



Ventral hernia repair under neuraxial anesthesia

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Summary

Background Acute strangulated ventral hernia is associated with operative morbidity and mortality. General anesthesia may increase the operative risk, especially in morbidly obese and COVID-19-positive individuals.

Methods A 67-year-old woman with body mass index (BMI) 51 kg/m², hospitalized for SARS-CoV-2-related interstitial pneumonia and renal failure, presented with acute abdominal pain, nausea, vomiting, and abdominal tenderness secondary to giant ventral hernia strangulation.

Results Due to the suspicion of vascular bowel compromise at contrast-enhanced CT scan, urgent open surgical repair surgery was performed under spinal anesthesia and Venturi mask support. There was no need for an intensive care unit (ICU) stay. Postoperative course was uneventful, and the patient was transferred to a rehabilitation center on postoperative day 10.

Conclusion Although some anesthetists and surgeons may be reluctant to use regional anesthesia for both emergent and elective ventral hernia repair, this may represent an excellent option in obese patients with a high respiratory risk.

Keywords Strangulated hernia · Spinal anesthesia · SARS-CoV-2 infection · Postoperative pain · Enhanced recovery

Main novel aspects

- Regional anesthesia for ventral hernia repair is feasible and allows reduction of airway manipulation and opioid requirements.
- Avoiding intubation and muscle relaxants in morbidly obese patients with concurrent COVID-19 infection allows enhancement of postoperative respiratory recovery with optimal pain control.

Introduction

During the COVID-19 pandemic, general and emergency surgery has faced tremendous challenges due to the burden of critical respiratory patients in intensive care units (ICUs). This situation has forced the adoption of alternative strategies such as patient prioritization and avoidance or procrastination of elective surgical procedures [1–3]. Furthermore, management of surgical emergencies has changed, with the recommendation to postpone surgical treatment in the absence of life-threatening conditions. However, when surgery is not deferrable, the anesthesiologic approach has to be chosen carefully. General anesthesia with endotracheal intubation carries several concerns, since patients with chronic obstructive pulmonary disease (COPD) may not easily be weaned from mechanical ventilation and aerosolization causes an increased risk for healthcare personnel [4]. In selected cases, such as abdominal hernia repair, a valid option may be represented by combined spinal and epidural anesthesia. We describe a case of giant ventral hernia repair performed under spinal anesthesia during the COVID-19 outbreak.

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Fig. 1 Contrast-enhanced abdominal CT scan showing a 7 cm fascial defect size and possible hypoperfusion of bowel contents within the hernia sac

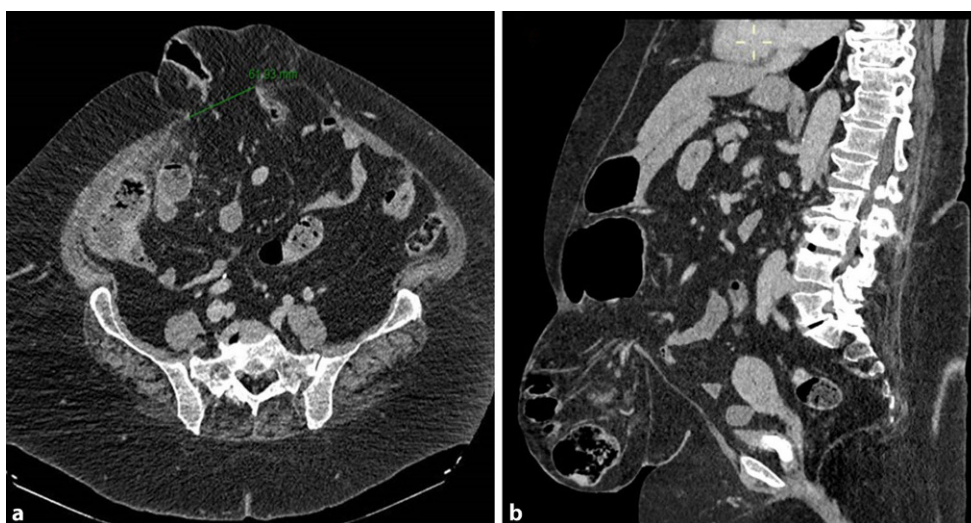
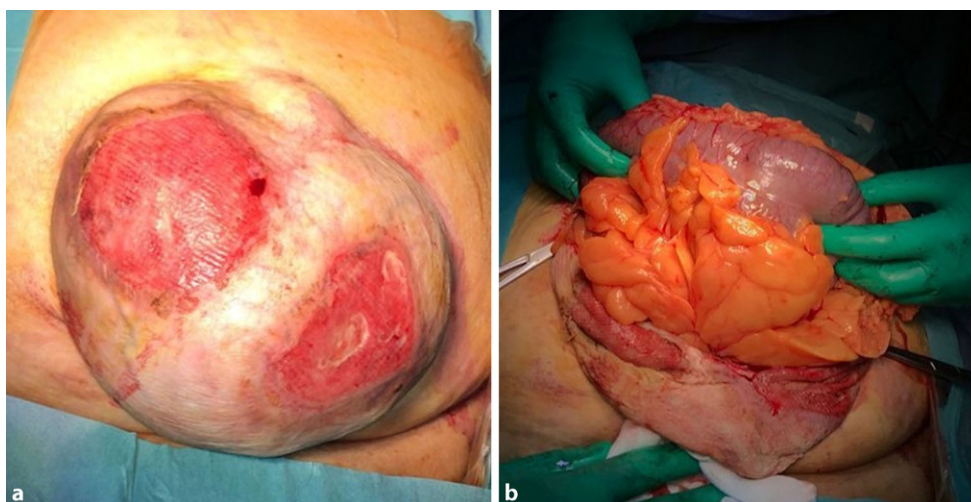


Fig. 2 External aspect of the abdominal wall showing a giant incarcerated ventral hernia (a). After open surgical approach and dissection of the hernia sac (b)



Case report

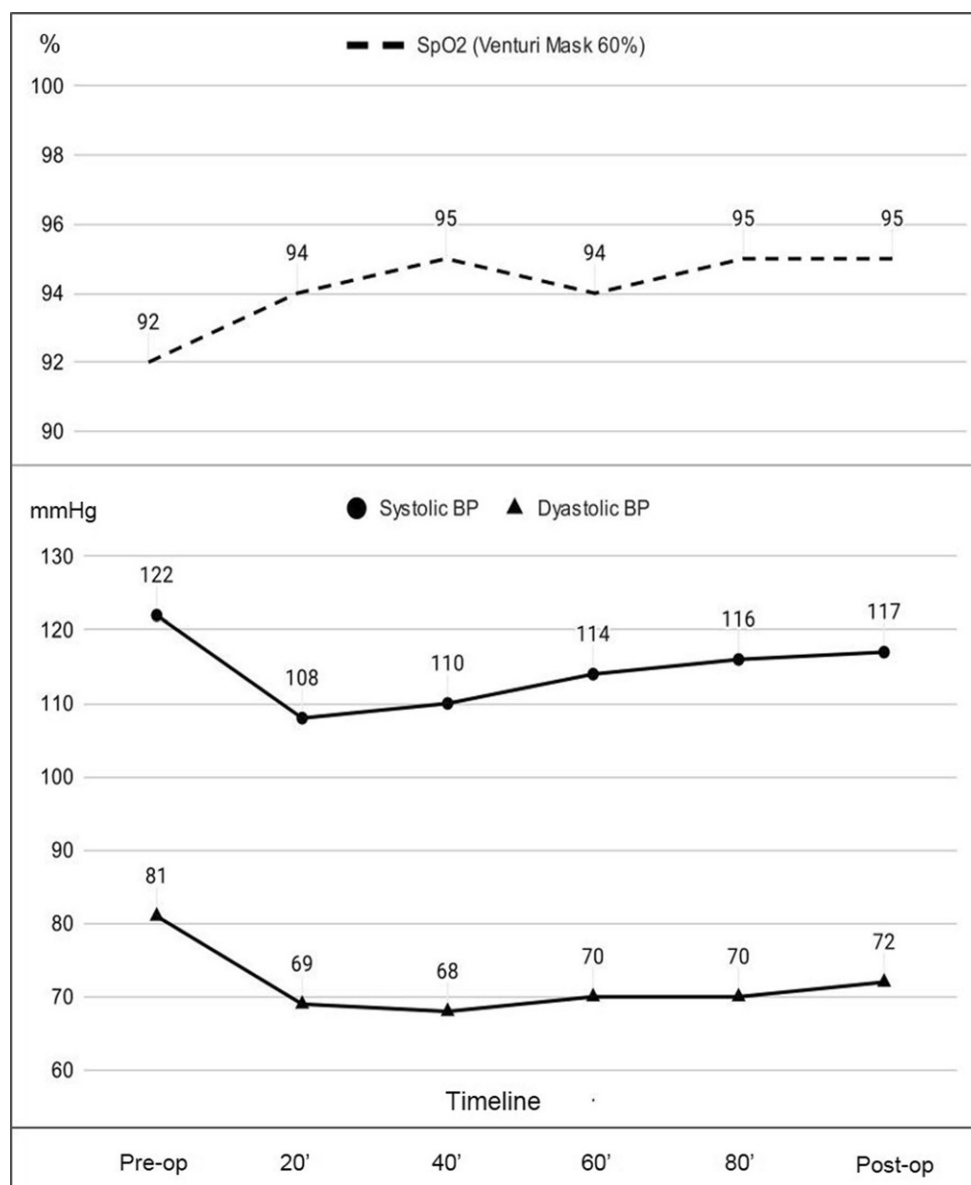
A 67-year-old woman hospitalized for COVID-19-related interstitial pneumonia and renal failure presented with abdominal pain, nausea, vomiting, and abdominal tenderness. She was on antibiotics and low-molecular-weight heparin prophylaxis. Her clinical history included grade III obesity (body mass index 51 kg/m²), hypertension, and hypothyroidism. Physical examination revealed a 15×15 cm incarcerated giant ventral hernia surrounded by circumferential cutaneous ulcerations. Abdominal CT scan showed a 7 cm fascial defect size and possible hypoperfusion of bowel contents within the hernia sac (Fig. 1a, b). Urgent surgery was therefore scheduled. The Mallampati score was 3. Due to the severe respiratory distress caused by the SARS-CoV-2 infection (PaO₂/FiO₂ ratio = 100) and patient comorbidities (ASA score 4, BMI 50.8 kg/m²), spinal anesthesia at T10–T11 level was performed using a 20G Thouy needle. A subarachnoid catheter was also placed. A single bolus of 10 mg hyperbaric Bupivacaine 0.5%

into the subarachnoid space was injected together with sufentanil 3 mcg and dexmedetomidine 10 mcg.

The surgical procedure was carried out under non-invasive cardiovascular monitoring. A Venturi mask was used to provide 60% FiO₂. Attention was paid to avoid fluid overload, and norepinephrine was not required. A midline abdominal incision was performed. Incarcerated transverse colon and omentum were identified, freed from adhesions, and reduced in the abdomen (Fig. 2). There were no signs of bowel ischemia. The hernia sac was then dissected, and longitudinal suture repair of the peritoneum and posterior fascia was performed. Operative time was 85 min. The vital signs and oxygenation parameters remained stable during surgery (Fig. 3).

The patient was transferred to the ward, and the postoperative course was uneventful. Analgesia with levobupivacaine 0.125% and sufentanil (1 mcg/ml) 1.6 ml/h was administered through the subarachnoid catheter until postoperative day 3. Control of pain was excellent (VAS score 0) without any motor impairment of the legs (Bromage score 0). Bowel movements

Fig. 3 Perioperative oxygenation and blood pressure parameters. SpO_2 Peripheral oxygen saturation, BP blood pressure



started on POD 2 and oral nutrition was reintroduced on POD 3. No postoperative headache occurred. The patient was discharged on POD 10 and transferred to a respiratory rehabilitation center. At 5-month follow-up the patient was doing well and there was no evidence of recurrent hernia.

Discussion

To the best of our knowledge, this is the only literature report of awake laparotomy under neuraxial anesthesia for strangulated ventral hernia repair in a morbidly obese patient with respiratory distress secondary to SARS-CoV-2 infection. A wait-and-see strategy was not possible in this patient, because the hernia was not reducible and bowel hypoperfusion was noted at CT scan. Therefore, an open surgical approach under spinal block was preferred to avoid a presumably com-

plex endotracheal intubation and the use of muscle-relaxant drugs that could have led to difficult weaning from the ventilator and prolonged ICU stay.

Ventral hernia, whether primary, incisional, or recurrent, is a common condition often requiring open, laparoscopic, or hybrid surgical repair [5, 6]. Ventral hernia carries a risk of incarceration, acute strangulation, and emergency operation. The estimated 30-day mortality is 9.5% and increasing age and bowel resection are significantly associated with mortality [7].

Over the past several months, the shortage of ICU beds and mechanical ventilation supplies, the limited access to operating rooms (many of them converted into ICUs), and the risk of virus spread have required adaptation of patient management protocols. In some hospitals, several non-deferrable surgical cases could be successfully performed under neuraxial anesthesia without occupation of ICU beds

[8]. Spinal anesthesia is safe and may represent an effective alternative option to endotracheal intubation in patients who are able to cooperate during the surgical procedure. Moreover, it allows good pain control with reduced opioids and rapid postoperative recovery [9, 10]. Among the feared disadvantages of abdominal surgery under spinal anesthesia are inadequate muscle relaxation, bradycardia, hypotension, nausea/vomiting, urinary retention, and headache. In a large single-center retrospective study including 4645 patients mostly undergoing laparoscopic cholecystectomy and treated by spinal anesthesia over a 11-year period [11], the overall conversion rate to general anesthesia was 0.01%. Intraoperative hypotension requiring fluid or pharmacologic support and neck/shoulder pain occurred in 18.2 and 12.2% of patients, respectively. Diclofenac was required for abdominal pain within 2 h postoperatively in 35.5% of patients. Headache persisting for an average of 2.6 days was reported by 5.4% of patients. Interestingly, Bayrak and Altintas [12] evaluated 60 patients with chronic obstructive pulmonary disease who underwent laparoscopic cholecystectomy under general or spinal anesthesia. Duration of the surgical procedure was similar in the two groups. Postoperative pCO₂ values and analgesia requirements were significantly higher in the general anesthesia group, with 13.3% of these patients requiring postoperative mechanical ventilation due to hypercarbia and acidosis.

Morbid obesity can pose formidable challenges to intra- and postoperative management due to difficult airway management and the presence of overt or occult cardiorespiratory compromise. It is well known that obese patients have a higher risk of ICU admission or death compared to normal-weight individuals [13]. It is also established that perioperative SARS-CoV-2 infection increases the 30-day mortality and that, whenever possible, surgery should be delayed by at least 7 weeks to reduce postoperative morbidity and mortality [14].

Emergent ventral hernia repair with neuraxial anesthesia is not even mentioned in textbooks and guidelines [15]. Henderson Harold and Webster [16] reported the benefit of neuraxial anesthesia for emergent abdominal surgery in a patient with Fontan physiology after tricuspid valvectomy who underwent emergent open umbilical herniorrhaphy and small bowel resection without complications. In such circumstances, laparoscopy under general anesthesia may have caused negative hemodynamic consequences because of reduced venous return and failure to control hypercarbia. Spontaneous ventilation during the operation maintained an adequate preload, ensured sinus rhythm, and minimized pulmonary vascular resistance. Janez et al. [17] reported on one patient with recurrent incarcerated incisional hernia who was treated by open Rives–Stoppa repair under spinal anesthesia. Postoperative course was complicated by superior mesenteric artery occlusion

with subsequent reoperation and death. Symeonidis et al. [18] reported on 23 obese patients undergoing elective laparoscopic ventral hernia repair with mesh under spinal anesthesia. The median mesh surface area was 190 cm². No major intraoperative complications occurred. Postoperative morbidity included nausea/vomiting and urinary retention. Median pain score was 1.5 at 24 h. Median length of stay was 1 day, and no readmission were recorded. One recurrent epigastric hernia (4.7%) was diagnosed over a median follow-up of 39 months. Sultan et al. [19] compared the outcomes of general and spinal anesthesia in 40 patients undergoing elective open ventral hernioplasty and found that patients who received spinal anesthesia had lower mean values of systolic and diastolic pressure between 10 and 40 min after the start of spinal anesthesia ($p < 0.05$). However, clinically relevant hypotension (< 90 mmHg) occurred in 4 (20%) patients and was treated with fluid bolus only. Also, patients receiving spinal anesthesia reported less postoperative pain, nausea, and vomiting compared to patients who received general anesthesia ($p < 0.05$).

Conclusion

Strangulated ventral hernia repair under spinal anesthesia proved to be effective in terms of patient and surgeon comfort, provided optimal pain control, and facilitated postsurgical recovery. Indications for spinal anesthesia could safely be expanded to include high-risk patients requiring elective ventral hernia repair.

Declarations

Conflict of interest P. Germanò, S. Siboni, P. Milito, G. Mauntoni, M. Resta, and L. Bonavina declare that they have no competing interests.

Ethical standards All procedures performed in studies involving human participants or on human tissue were in accordance with the ethical standards of the institutional and/or national research committee and with the 1975 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from the patient included in the study. Internal review board approval: HSD 2021-081.

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