Case Report

Laparoscopic bariatric surgery in a patient with idiopathic intracranial hypertension and lumboperitoneal shunt: Anesthetic implications

ABSTRACT

Idiopathic intracranial hypertension (IIH) typically affects obese young women. Treatment is mainly medical, but some cases require surgery; ventriculoperitoneal (VPS) or lumboperitoneal shunts (LPS) being the most common procedures. Although bariatric surgery is not the first-line surgical treatment, it can be useful in refractory cases and allows treating the major underlying risk factor and its comorbidities. Laparoscopic bariatric surgery is the gold standard; however, literature in patients with shunts is scarce. In the present study, we report the case of a morbidly obese female with IIH treated with an LPS and with refractory headache, scheduled for laparoscopic Roux-en-Y gastric bypass. LPS position was checked before surgery (abdominal X-ray) and during pneumoperitoneum was clamped. Anesthetic management was guided to minimize increases in intracranial pressure (ICP). Surgery and anesthesia were uneventful. Three months later, headaches disappeared and analgesics were discontinued. In conclusion, laparoscopic bariatric surgery may be an option for IIH. It is safe in patients with LPS, although concerns should be taken into account (avoid any damage to the shunt, limit digestive tract contents spillage, and strict vigilance for early detection of intracranial hypertension signs). Although valve system could prevent pressure complications, the catheter can be clamped to avoid retrograde insufflation of CO_2 or digestive tract content.

Key words: Anesthesia; bariatric surgery; idiopathic intracranial hypertension; laparoscopy; ventriculoperitoneal shunt

Introduction

Idiopatic intracranial hypertension (IIH) is a disorder that typically affects obese young women. Although the treatment is mainly medical, bariatric surgery can be useful in refractory cases and allows treating the major underlying risk factor.

In the present study, we report the case of a morbidly obese woman with IIH treated with a lumboperitoneal shunt (LPS) and with refractory headache undergoing laparoscopic bariatric surgery. We review the anesthetic implications and the management options of the shunt catheter during the pneumoperitoneum.

Case Report

A 42-year-old female (121 kg, 1.62 m, BMI = 46.10 $kg.m^{-2}$) was scheduled for laparoscopic Roux-en-Y gastric bypass. Her medical history included factors such as IIH treated with an

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LPS, frontal meningoencephalocele, epilepsy treated with levetiracetam, and severe apnea-hypopnea syndrome with nocturnal CPAP. The neurosurgeon confirmed appropriate LPS function and recommended an abdominal X-ray to assess the intraperitoneal path [Figure 1]. We obtained the patient's consent to publish the case.

Upon arrival at the operating room, IV midazolam 1 mg was administered. Anesthesia was induced with IV remifentanil 60 µg, propofol 200 mg and rocuronium bromide 80 mg. EKG, invasive arterial pressure, pulsioximetry, capnography, BIS, TOF, and urine output were monitored. Anesthesia was maintained with propofol 4–8 $mg.kg^{-1}.h^{-1}$ for BIS = 40–60, remifentanil 0.1–0.25 $\mu g.kg^{-1}.min^{-1}$ according to hemodynamic parameters, and rocuronium bromide 0.3–0.5 $mg.kg^{-1}.h^{-1}$ for TOF = 0 responses. She was ventilated with control pressure 20–26 cmH_2O, respiratory rate 12–16, I/E 1/1.5, 50% oxygen/air mixture and PEEP 3–5 cmH_2O (tidal volume = 500–600 mL, $EtCO_2$ = 30–35 mmHg). Hourly arterial blood gas and glycemia were obtained; pupils were checked every 30 min. Pneumoperitoneum lasted 3.5 h. After insufflation, free drainage of cerebrospinal fluid (CSF) was checked and LPS was clamped near its tip; at the end, the catheter was unclamped, and CSF drainage was confirmed again [Figure 2]. During the procedure, IV metamizole 2 g, dexketoprofen 50 mg, morphine chloride 14 mg, dexamethasone 8 mg, and ondansetron 4 mg were administered. Before extubation, incisions were infiltrated with 0.375% levobupivacaine, and neuromuscular relaxation reversed (IV sugammadex 200 mg).

The postoperative course was uneventful. Three months later, headaches disappeared and analgesics were discontinued.

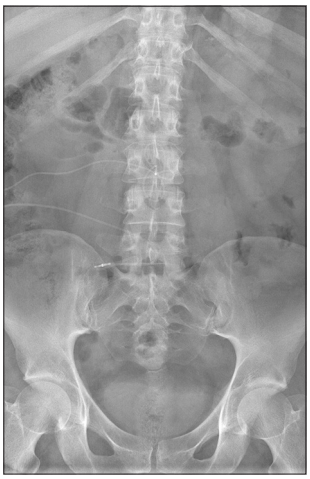

Figure 1: Preoperative abdominal radiograph. Medium pressure lumboperitoneal shunt device can be identified. The abdominal tip is in right iliac fossa area

BMI stabilized at 24 $kg.m^{-2}$ since 2 years later without complications during 50 months follow-up.

Discussion

IIH is a syndrome characterized by raised intracranial pressure (ICP) in the absence of identifiable cause which typically affects young obese women. Symptoms are headache, blurred vision, diplopia, tinnitus, nausea, and vomiting. The major risk is visual loss (up to 25%).[1]

There is no consensus regarding IIH management. Weight loss is effective in overweight patients. Initial treatment is medical (acetazolamide, furosemide, topiramate, and corticosteroids). Medical therapy failure, vision loss, and intractable headache are indications for ventriculoperitoneal (VPS) or LPS implantation.[1] Both improve symptoms but do not alter the most important underlying risk factor and its comorbidities. Moreover, they are associated with common complications[1] and have a high failure rate, probably because of shunt a high-pressure system (CSF) to another one (obese´s abdomen). There is low evidence (class IV) to justify using bariatric surgery as a primary treatment for obesity-related IIH[1]; nevertheless, it may be useful when other treatments have failed and some authors consider it as the most effective treatment in the long-term and the first-line treatment for morbid obese with IIH.

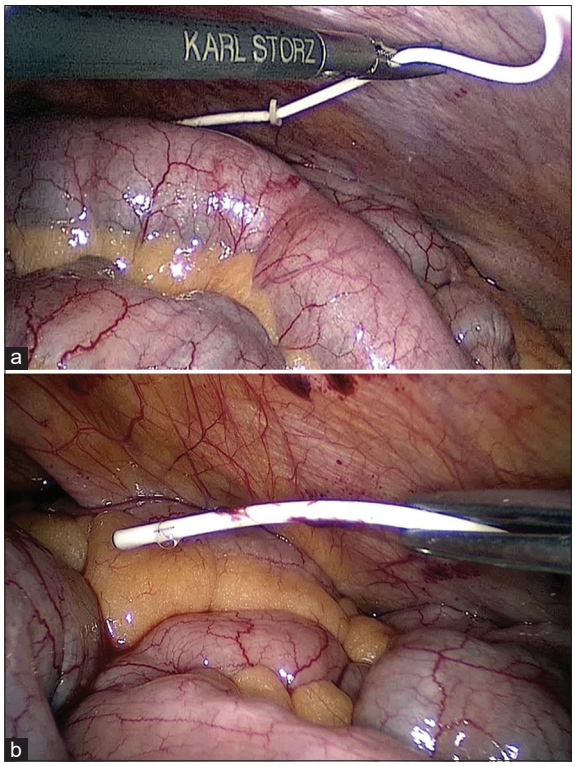

Figure 2: Lumboperitoneal shunt clamping with a Hem-o-lok® device (a). Checking normal cerebrospinal fluid drainage at the end of the procedure (b)

Traditionally, laparoscopy was not considered to be the procedure of choice in patients with shunts because of the risk of CSF infections or elevation of ICP.[2,3] However, shunts do not represent an absolute contraindication.[4] Furthermore, insertion of VPS and shunt complications have been managed laparoscopically resulting in less postoperative adhesions.[3]

Before surgery, neurosurgeon should verify shunt function.[5] Plain X-rays are useful to identify the type of shunt and its path to reduce the risk of damage caused by trocar placement[2,3]; however, not all shunt components are radiopaque. Most of shunts have valves which can withstand pressures greater than the usual pneumoperitoneum pressure (up to 300 mmHg) but some LPS are valveless, making the development of pneumoencephalus a real concern.[2] In addition, the location of the shunt reservoir should be known, so it can be pumped if necessary. Elective laparoscopic procedures should be delayed in recently implanted shunts because the risk of massive subcutaneous emphysema related to insufficient peritoneal sealing around the catheter.[3]

Pneumoperitoneum can increase ICP by different mechanisms[3,4]: increased resistance to shunt outflow, retrograde insufflation of CO_2, increased cava pressure, hypercarbia, and distal catheter occlusion. The optimum management is uncertain. Different strategies have been proposed[3,5]: low insufflation pressure; clamping shunt´s distal tip and working at usual intraabdominal pressure; reduction of intraperitoneal pressure periodically; clamping catheter´s subcutaneous portion; catheter externalization; transcranial Doppler monitoring; ICP monitoring; and drainage of CSF from VPS reservoir when necessary. There is no evidence to show that one strategy is superior to the other.[3,5] Since infection risk is low in clean or clean/contaminated surgeries, externalization would be not indicated.[6] When it is unknown if the shunt has a valve, the peritoneal catheter should be clamped before gas insufflation.[2] This measure is safe in short-term laparoscopic procedures; the risk is higher in long procedures in Trendelemburg position.[3] If there are signs of increased ICP, unclamping the shunt and desufflation is mandatory.[2] It is important to ensure that the shunt is permeable before the end of laparoscopy.[5] If CSF output is not observed, the VPS reservoir should be flushed to expel air or soft tissue impacted; in the LPS, gentle aspiration of the distal tip should be performed.[4]

For general anesthesia, the approach should minimize the rise in ICP associated with intubation, inadequate depth of anesthesia, or extubation. Some authors have proposed to avoid succinylcholine whenever possible because of the potential increase in the ICP,[7] but that risk is low in case of a normal functioning LPS and a deep plane of anesthesia. During surgery, measures for decreasing ICP include head elevation, maintain $EtCO_2$ = 25–30 mmHg, and avoid hypoxia, hypercarbia, hyperthermia, and hypotension. Profound neuromuscular block allows both an adequate surgical field and lower insufflation pressures. Intravenous mannitol could be used if necessary.[7]

There is no contraindication for spinal/epidural analgesia in IIH. It has been postulated that the uniform swelling and stiffness of the brain prevents herniation.[8] Some authors consider neuraxial blockade is contraindicated in patients with LPS because the risk of shunt damage or anesthesia failure due to loss of local anesthetic into the peritoneal cavity[9]; however, both epidural and spinal anesthesia have been used with no complication. Some authors have suggested a previous radiologic study,[10] but others consider safe to perform the tap in the midline, below or above the scar, to reduce the risk of LPS trauma.[9] The knotting of the epidural catheter with the LPS is a theoretical concern; it should be removed cautiously, and if abnormal resistance is felt, appropriate imaging studies should be made.[9]

Postoperatively, patient monitoring for neurologic signs/symptoms of shunt failure and ICP changes is crucial. Shuntogram can confirm shunt patency if any concern exists. Tension pneumoencephalus may manifest as consciousness deterioration, lateralizing signs, restlessness, convulsions, or focal neurologic deficits.[2]

Author's contributions

- Dr López: All author's coordination, pathophysiological and anesthetic review, writing all the versions
- Dr Trébol: Manuscript surgical aspects, image and figures selection and editing, final revision of all the versions
- Dr Sastre: Scientific support, anesthetic concerns, language editing and counseling, final revision of all the versions.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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