

Hernia with loss of domain complicated resolved with preoperative progressive pneumoperitoneum.

A case report

Itzel Velazquez Viniegra M.D.

Daniel Lechuga Daniel M.D.

Marco Farid Flores Rayes M.D.

Francisco Javier Ramos Mejía M.D.

Tepic, Mexico

Case Report

General Surgery



Background: The management of giant incisional hernias represents a challenge due to the physiological repercussions that reducing them can bring. Progressive preoperative pneumoperitoneum (PPP) aims to enlarge the volume of the abdominal cavity for surgical preparation of patients with large hernias, especially in cases of loss of control.

We present the case of a 77-year-old woman, with intestinal occlusion secondary to an incarcerated hernia with loss of dominance, managed with progressive preoperative pneumoperitoneum, with subsequent abdominal wall repair with separation of components with transverse muscle release; with the aim of demonstrating the good results. A systemic and descriptive bibliographic review was executed, through the meta-search engines: PUBMED, MEDLINE, SCIELO, PAHO and WHO published in the last 6 years (2018 to 2023), by keywords “pneumoperitoneum and hernia”, “Tanaka score or hernia”, “Incisional hernia” and “Giant incisional hernia”. Thirty-two articles were retrieved, after the application of the inclusion and exclusion criteria, 20 original titles were selected.

Keywords: Hernia, abdominal wall, pneumoperitoneum, transverse muscle and surgical approach.

The incidence of ventral hernias has been increasing in recent years, due to population aging, obesity and increased abdominal surgeries [1,2]. While the incidence of incisional hernias ranges from 4%-10% [2], loss-of-dominance hernias account for up to 21% of all midline hernias [3].

Loss of dominance refers to the volume of visceral content that remains in the hernia sac, behaving as a second abdominal cavity [4,5]. The reduction of the hernial content can lead to potentially fatal complications derived from an abrupt increase in intra-abdominal pressure, including abdominal compartment syndrome and respiratory restriction; therefore, for 8 decades, progressive preoperative pneumoperitoneum (PPP) has been proposed as a prehabilitation technique for the management of giant hernias, whose purpose is the physiological reintroduction of the abdominal organs with better tolerance [6]. By consensus, its use is suggested in elective procedures; there is little evidence to support it in patients with acute symptomatology [7,8]. We present a case report that supports its application in these cases.

Case report

A 77-year-old woman with a history of arterial hypertension and type 2 diabetes mellitus, of 14 years of evolution, with poor adherence to treatment. Surgical history of umbilical plasty without mesh placement in 2009, with recurrence after 6 months, thereafter the patient lost follow-up and continued without treatment.

She started on April 7, 2022, with burning abdominal pain, in mesogastrium, with VAS intensity 5/10; nausea, vomiting of gastrointestinal content and inability to channel gas. Four days after the onset of symptoms, the patient came to our hospital for evaluation. On physical examination, the patient had World Health Organization class II obesity (BMI 39.91 kg/m²). Abdomen was globular at the expense of adipose panniculus and large hernial sac, indurated, painful on manipulation, non-reducible. On auscultation with peristaltic “fighting” noises. A wall defect of approximately 10 cm was identified; there was no evidence of peritoneal irritation.

An abdominopelvic computed tomography (CT) scan was performed, with evidence of abdominal

From the General Surgery Department at ISSSTE Tepic General Hospital APP, Tepic, México. Received on July 10, 2025. Accepted on July 15, 2025. Published on July 16, 2025.



Figure 1. Placement of bilumen catheter in Palmer's point for PPP management.

wall defect, at midline level with a greater diameter of 107.4 mm, hernial sac of 278.8 mm x 131.2 mm in its vertical and transverse diameters respectively, within the hernial sac is identified passage of mesenteric fat, transverse colon, ileum and jejunum; dilation of loops and hydro-aerial levels. A Tanaka index of 48% was calculated.

With a diagnosis of intestinal occlusion, secondary to incarcerated incisional hernia M3W2R1 (European Hernia Society; EHS), management was started with parenteral fluids, nasogastric tube to shunt and monitoring. A double lumen peritoneal catheter was placed in the operating room to start preoperative progressive pneumoperitoneum (PPP). Fig.1

During 15 days the pneumoperitoneum was progressed to low daily air volumes (6100 ml of total volume), strict follow-up with gasometry and thromboprophylaxis with low molecular weight heparin was performed; as for her evolution, the patient's obstructive condition improved. A final control of the PPP was obtained by simple CT of the abdomen, which reported a reduction of the sac to 266 x 128.1 mm. Fig.2

On the 16th day of hospitalization, separation of the posterior components with release of the transverse muscle was performed, no evidence of intestinal distress was found, the surgery was performed without eventualities. Fig.3 The following day the patient was discharged without complications. Throughout her follow-up to date, the patient is doing well and there is no evidence of recurrence.

Discussion

According to the Sociedad Hispanoamericana de Hernia, incisional hernias occur in up to 15-20% of cases after laparotomy; this incidence can increase up to 50% in cases of urgent surgery or risk groups; the

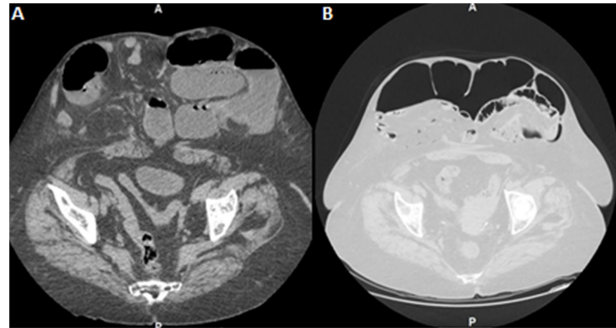


Figure 2. Simple abdominopelvic CT. A) Axial section prior to prehabilitation. B) Axial section after PPP.

recurrence rate after primary repair is as high as 46% [8,9].

Large eventrations produce a muscular retraction that causes a decrease in the transverse diameter of the abdominal cavity, leading to a loss of its volume and capacity to contain the viscera inside, a situation known as a hernia with loss of domicile or domain; by definition they have a size >10 cm in width or length [10,11]. In the present case, the definition used was the presence of a hernia sac > 20% of the cavity volume, as described by Tanaka et al. in their original article [4,12].

Progressive preoperative pneumoperitoneum (PPP) was initially used in 1930 for the collapse of tuberculous caverns and later in 1940, Goñi Moreno described it as an adjuvant technique for the management of hernias with loss of domain [13,14]. Its objective is to enlarge the volume of the abdominal cavity, from 30 to 45%; to elongate the retracted muscles, as well as to reduce the edematous visceral volume up to 47%, allowing the reduction of the content of the hernia sac and closure of the defect, with a better adaptation to the increase in intra-abdominal pressure [9,15, 16].

According to the systematic review conducted by Martínez H et al, which covered works from 1940 to 2019, it was found that despite the heterogeneity of the insufflation volumes reported in the literature, in 99.6% of the cases visceral reintroduction was achieved and in 86% primary closure, with an

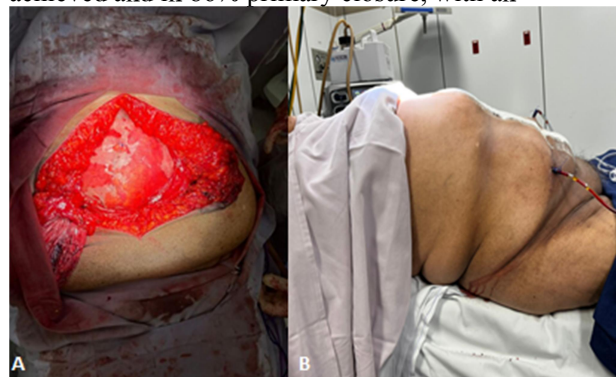


Figure 3. A) Ventral plasty with posterior component separation. B) Immediate postoperative results.

incidence of complications of 12%, these generally minor and associated with insufflation. [4,17, 18]. Shoulder pain and abdominal pain, subcutaneous emphysema and dyspnea were the most common; while enteric puncture and intracolonic catheter placement during catheter insertion were described in two studies [19,20].

Conclusion

Tissue elongation, tension-free closure and ventilatory adaptation are effects of this expansion technique. Therefore, it represents an adequate preoperative preparation method for patients with giant hernias. In this preparation, CT has proved to be a complementary tool for an objective evaluation, allowing the determination of the volumes of the hernia, of the abdominal cavity and the estimation of the volume of gas to be insufflated in the abdominal cavity.

The current indications for the use of PPP lack standardization, however, with this case we demonstrate its potential usefulness in the resolution of complications in giant hernias and the prevention of the need for open abdomen.

Conflicts of interests

It is declared that there are no conflicts of interest related to the publication of this work.

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Francisco Javier Ramos Mejía
General Surgery Department
ISSSTE Tepic General Hospital APP
Tepic, México