

**Case Report**

Laparoscopic Gastric Band Insertion Under Spinal Anesthesia and Intravenous Sedation

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Our case study was performed in January 2021, during the COVID 19 pandemic. The safety of both patients and healthcare workers should be taken into consideration when performing anesthesia management for patients during that critical time and special consideration should be taken regarding patients with chronic respiratory illness such as Bronchial asthma as they are at high risk of pulmonary complications during the perioperative period [1]. In addition, general anesthesia requiring airway intervention has a higher risk of perioperative pulmonary complications than regional anesthesia [2,3]. A previous systematic review reported that the incidence of postoperative pneumonia in patients undergoing neuraxial anesthesia was lower than that in patients undergoing general anesthesia (odds ratio, 0.63) (Pelosi P, et al. (1985)). Thus, it is reasonable to prioritize regional anesthesia over general anesthesia to minimize the risks of exacerbating respiratory infection and causing pulmonary complications in patients during COVID-19 pandemic.

Moreover, rapid and uneventful postoperative recovery following general anesthesia in morbidly obese patients undergoing bariatric surgery may offer challenges to anesthesiologists. With improved surgical techniques and shorter pneumoperitoneum, regional anesthesia may be considered for this laparoscopic procedure in selected cases. Our patient was a 32 years old male (body mass index: 38 kg/m²) with history of bronchial asthma on Ventolin inhaler and was scheduled for laparoscopic gastric band implantation. After standard intraoperative monitoring was applied supplemental oxygen was administered by nasal cannula at flow rate 4 l/min following a premedication of 1 mg of intravenous midazolam, spinal anesthesia was performed at Lumber 3-4 space with 3ml of 0.5% hyperbaric Marcaine then light sedation with dexmedetomidine and Propofol TCI started. Surgical technique modification included insufflation of CO₂ at a low flow rate and avoidance of orogastric tube use. During the procedure, the patient breathed spontaneously without difficulty and hemodynamics were stable throughout the surgery. Both patients were satisfied with the anesthesia technique and was discharged uneventfully.

Introduction

Bariatric surgery, which is the only proven, effective, and durable treatment for morbidly obese patients [4], is usually performed under general anesthesia with volatile anesthetics and neuromuscular blockade. However, general anesthesia with neuromuscular blockade increases upper airway collapse risk, pulmonary atelectasis, and postoperative pulmonary complications in this population [5]. Acute respiratory failure, if occurs after bariatric surgery, may significantly increase in-hospital mortality

[6]. We reported a case of successful laparoscopic gastric band implantation under spinal anesthesia with minimal sedation followed by TAP block for postoperative pain control to minimize the need of postoperative opioids avoiding its respiratory depression effect specially as this surgery was performed during COVID 19 pandemic in a patient with a preexisting lung problem such as bronchial asthma. We have found that with improved surgical technique and shorter pneumoperitoneum, regional anesthesia may be considered as a viable alternative to general anesthesia in selected cases undergoing bariatric surgeries.

Case Study

The patient was a 32-year-old male (weight: 121 kg; height: 180 cm; body mass index: 38 kg/m²) who was scheduled for laparoscopic gastric band implantation. He is asthmatic, nonsmoker. Preoperative pulmonary function tests revealed minimal obstructive impairment, with Forced Vital Capacity (FVC) 4.26 L, one-second Forced Expiratory Volume (FEV1) 3.95 L, and FEV1/FVC 113%. The airway, assessed in sitting position, was judged to be Mallampati class I-II.

The patient was scheduled for laparoscopic gastric band implantation surgery due to failing conservative weight loss measures. The operative criteria were based on the Asia-Pacific guidelines for bariatric surgery, i.e. body mass index ≥ 32 kg/m² in the presence of comorbidities and body mass index ≥ 37 kg/m² with or without comorbidities.

At the preoperative visit, He opted for spinal anesthesia with sedation followed by TAP block after a detailed explanation regarding postoperative pulmonary complication risks. Spinal anesthesia and the possibility of intraoperative conversion to general anesthesia were explained. Standard intraoperative monitoring included electrocardiography, noninvasive blood pressure, and pulse oximetry. After obtaining baseline vital signs, 1mg of intravenous midazolam was administered, then oxygen (4 L/min) was commenced through a face mask. Before spinal anesthesia, he received Ringer's lactate solution (500 ml). With the patient in sitting position, an 26-gauge pencil point needle was introduced at the L3/L4 intervertebral space using the median approach under full aseptic precautions. Thigh-length antiembolic stockings and sequential pneumatic compression devices were placed on both lower extremities for venous thromboembolism prophylaxis. Urine catheter was not inserted. 3-ml of 0.5% hyperbaric Marcaine with 10 µg/ml fentanyl was injected intrathecally then Trendelenburg position was applied for 10 minutes to obtain segmental sensory block (pinprick) till the fourth thoracic dermatomes. Then the patient was placed in reverse Trendelenburg position at 30°-45° angle and dexmedetomidine intravenous infusion of 0.2 µg/kg/hour plus Propofol target controlled infusion (Schneider's model) with the initial target plasma concentration set at 1.5 µg/ml. Calibrating orogastric tube was not used for gastric pouch formation. Laparoscopic bariatric surgery was performed by an experienced surgeon, who performed 250-300 cases of laparoscopic bariatric surgery per year. Pneumoperitoneum was established with carbon dioxide at an intra-abdominal pressure of 13 mmHg. To avoid vasovagal reflex and shoulder pain, the carbon dioxide was insufflated at a low flow rate (2 L/min) [7]

The patient's sedation score was monitored by BIS and kept between 60-80% and hemodynamics were closely monitored & changes were minimal. The patient was spontaneously breathing without difficulty. Intraoperatively, no shoulder pain

or other discomfort was described. No episode of hypotension or desaturation was observed during the procedure. The surgeon considered the abdominal relaxation was acceptable. The procedure was completed without complications (operative time 30 min). At the end of the operation, ultrasound guided bilateral TAP block was given, a total of 30 ml of a local anesthetic agent on each side (equal mixture of ropivacaine 0.2% and levobupivacaine 0.5%) was injected. Then IV sedation stopped and the patient was transferred to PACU conscious, hemodynamically stable & pain free. He was able to move unassisted from the operating table to their bed after the operation. Postoperative recovery was uneventful. He did not experience nausea, vomiting, itching, urine retention, or respiratory depression. Rescue analgesics for pain were not required within 24 h postoperatively. He was satisfied with the anesthetic technique at the postoperative visit, and was discharged on next day.

Discussion

Obesity is associated with increased work of breathing and poor pulmonary functional residual capacity as well as higher risk of perioperative atelectasis persisting for longer duration compared to patients with normal weight [8]. In addition, OSA is a common condition among patients with severe obesity [9]. It is associated with increased risk of cardiopulmonary events and a significant mortality rate. Patients with OSA have historically been considered to be at a high risk of perioperative complications, particularly those of respiratory nature [10]. Patients with obesity hypoventilation syndrome may exhibit even higher risk of cardiopulmonary complications and longer hospital stay, compared to patients with OSA alone [11].

As general anesthesia may cause increased intrapulmonary shunting and atelectasis, postoperative pulmonary complications are common in morbidly obese patients after laparoscopic bariatric surgery [12]. Respiratory failure in morbidly obese patients is associated with greater in-hospital mortality after bariatric surgery. Patients under regional anesthesia usually develop fewer pulmonary complications than those under general anesthesia [13]; this is why we chose spinal anesthesia for this procedure. Carbon dioxide pneumoperitoneum may adversely affect intraoperative pulmonary mechanics [14]. Therefore, our patient was at risk of intraoperative pulmonary distress. In a previous small feasibility study (n = 23), Symeonidis et al. (2013), found that obese patients (mean body mass index: 36 kg/m²) tolerate laparoscopic ventral hernia repair well without intraoperative pulmonary complications. Also, there are several reported cases of uneventful laparoscopic cholecystectomies that used regional anesthesia in patients with severe pulmonary disease [15]. Pneumoperitoneum-induced respiratory distress did not occur in our patients. To maintain the reverse Trendelenburg position at 30°-45° angle during procedure and short duration of pneumoperitoneum may have also contributed

to this. There are several advantages to using regional anesthesia for laparoscopic bariatric surgery in both cases. First, preoperative pulmonary function parameters may be maintained throughout the surgery [16].

In contrast, pulmonary function parameters may not return to preoperative levels until the seventh postoperative day in patients receiving general anesthesia [17]. Secondly, both the laparoscopic procedure [18] and invasive tracheal intubation may induce significant systemic stress response, which can have a potential detrimental effects in high co-morbidity obese patients. Using spinal anesthesia for our patient helped avoid airway intervention and attenuated sympathetic responses caused by the surgical insult; this likely improved his postoperative outcomes and accelerated baseline function return. Finally, morbid obesity is generally concluded to be a risk factor for the development of perioperative deep venous thrombosis and pulmonary embolism. The risk of deep venous thrombosis and pulmonary embolism is lower with epidural anesthesia than with general anesthesia [19].

Shoulder pain, caused by diaphragmatic irritation by insufflation gas, is common during laparoscopic surgery under regional anesthesia, but that was avoided by shortening the surgical time and minimal gas insufflation. Hypotension caused by neuraxial blockade is also common during laparoscopic surgeries, but it can be easily controlled with ephedrine, as in our case. In our patients, 10 micrograms of intrathecal fentanyl was administered for postoperative analgesia, which may avoid the risk of ventilatory depression induced by intravenous opioid administration. Because of the absence of side effects, such as vertigo from general anesthesia and intravenous opioids, patients receiving regional anesthesia and analgesia tend to ambulate earlier than patients receiving general anesthesia. Early ambulation may decrease the incidence of postoperative pulmonary complication in obese patients. There are some limitation in this report. First, difficulty in anesthetic technique may be encountered more frequently in obese patients, which may lead to a high failure rate when performing spinal anesthesia. Secondly, intraoperative conversion of epidural anesthesia to general anesthesia may be required if patients cannot tolerate the laparoscopic procedure (e.g. intolerable shoulder pain or prolonged surgical time). Finally, increased respiratory rate in awake patients during pneumoperitoneum may lead to difficulty in performing laparoscopic surgery. In this condition, conversion to general anesthesia is also required. These concern may discourage anesthesiologists and surgeons to perform this anesthetic technique for laparoscopic bariatric surgery. Further prospective studies with large sample size are required to clarify the indication and contraindication (relative advantages and disadvantages) of performing regional anesthesia for laparoscopic bariatric surgery.

Conclusion

Spinal anesthesia in bariatric surgeries may be an alternative to general anesthesia for laparoscopic bariatric surgery in selected cases. This anesthetic technique may maintain pre-operative respiratory function, increase alertness, and reduce the use of rescue analgesics. Shorter recovery time, lower incidence of nausea and vomiting, better patient satisfaction & pain control with consequent early hospital discharge and speedy return to baseline function is crucial for optimal outcomes in these patients.

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