

## REVIEW ARTICLE

# Obturator hernia: Clinical, imaging, and treatment aspects

## Hernia obturatriz: aspectos clínicos, imagenológicos y tratamiento

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### Abstract

**Introduction.** Due to the rarity of the obturator hernia and the impossibility to develop controlled studies with a high degree of evidence, most of the reference literature comes from case reports. This, coupled with little knowledge of the anatomical area of presentation and clinical picture, makes it the hernia with the highest mortality.

Because the obturator hernia is uncommon, it is difficult to develop controlled studies with a high degree of evidence. Most of the literature on the subject comes from case reports. This, coupled with little knowledge of the anatomical area and the clinical presentation, it makes this hernia to carry a high mortality.

**Methods.** A literature search was carried out in the main databases, illustrated with patients managed in the General Surgery Service of the Clínica Santa María de Sincelejo.

**Discussion.** Obturator hernia can be discovered in elderly women with a history of abdominal surgery or multiparity. The Howship – Romberg sign occurs in half of the patients, it can be associated with lower abdominal pain, vomiting, and progressive distension. Plain abdominal X-ray shows delayed air-fluid levels with absence of gas in the rectal ampulla, but since it is not very specific to demonstrate the site of obstruction, computed axial tomography is preferable.

**Conclusion.** Obturator hernia requires a high index of suspicion, which helps early detection and immediate surgical intervention, to avoid complications.

**Keywords:** obturator hernia; intestinal; abdominal pain; pelvic pain; diagnosis; computed tomography.

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## Resumen

**Introducción.** Debido a la rareza de la hernia obturatriz y la imposibilidad para desarrollar estudios controlados de alto grado de evidencia, la mayoría de la literatura al respecto proviene de reportes de casos. Lo anterior, aunado al poco conocimiento del área anatómica de presentación y el cuadro clínico, la convierte en la hernia con mayor mortalidad.

**Métodos.** Se realizó una búsqueda de la literatura en las principales bases de datos, ilustrado con pacientes manejados en el Servicio de Cirugía general de la Clínica Santa María de Sincelejo, Colombia.

**Discusión.** La hernia obturatriz se puede descubrir en mujeres ancianas con antecedentes de cirugía abdominal o multiparidad. El signo de Howship-Romberg, que se presenta en la mitad de los pacientes, puede acompañarse de dolor abdominal en hipogastrio, vómitos y distensión progresiva. La radiografía de abdomen simple muestra tardíamente niveles hidroaéreos con ausencia de gas en ampolla rectal, pero como es poco específica para demostrar el sitio de obstrucción, es preferible la Tomografía computarizada.

**Conclusión.** La hernia obturatriz requiere alto índice de sospecha, que ayude a la detección temprana e intervención quirúrgica inmediata, para evitar las complicaciones.

**Palabras claves:** hernia obturatriz; obstrucción intestinal; dolor abdominal; dolor pélvico; diagnóstico; tomografía computarizada.

## Introduction

Hernia is a protrusion or projection of an organ or part of it through the body wall that normally contains or protects it <sup>1</sup>. Where this wall is located will give the name to the defect, in this way, when some intra-abdominal viscera or extraperitoneal tissue comes out through the obturator canal, it will be called an obturator hernia. This can be classified according to its etiology in <sup>2</sup>:

- Congenital hernia: a defect present since the patient's birth and in this case it is due to incomplete closure of the obturator foramen membrane <sup>3</sup>.
- Acquired hernia: most frequent presentation in obturator hernia, due to weakening of the fibromuscular lines of the pelvic wall <sup>2</sup>, associated with malnutrition, weight loss, chronic constipation, advanced age, and female sex <sup>4</sup>.

Obturator hernia was first described by Pierre Roland Arnaud de Ronsil in 1724, at the Royal Academy of Sciences of Paris, and in 1851 Obre developed his first successful repair <sup>5</sup>. Of all the cases of hernias reported, the obturator only represents 0.07% to 1% <sup>4</sup>, which makes its initial suspicion more difficult. That is the reason why

the literature about these rarer hernias (Spiegel, lumbar, and obturator) is based on case reports with an associated literature review <sup>6</sup>. The phenotype of a patient with obturator hernia commonly consists of thin and elderly women, for this reason it is called "the hernia of old ladies" <sup>6</sup>.

## Methods

A literature search was performed on articles published in the main databases such as PubMed, LILACS and Google Academic, from January 1, 2010 to December 30, 2020 and some of the references of the original reports, with the words keys: obturator hernia, intestinal obstruction, pelvic pain, intestinal pseudo-obstruction, diagnosis, computerized axial tomography, Howship-Romberg sign.

The review of the literature is illustrated with photographs of patients treated at the General Surgery service of the Clínica Santa María de Sincelejo, Colombia.

## Anatomical description

The lateral walls of the pelvis, composed by the right and left coxal bones <sup>7,8</sup>, contain an obturator foramen and the obturator foramen, resulting

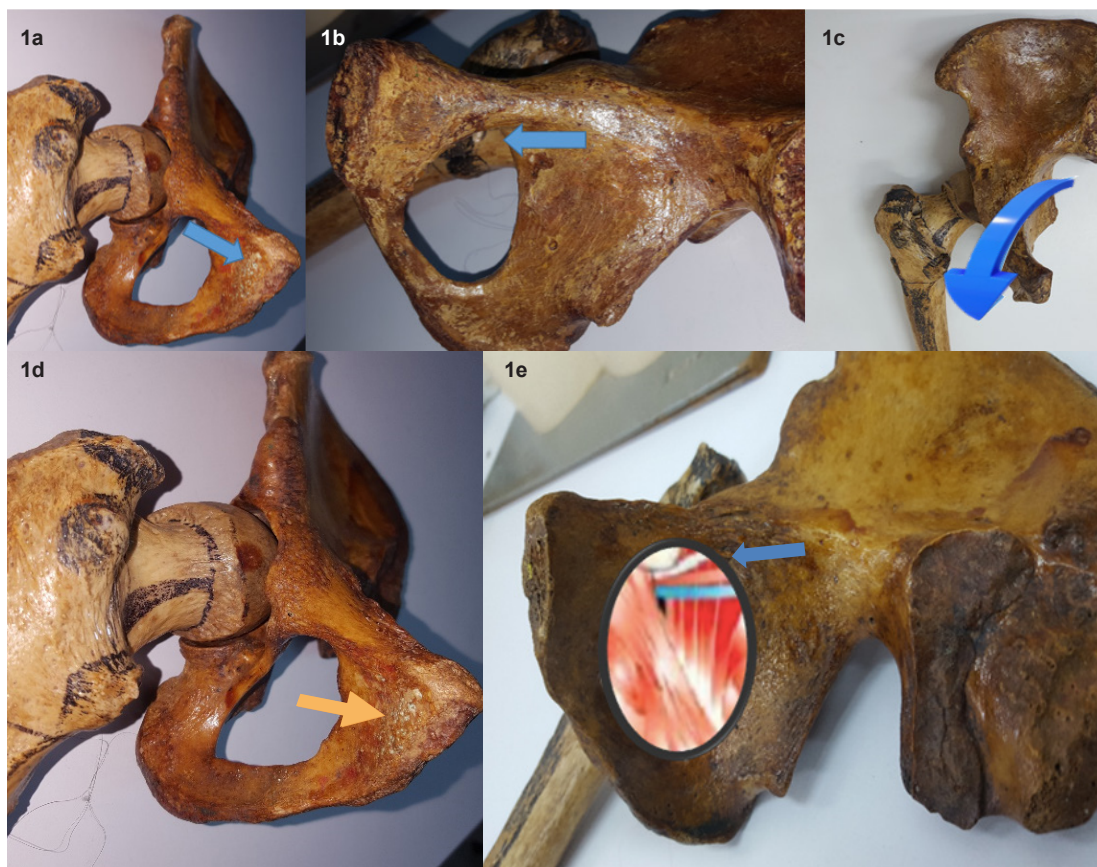
from the incomplete closure of the obturator membrane, formed by strong fibers intertwined with each other (Figure 1). These walls are covered by the internal and external obturator muscles and are innervated by the internal obturator nerve (L5, S1, S2), whose main function is lateral rotation of the thigh, also helping to keep the head of the femur in the acetabulum

The fibers of each of these muscles subsequently become tendinous and abruptly rotate laterally in order to pass from their point of origin (which is in the pelvis) through the lesser ischial foramen to their point of origin. insertion located on the greater trochanter of the femur; on the outside they are related to the pectineus muscle <sup>7-9</sup>.

The medial surfaces of these muscles are covered by the obturator fascia, which is thickened in the central part to form the arcus tendineus, whose function is to provide attachment to the pelvic diaphragm <sup>7,8</sup>.

## Epidemiology

The incidence is 6 to 9 times more frequent in women than in men, possibly secondary to the characteristic anatomy of women that gives them a larger and wider pelvis, with the obturator canal inclined horizontally <sup>5,10</sup>. The foregoing, added to malnutrition or weight loss habits, result in a loss of preperitoneal fat and connective tissue, which in normal conditions seals the obturator canal <sup>5</sup>.



**Figure 1.** Obturator foramen anatomy: 1a and 1d: External face of the lesser pelvis. 1b and 1e: Internal face of the lesser pelvis, covered by the internal obturator muscle, allows the passage of the obturator vascular-nervous bundle. Blue arrow: obturator foramen, lower border of the iliopubic branch. Orange arrow: ischiopubic ramus. Prepared by the authors with anatomical pieces from the Medicine program of the Department of Morphology of the Universidad de Sucre.

It has a high risk of complications such as incarceration, strangulation, and mortality. In fact, it is the hernia with the highest reported mortality rate, ranging from 12% to 70%, due to late diagnosis, intestinal necrosis and associated comorbidities <sup>4,11-14</sup>.

Similarly, the risk of presenting intestinal obstruction in obturator hernia is 90% <sup>15</sup>; however, of all patients with intestinal obstruction, only 0.2 to 1.6% are due to obturator hernia <sup>4</sup>. Intestinal obstruction is usually right-sided, symptomatic in up to 6%, and asymptomatic in up to 34%.

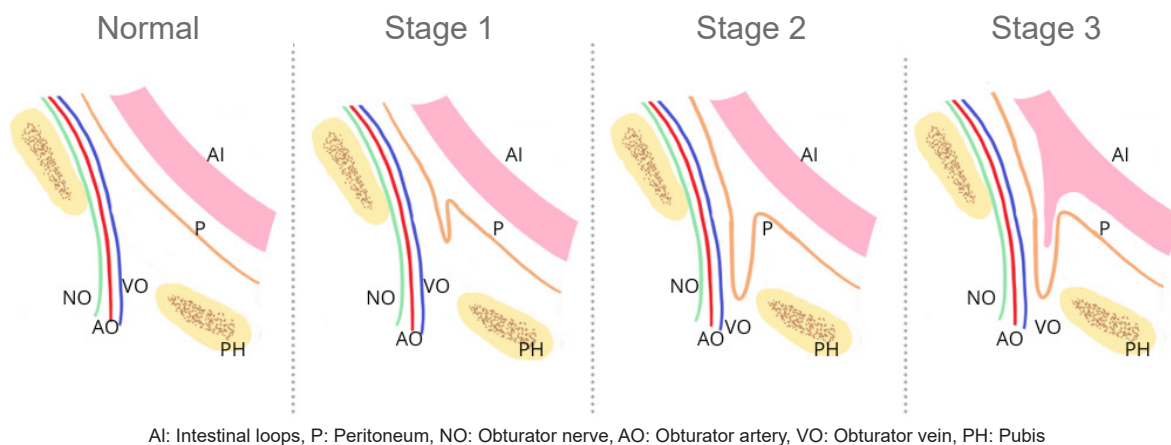
### Pathophysiology and classification

The pathophysiology of obturator hernia, described by Gray, consists of 3 stages (Figure 2): first, it begins with the bulging of preperitoneal fat through the previously weakened obturator foramen; then follows the stage of development, which, as its name indicates leads to the formation of a true hernial sac due to the prolongation of the peritoneum; and finally, in the third stage, we find a protrusion of the abdominal viscera into the sac, which mainly involves the ileum, sometimes with clamping and subocclusion (Richter hernia). Cecal appendix, Meckel's diverticulum, tube, ovaries, colon, and bladder have also been described <sup>11,16,17</sup>, with the subsequent appearance of clinical symptoms <sup>5</sup>.

Its classification depends on the path of the protrusion and its true importance lies at the time of surgery. According to cadaver studies, it is classified into 3 types (Figure 3): in type 1, the hernial sac runs parallel to the anterior branch of the obturator nerve, for this reason it is also called "anterior branch type"; In type 2, the hernial sac passes parallel to the posterior branch of the obturator nerve, also called "posterior branch type" and, finally, there is type 3 or intermembranous, so named because the hernial sac runs between the membranes of the internal and the external obturator muscle; this represents the rarest type of obturator hernia <sup>18</sup>.

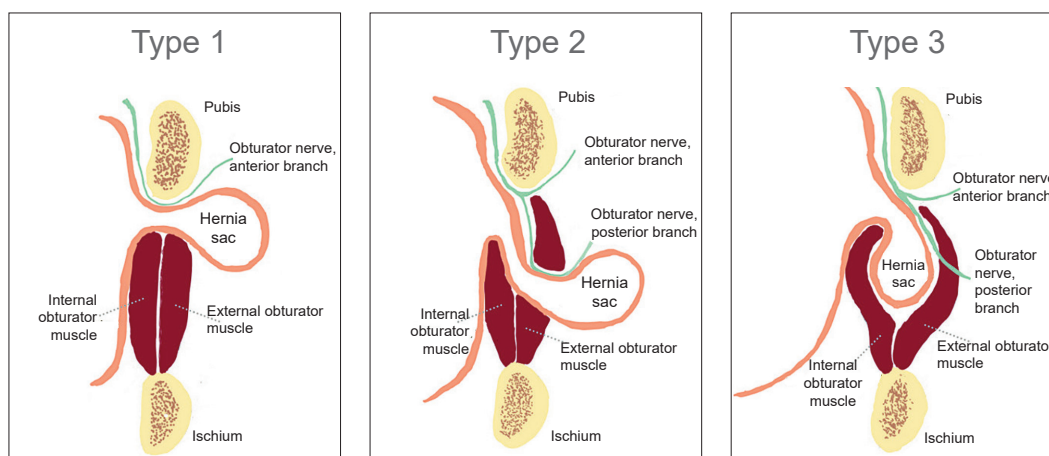
### Clinical findings

Obturator hernia typically occurs in female patients, aged between 70 to 80 years (85% of cases) <sup>4</sup>, multiparous, with a BMI less than 25 kg/m<sup>2</sup> and with possible defects in the pelvic floor <sup>11</sup>, generally on the right side of the pelvis, because the sigmoid colon covers the left obturator foramen with its weight, leaving the right at a disadvantage <sup>5</sup>. Its form of presentation in 90% of cases consists of a picture of intestinal obstruction <sup>7,15,19</sup> with a previous history of intermittent chronic pelvic pain and partial obstructions that spontaneously subside.



**Figure 2.** Physiopathology of the obturator hernia, image elaborated by the authors, adapted from Gray's classification and drawing by Zevallos <sup>17,52</sup>.





**Figure 3.** Classification of obturator hernia. Image elaborated by the authors and adapted from Gray's classification and drawing by Skandalakis <sup>3,52</sup>.

In the 60% of cases present with vomiting and 50% with nonspecific lower abdominal pain <sup>4</sup>.

In addition to the form of presentation of the obturator hernia as intestinal obstruction with incarceration, it can also manifest with a clinical picture of refractory inguinal pain. Type I is the most frequently underdiagnosed <sup>20</sup>.

### Physical exam

When an obturator hernia is suspected, the initial physical examination should focus on looking for a bulge or reducible mass in the femoral region. Additionally, in women, when performing vaginal examination, a tense mass is perceived, painful on palpation, mainly in type 3. Ecchymosis could also be found at the tip of the Scarpa triangle, which would indicate strangulation of the hernia or necrosis of the gut loop <sup>1,7</sup>.

It is recommended to assess the patient lying down in a comfortable position and look for the Howship-Romberg and Hannington-Kiff signs.

The Howship-Romberg sign, first described by John Howship in 1840 and its pathophysiology explained by Moritz Heinrich Romberg, is pathognomonic for obturator hernia; however, it has only been demonstrated in 15% to 50% of reported cases. This sign is reproduced and confirmed by the abduction, extension and medial

rotation maneuver of the thigh, with the subsequent generation of pain in the medial area of the thigh, due to compression of the obturator nerve, which is the origin of the branches that supply sensory fibers to the distal medial thigh <sup>21,22</sup>.

The Hannington-Kiff sign is less frequent and consists of the absence of the adductor reflex. It is obtained by placing the index finger perpendicularly on the adductors (5 cm above the knee) and trying, by means of blows with the reflex hammer, to observe the visual or tactile abolition of the reflex (contraction of the adductors), comparing it with the contralateral limb <sup>5,7</sup>. Some authors consider it more specific <sup>19</sup>.

Apparently the Howship-Romberg sign is more frequent in type 1 obturator hernia and the Hannington-Kiff sign in type 2; however, more reviews and studies on this relationship are needed <sup>18</sup>. It should be emphasized that due to the advanced age of the patients and their concomitant osteoarthritis, these signs cannot always be correctly evaluated <sup>17</sup>.

### Diagnostic imaging

Given its low incidence, obturator hernia can represent a diagnostic challenge for the radiologist and the surgeon <sup>20</sup>. Evaluation with conventional radiography is nonspecific and in its presentation

as intestinal obstruction, it shows signs of loop distention and air-fluid levels (Figure 4). Occasionally intraluminal gas (gas bubble) is seen in the vicinity of the iliopubic branch or the obturator foramen, the latter being highly suggestive of obturator hernia<sup>7,23</sup>.

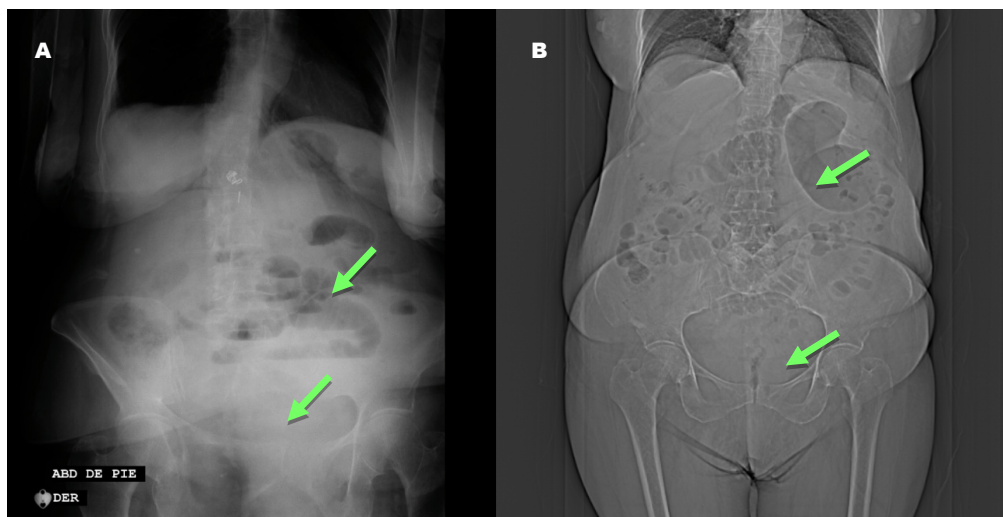
The usefulness of ultrasound is limited and operator dependent; however, it can play a role in early diagnosis, by demonstrating the herniated intestinal segment as a cystic lesion, with a thickened wall and a deeper location to the pectineus muscle. This muscle is the reference structure to differentiate an obturator hernia from a femoral hernia, since in the latter the hernia ventral to the pectineus muscle is observed, in the subcutaneous space. The amount of peritoneal fluid and peristaltic activity may vary in obturator hernias, depending on the degree of incarceration<sup>24</sup>.

Computed tomography (CT) of the pelvis is the gold standard for the diagnosis of this entity, because its sensitivity can be greater than 90%<sup>4,25</sup> and it is capable of showing asymptomatic bilateral hernias. It was suggested in 1983 by Cubillos, and its typical image is a bubble with an air-fluid level, located between the external obturator muscle and the pectineus (Figure 5) or between both obturator muscles (type 3 or intermembranous

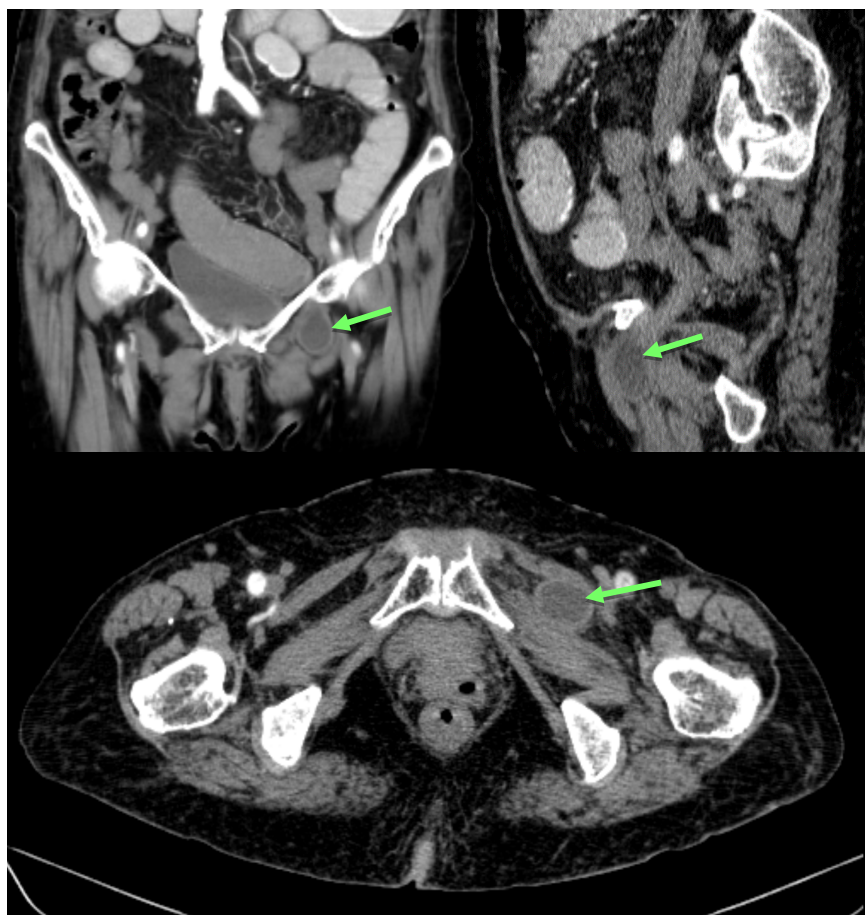
obturator hernia). On other occasions, this image represents the intestinal loop segment with the hernial sac protruding between the pectineus and external obturator muscles in type I<sup>7,10,17,26-28</sup>.

A Japanese study with 43 patients was able to measure the impact that the discovery and development of CT had on the timely diagnosis of obturator hernia, showing that group B, treated after 1987 (the year in which CT was adopted to diagnose hernia obturator in Japan), had a pre-surgical diagnostic accuracy of 80% versus 43% in group A (treated between 1968 and 1986), in addition to a lower rate of resection and mortality (5% vs 30.4%), thus concluding the importance of this imaging technique, which improves the vital role in the reduction of morbidity and mortality of patients with obturator hernia<sup>29</sup>, so much so that for some authors, the development of CT was comparable in the 20th century with the discovery of the X-rays by Wilhelm Conrad Röntgen<sup>30</sup>.

Finally, due to its superior tissue resolution, magnetic resonance imaging (MRI) shows greater diagnostic value in the identification of type I hernias and similar sensitivity to CT in type II and III; however, its availability in the field of urgency tends to be limited or delayed, so it is not a better option than CT<sup>17</sup>. With coronal and axial T2 and



**Figure 4.** Simple abdominal X-ray (4a) and computed tomography (4b), showing intestinal distention, with no gas in the left colon and rectum (arrows). Original photographs taken from patient imaging studies.



**Figure 5.** Incarcerated left obturator hernia without signs of ischemia on double-contrast abdominal computed tomography; shows the passage of the small intestine through the obturator foramen, between the obturator externus muscle and the left pectineus (green arrow). Original photographs taken from patient imaging studies.

axial STIR images (sequence used to suppress the signal of certain elements or specific tissues, such as fat or water), the hernial sac is shown distended by fluid between the pectineus and external obturator muscles (Figure 6).

### Differential diagnosis

The presence of the Howship-Romber sign can also be found in patients with coxarthrosis<sup>19</sup>. In addition, other diagnoses such as femoral hernia, post-herniorrhaphy genitofemoral neuralgia, and chronic pelvic pain should be taken into account.

Among the reasons for which the diagnosis and the respective treatment are delayed, are

the low incidence of the pathology, its totally non-specific clinical picture and the consequent low clinical suspicion, which may be related to the increased rate of strangulation and mortality, that occur between 25-100% and 12-70% of cases of obturator hernia, respectively<sup>19</sup>.

### Treatment and surgical technique

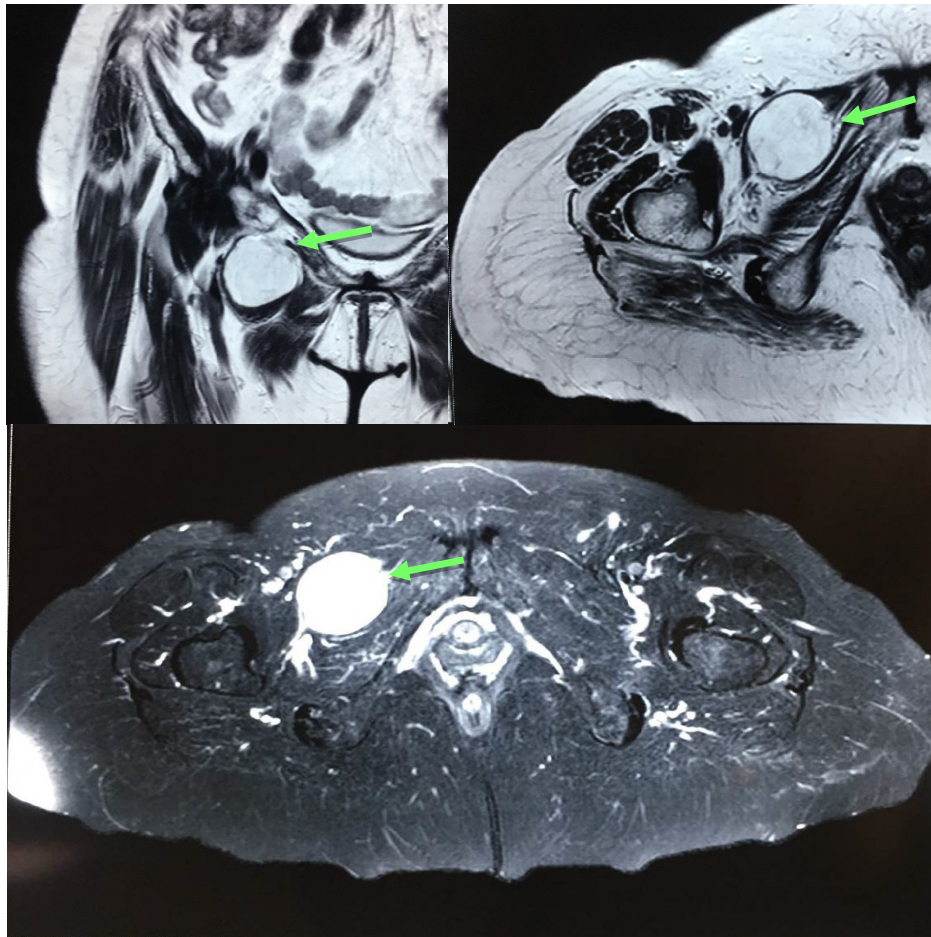
Only 21.5 to 31.3% of patients with obturator hernia are correctly diagnosed before surgery<sup>4</sup>. Generally, intestinal obstruction is what motivates surgical treatment, so patients are taken to exploratory laparotomy, with intraoperative findings of incarcerated obturator hernia (Figure 7), that



can be associated with necrosis of the small intestine, according to the time of evolution, which makes it necessary to perform intestinal resection with anastomosis <sup>13,19,31</sup>. Although the laparoscopic route has been increasing its participation in the study of chronic pelvic pain and resolution of hernias with good results <sup>32-34</sup>, it has not been openly accepted for obturator hernia due to its longer operating time and high cost <sup>10</sup>, despite the fact that a recent study showed that there are no significant differences in the time of laparoscopic surgery versus open surgery, and it has shorter hospital stays, in addition to fewer complications and mortality <sup>35,36</sup>.

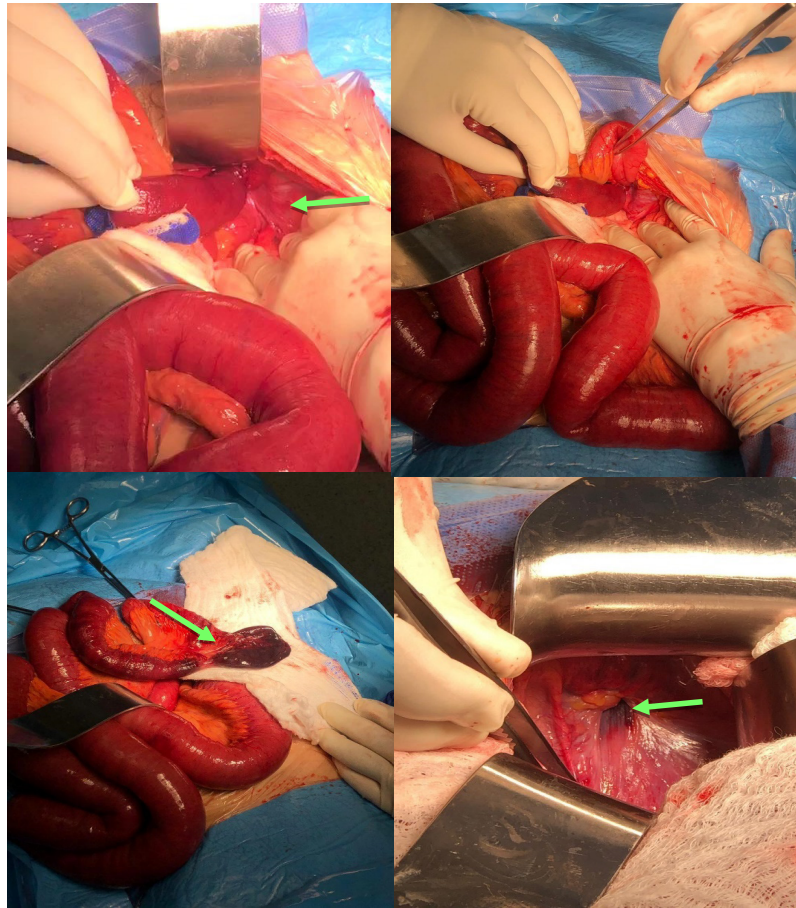
There is a wide variety of techniques for the treatment of obturator hernia, and their choice depends on the patient's conditions, stage of the herniation, clinical presentation, whether emergency or elective, with intra, extraperitoneal or mixed surgical alternatives, closed reduction and then laparoscopic correction <sup>7,13,33,34</sup>.

- Laparotomy: it is the traditional procedure. The median infraumbilical incision is preferred in emergency surgery with a high suspicion of strangulation or intestinal necrosis, whose advantages lie in obtaining better vision field exposure over the hernia sac, the possibility of generating a definitive diagnosis, in addition



**Figure 6.** Magnetic resonance imaging of the pelvis showing a type 2 obturator hernia. Coronal and axial T2 images (top) and axial STIR (bottom) showing hernial sac distended by fluid between the right pectineus and external obturator muscles. Original photographs taken from patient imaging studies.





**Figure 7.** Reduction of the small intestinal loop strangulated through an obturator hernia defect; note the strangulation of the jejunum (green arrow). Original photographs of the surgical procedure taken by the authors.

to perform an intestinal resection with anastomosis, if necessary <sup>10,17,36-41</sup>. It begins with the median infraumbilical incision, the systematic exploration of the intestine is continued to discover the loop imprisoned in the obturator canal, using atraumatic forceps to avoid accidental opening of the intestine, with the exit of contaminating material <sup>7</sup>.

- Laparoscopy: it is the procedure on the rise and every day there are more reports of techniques, be it the totally extraperitoneal (TEP), for elective cases, and the transabdominal preperitoneal (TAPP), in an emergency situation or in the study of chronic pelvic pain, achieving diagnosis of bilaterality in 6%, with 10% conversion

to laparotomy <sup>13,35,39</sup>. It is used essentially in the case of association of obturator hernia with inguinal or femoral hernia, and it begins with the positioning of the patient, the creation of the pneumoperitoneum and the location of the trocars, with incision above the inguinal pits; the inguinal flap is dissected, the sac is reduced, and the mesh is applied in the extraperitoneal space, covering the area of direct and indirect inguinal hernias, with subsequent closure of the peritoneum <sup>7</sup>.

- Open transinguinal or transfemoral route: it is a technique in disuse due to the technical difficulty to reduce the hernial sac and the management of the intestinal loop <sup>42</sup>. Sometimes the defect is

closed by approximating the affected obturator muscle and the pectineus muscle with nonabsorbable suture <sup>22</sup>.

Generally the defects are corrected with a prosthesis (mesh), even more when they are associated with inguinal or femoral hernia, however, there are controversies in cases with gangrene or intestinal perforation and peritonitis, considering the repair of the defect with only suture, aponeurosis flaps and periosteum, although it is difficult due to the fibrous nature of the area and has a high incidence of recurrence, greater than 22% <sup>13,32,40,41</sup>.

The 2017 abdominal wall hernia emergency repair guideline recommends, with the best possible degree of evidence, the use of mesh only in hernias with intestinal incarceration, due to the low level of recurrence and no increase in the site infection rate operative compared to tissue repair <sup>43,44</sup>; on the other hand, in case of intestinal necrosis or peritonitis, primary repair is initially preferable, namely the most common treatment for obturator hernia <sup>45</sup>, while mesh is the second option, for cases of unsuccessful repair, with a 2C degree of evidence, that is, very low recommendation <sup>44</sup>.

On the contrary, in cases with strangulation and intestinal resection, the recommendations are controversial. For example, a meta-analysis with nine studies linked in their research methodology, determined that in patients with strangulation, the rate of recurrence and infection of the wound was lower in mesh repair than in the group without mesh, however, they conclude that in cases of bowel resection could not be recommended, despite the fact that operative site infection rates were similar in both groups <sup>46</sup>. Likewise, another 6-year prospective study found no differences in morbidity, infection or hernia recurrence with the use of mesh in intestinal resection <sup>47</sup>, and another 10-year study concluded that the non-viability of the intestine in cases of hernia abdominal pain is not a contraindication to mesh repair <sup>43</sup>. In short, several current series of systematic reviews show a significant improvement in the perioperative morbidity rate with the use of mesh versus repair

without mesh <sup>13</sup>; however, a high degree of evidence for its use in cases of intestinal resection has not been determined.

The mesh plug technique (Figure 8) requires adequate calibration and has achieved fewer compression complications of the neurovascular bundle, such as those neuralgia difficult to treat <sup>12</sup>, foreign body rejection, and hernia recurrence. Some authors fix the mesh to Cooper's ligament and the internal obturator muscle <sup>40</sup> and others do not fix it <sup>41</sup>.

## Complications

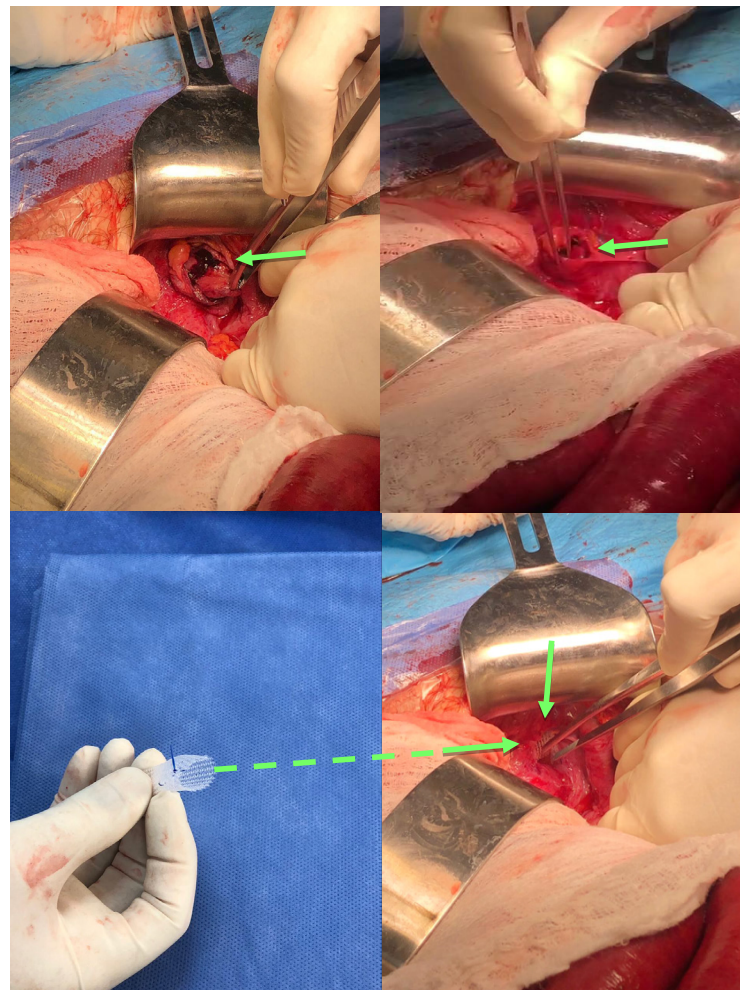
Obturator hernia has a high risk of incarceration and strangulation, which leads to 75% of intestinal resections and possible mortality, ranging from 12% to 70% of cases <sup>7,11,16</sup>. This fact is related to the age of the patients, comorbidities and, above all, to the delay in diagnosis and intervention, which increase the morbidity and mortality rate according to various reviews <sup>16,17,19,48</sup>.

Surgical site infection is the main complication of abdominal wall hernias <sup>44</sup>, and obturator hernia is no exception to this rule. Also, others are added such as acute respiratory failure, paralytic ileus, heart failure, peritonitis and intestinal necrosis <sup>4,16</sup>.

Complications of surgical treatment include bleeding and hemorrhage, hernia recurrence, obturator nerve neuralgia, anastomosis failure, and sepsis <sup>48</sup>.

## Prognosis

The associated morbidity and mortality in patients with obturator hernia will be influenced proportionally by the promptness of diagnosis and surgical management, finding in different reviews that computed tomography has a positive influence when it is included early in the evaluation and does not modify the prognosis in patients with delayed presentation <sup>49,50</sup>. In this way, the morbidity and mortality of patients with obturator hernia will tend to be high given the age of presentation and their different comorbidities such as COPD, chronic renal failure or ischemic heart disease <sup>48,51</sup>.



**Figure 8.** Dissection of the hernial sac and correction of the defect with the polypropylene mesh plug technique (green arrow). Original photographs of the surgical procedure taken by the authors.

## Conclusion

Obturator hernia is a disease of elderly women with malnutrition, difficult to diagnose early because its rarity, with high morbidity and mortality due to the rigidity of the obturator canal, in addition to indirect symptoms of intestinal obstruction, signs that are difficult to find such as neuralgia, anesthesia due to compromise of the obturator nerve, or the bulge covered by the pectineus muscle in the femoral region. Only early clinical suspicion and knowledge of the pathology, supported by the imaging study of choice, such as contrast-enhanced computed tomography, lead to

a reduction in diagnostic delay and morbidity and mortality, as well as achieving timely treatment.

The correction of the defect can be performed open, generally with an infraumbilical median incision, or laparoscopically, with the use of mesh. Regarding this, the authors recommend its use in hernias with intestinal incarceration, but not in intestinal necrosis, while in peritonitis and intestinal strangulation, the risk/benefit ratio and the possibility of complications depending on the degree of the obturator hernia should be reviewed. In the same way, it could be used from simple closure, neighborhood flaps in the initial stages, to the use of prostheses in late stages, and even in-



testinal resection and anastomosis in some cases. In summary, type 1 obturator hernia is repaired with local plication with fixation to the periosteum, while types 2 and 3 are repaired using the mesh plug technique or, if associated with femoral or inguinal hernias, flat mesh placement covering the corresponding defects.

## Compliance with ethical standards

**Informed consent:** The drawings are original and the photographs were taken of the surgical intervention and the imaging studies, with the prior authorization of the patient for publication with the completion of the respective consent. The images have not been digitally altered and represent the facts. This work is a review of the literature, so it did not require approval by the Ethics Committee.

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## Author's contributions:

Conception and design of the study: Alfonso Palmieri-Luna, Adriana María Palmieri-Hernández y Linda Lucía Guardo-Martínez.

Acquisition, analysis and summary of articles: Alfonso Palmieri-Luna.

Drafting the manuscript: Alfonso Palmieri-Luna, Jaime Andrés González-Vega, Adriana María Palmieri-Hernández, Luz Adriana Hernández-Amín, Linda Lucía Guardo-Martínez y Alfredo Navarro-Ucrós.

Critical review: Alfonso Palmieri-Luna y Jaime Andrés González-Vega.

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