmonary function, reduced hospital stay (7, 8). Although four trocars are mostly used for cholecystectomy the fourth port is not necessary to grasp the gallbladder fundus and expose Calot's triangle. In experienced hand, a three-trocar cholecystectomy is safe and feasible, requires the fourth port in a minority of cases, minimizes postoperative pain, allows a rapid return to activity and work, improves patient satisfaction and cosmetic results due to one less scar, avoids the cost of the fourth trocar (9, 10). Our patient represented a challenging case due to a partly-controlled asthma. A potential dreaded bronchospasm under general anesthesia was prevented by spinal anesthesia to keep a spontaneous physiologic respiration, preventive irrigation of the right subdiaphragmatic surface with lidocaine associated with i.v. administration of midazolam and ketamine to control right shoulder pain, safe dissection by three trocars, as per our usual technique, to avoid one more site of pain close to the chest, a pneumoperitoneum at 8 mmHg together with the supine position to prevent significant physiologic changes and minimize diaphragmatic irritation.

Conclusion

Our patient represented a challenging case due to a partly-controlled asthma. Bronchospasm under general anesthesia was prevented by spinal anesthesia to keep a spontaneous physiologic respiration, irrigation of the right subdiaphragmatic surface with lidocaine to control right shoulder pain, safe dissection by three trocars, a pneumoperitoneum at 8 mmHg, the supine position to prevent significant physiologic changes and minimize diaphragmatic irritation.

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