

# Neumoperitoneo progresivo preoperatorio para el tratamiento de la hernia inguinoescrotal gigante: reporte de caso.

## *Progressive preoperative pneumoperitoneum for giant inguinoscrotal hernia: a case report*

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### Abstract

**Introduction:** The procedure of progressive preoperative pneumoperitoneum for the management of giant hernias with “Loss of domain” or “Loss of the right of domain” was introduced in 1940 by Goñi Moreno in Argentina, followed in later years by authors such as Herszage, Berlemont, Koontz, Gravez and Martínez Munive, all with some interesting variations of the original method. Its use is recommended for previous preparation of patients with giant hernias and large contents of viscera in the hernial sac, in which it would not be possible to re-introduce and perform hernioplasty, or in which its forced reduction could lead to the patient to the development of an abdominal compartment syndrome in the immediate postoperative period.

**Clinical case:** A 65-year-old male patient with a clinical picture of one month of evolution characterized by pain in the left inguinal region. There was evidence of a giant left inguinal scrotum, not reducible, with approximately 40% abdominal contents.

**Results:** Most studies describe the use of progressive pneumoperitoneum for the repair of giant hernias, however, in our experience and in that of other authors, this technique can also be used to resolve hernias giant inguinal and umbilical, with good results. In all cases it is recommended use prosthetic material.

**Conclusion:** The use of progressive preoperative pneumoperitoneum is a safe and easy-to-perform technique that can complement complex eventroplasty's techniques, providing advantages in the preparation of patients with large abdominal wall defects and obtaining good results.

**Key words:** Incisional hernia, hernioplasty, pneumoperitoneum, complications.

### Resumen

**Introducción:** El procedimiento de neumoperitoneo progresivo preoperatorio para el manejo de hernias gigantes con "Pérdida de dominio" o Pérdida de derecho a domicilio" fue introducido en 1940 por Goñi Moreno en Argentina. Autores como Herszage, Berlemont, Koontz, Gravez y Martínez Munive presentaron variaciones interesantes del método original. Su uso se recomienda para preparación previa de pacientes con hernias gigantes y grandes contenidos de vísceras en el saco herniario, en los cuales no sería posible su re-introducción y efectuar la hernioplástia, o en los que su reducción de manera forzada pudiera llevar al paciente al desarrollo de un síndrome compartimental abdominal en el postoperatorio inmediato.

**Caso clínico:** Paciente de sexo masculino de 65 años de edad, que presenta cuadro clínico de un mes de evolución caracterizado por dolor a nivel de la región inguinal izquierda, en el cual se evidencia presencia de hernia inguino escrotal gigante izquierda, no reductible, con aproximadamente un 40% de contenido abdominal.

**Resultados:** La mayoría de los estudios describen el uso del neumoperitoneo progresivo para la reparación de las eventraciones gigantes, sin embargo, en nuestra experiencia y en la de otros autores, esta técnica también puede utilizarse para resolver las hernias inguinales y umbilicales gigantes, con buenos resultados. En todos los casos se aconseja utilizar material protésico.

**Conclusión:** El uso del neumoperitoneo preoperatorio progresivo, se trata de una técnica segura y fácil de realizar que puede complementar las técnicas de eventroplastía complejas, aportando ventajas en la preparación de los pacientes con grandes defectos de pared abdominal y obteniendo buenos resultados.

**Palabras clave:** Hernia incisional, hernioplástia, neumoperitoneo, complicaciones

#### Introduction

The preoperative progressive pneumoperitoneum procedure for the management of giant hernias with “Loss of domain” or “Loss of right to domain” was introduced in 1940 by Goñi Moreno in Argentina (1) with the aim of allowing, by means of gaseous re-expansion, visceral reintroduction, and adaptation of the abdominal cavity in a progressive manner, reducing cardiorespiratory complications in the immediate postoperative period. This technique is one of the therapeutic resources of surgeons who must deal with large hernial defects, especially in patients with severe cardiorespiratory disease. Abdominal hernia or eventration with loss of domain is one in which more than 50% of the content of the abdominal cavity is outside of it. Patients with this type of eventration have chronic defects that grow and progressively alter the normal physiology of the abdominal wall and all its adjacent systems. The repair of these defects can lead to various serious physiopathological problems, such as abdominal compartment syndrome, produced by the sudden introduction of herniated abdominal contents into a cavity that has already chronically decreased in size and has no space to accommodate these contents, then there is an acute respiratory compromise secondary to the sudden increase in intra-abdominal pressure (3).

The function of the abdominal wall is to retain and protect the visceral organs; it also intervenes in the movements of the trunk, in the processes of evacuation, urination and in the regulation of diaphragmatic movements for adequate pulmonary ventilation (4). When there is a hernia with a large sac, containing important quantities of viscera, local changes occur (mesentery, intestines, subcutaneous cellular tissue, and skin surrounding the sac) consisting of a decrease in the caval and portal venous return to the thorax. In addition, there is a decrease in venous and lymphatic return due to the compression exerted by the annulus or fibrotic hernia defect on the loops that hang outside the cavity (5). All the above results in an edematous and thick intestine and mesentery that makes its reduction difficult.

The mechanical inflammation exerted by the ring on the loops causes them to adhere to the sac and the hernial defect. The subcutaneous cellular tissue is pressed and deviates laterally, atrophying the rest by compression of the hernial content, which leaves the skin, also distended in excess, with little circulation and with a tendency to progressive atrophy (6), causing, in advanced

cases, ulcerated areas that can hardly regenerate and are home to bacteria in a chronic form.

By using a guided double lumen catheter, the insufflation of the pneumoperitoneum is performed without the need for daily punctures, and sometimes even a pig-tail catheter with an antibacterial filter can be used, through the initial creation of a small pneumoperitoneum with a Veress needle to place the intraperitoneal catheter or under radiological control by ECO or CT. CO<sub>2</sub> or room air can be insufflated, O<sub>2</sub> is absorbed four times faster. An initial insufflation of 0.5 to 1 l of room air can be performed, depending on the patient's tolerance. During an average period of 15 days, introducing a volume of between 6.6 and 18 l of ambient air producing the distension of the lateral musculature of the abdomen to later carry out the definitive surgical repair and avoid abdominal hypertension and its consequences.

The preoperative progressive pneumoperitoneum in these patients attempts to correct some of these problems, mainly by enlarging the abdominal cavity to re-house all the long protruded intestinal contents, allowing the proper performance of the plasty technique and without the risk of a subsequent compartment syndrome as demonstrated by Munegato et al (7).

There are increasing reports of series of patients submitted to this procedure with good results insufflating oxygen, CO<sub>2</sub> or in its original form with ambient air filtered by siphon bottles containing povidone-iodine. The objective of the present work is to communicate our experience with the progressive preoperative pneumoperitoneum procedure, in a particular case presented at the Hospital de Especialidades Dr. Abel Gilbert Pontón, and to propose it as a routine practice for this type of pathologies.

### **Clinical case**

A 65-year-old male patient presents with a four-month clinical picture characterized by a large swelling in the left inguinal region that reaches the upper third part of the thighs. It is accompanied by pain that eases with the administration of analgesics.

On physical examination there is evidence of a giant left inguinal scrotal hernia, non-reducible, with approximately 40% of abdominal content. Patient with a history of two surgeries in that area (herniorrhaphy and hernioplasty). At the time of admission, the patient was hemodynamically stable, with RASS scale 5/10. It was decided to admit the patient to the hospital to plan left inguinal-scrotal hernia repair surgery.

In the presence of a giant inguinal-scrotal hernia, it was decided to perform the Goñi Moreno technique, blowing CO2 into the abdominal cavity to distend the muscle-aponeurotic structures of the abdominal cavity and facilitate the reintroduction of the intestinal loops, thereby avoiding the reduction of cardio-respiratory complications in the immediate post-operative period caused by intra-abdominal compartment syndrome.

Eight CO2 insufflation sessions were performed in the operating room. In each one 250cc are insufflated by means of a VERRES needle. Approximately 2000cc of CO2 were insufflated, obtaining sufficient space in the abdominal cavity to reintroduce the abdominal viscera (fig. 1). It was decided to perform surgical repair after the eighth session and it was repaired by Lichtenstein technique, plus placement of prolene mesh (fig. 2).

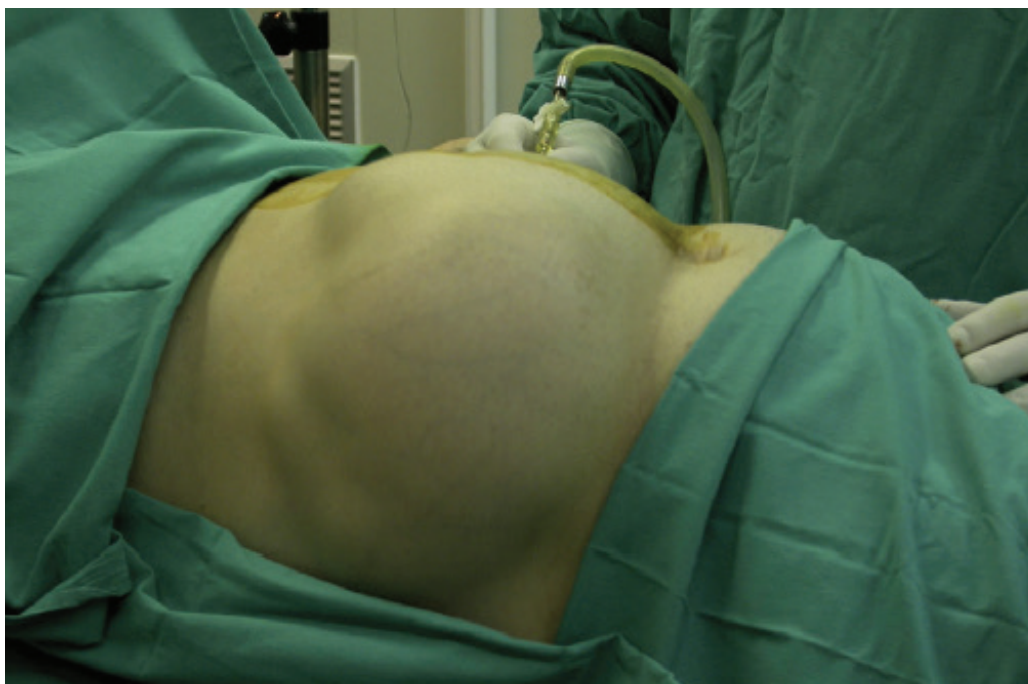


Fig. 1. Patient in the operating room during a pneumoperitoneum session.

*«On physical examination there is evidence of a giant left inguinal scrotal hernia, non-reducible, with approximately 40% of abdominal content.»*





Fig 2. Observe inguinal-scrotal hernia with loss of domain.  
Yellow arrow indicates place where pneumoperitoneum is performed

### Procedure

The technique consisted in the initial placement of a catheter inside the abdominal cavity. This procedure was performed in the operating room, under local anesthesia and sedation, through the initial creation of a small pneumoperitoneum with a Veress needle to place the intraperitoneal catheter (fig. 1), or under radiological control by ECHO or CT scan.

During daily insufflation, the patient remained supine in bed. The procedure was monitored clinically, questioning the patient about the appearance of symptoms such as abdominal pain, shortness of breath or nausea. Between 250 - 300CC of CO<sub>2</sub> was insufflated daily.

At the seventh insufflation session, the abdominal wall was examined, evaluating the tension presented by the musculature in the lateral part of the abdomen, to verify that it was relaxing adequately. Subsequently, surgical repair was performed, which was planned according to the morphology of the defect in which prosthetic material was placed and the hernia was repaired

with the Lichtenstein technique.

The patient remained in the hospital until he had good tolerance to ingestion, adequate pain control, without the need for drainage and with the surgical wound in such a condition that it could be treated on an outpatient basis (**Fig. 3**). Postoperative follow-up was scheduled for the following 30 days, 3 months, 6 months and 1 year.



Fig. 3. Giant inguinal-scrotal hernia repaired with the Goñi Moreno technique of induced pneumoperitoneum

### **Discussion**

The complexity of patients with giant abdominal wall hernias has led to a better understanding of the pathophysiology of the maladaptation of multiple organs and systems due to the absence of a functional abdominal cavity. This mismatch can lead to various complications, such as respiratory insufficiency, abdominal visceral irrigation deficit, etc., at the time of surgical correction involving reintegration of the contents into the abdomen and, in turn, reconstruction of the abdominal wall.

The progressive preoperative pneumoperitoneum technique has been used and improved for many years. Although it is true that its use has not been widespread in most hospitals, those specialized surgical teams that have incorporated this technique in the treatment of complex abdominal wall diseases have reported good results under acceptable risk (8).

Technically, the procedure currently presents some significant improve-

ments, such as the use of a double lumen catheter, the same as the one used in subclavian punctures, for the insufflation of the pneumoperitoneum (9) without the need for daily punctures, as described in the initial technique, and with the advantage of reducing the incidence of infections at the puncture site. In more recent cases, we have introduced the use of a pig-tail catheter, which also has an antibacterial filter. The placement of a catheter under ultrasound guidance has replaced in our most recent cases the procedure previously performed to place the catheter with a Veress needle (1). To control the insufflation volume, some authors perform intra-abdominal pressure measurements (8). In our case, we placed a daily volume of air between 250 - 300CC, limiting ourselves to the patient's tolerance, depending on whether he/she presented any symptoms of discomfort, pain or nausea, which correlates directly with the increase in abdominal pressure (3).

Some authors consider that, after monitoring the patient's abdominal circumference and respiratory function, there is no benefit of pneumoperitoneum beyond 6-10 days of insufflation (4). In our experience, the average number of days of insufflation was 8, with individual variability depending on the patient's tolerance.

The Goñi Moreno technique ends insufflations when the abdominal flanks are sufficiently relaxed and prominent (10). It is generally considered that a patient who does not adequately tolerate preoperative progressive insufflation will not tolerate definitive surgical repair well either (11).

One of the additional effects of pneumoperitoneum is the increase in the length of the rectus abdominis muscles, determined by CT topographic measurements (12). This increase could facilitate fascial repair in giant hernias and eventrations, with minimal tension closures.

Most studies describe the use of progressive pneumoperitoneum for the repair of giant eventrations (13), however, in our experience and that of other authors (14), this technique can also be used to resolve giant inguinal and umbilical hernias, with good results. In all cases it is recommended to use prosthetic material (15).

« *The Goñi Moreno technique ends insufflations when the abdominal flanks are sufficiently relaxed and prominent.* »



Complications described for this technique are mainly local, such as subcutaneous emphysema and abdominal wall infections. Serious complications are rare and are related to the underlying cardiopulmonary disease.

Although there is no conclusive evidence in the literature for the treatment of patients with complex abdominal wall disease, if we refer to the series published in the last 10 years (16), it seems that the described technique can be used in the hospital setting, in a safe manner, providing better surgical results than primary repair techniques.

### **Conclusions**

The use of progressive preoperative pneumoperitoneum is considered a safe and easy to perform technique that can complement complex eventrations techniques, providing advantages in the preparation of patients with large abdominal wall defects and obtaining good results in terms of operative technique and multisystemic adaptation of the patient.

With this work we want to join the efforts of the different groups specialized in the abdominal wall, in order to contribute our experience in the use of this technique and thus be able to reach conclusions that are increasingly applicable to the general population.

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