

Umbilical Hernia: Basic Concepts, Diagnosis and Treatment Options

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ABSTRACT

Umbilical Hernias are those ventral type hernias, and can be located within the umbilicus or in its surroundings, according to “The European Hernia Society” classifications, a hernia can be defined as an umbilical hernia when is located 3 cm above and 3cm below the umbilicus. In order to classify hernias, they have to be divided into 3 types: Omphalocele and gastroschisis, infant umbilical hernias and acquired umbilical hernias. The diagnosis of the patients with umbilical hernias must be correlated with the clinic, although these patients generally are asymptomatic and do not display any other complications besides from an esthetic defect. If the clinical diagnosis is very complicated, image studies may be required as an abdominal ultrasound, tomography or a magnetic resonance. The umbilical hernia treatment can be expectant, open surgery or laparoscopic surgery, depending on the characteristics of the affected patient or the umbilical hernia.

KEYWORDS: Umbilical hernia, Omphalocele, gastroschisis, diagnosis, treatment, open surgery, laparoscopic surgery.

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INTRODUCTION

Umbilical Hernias are those ventral type hernias, and can be located within the umbilicus or in its surroundings, according to “The European Hernia Society” classifications, a hernia can be defined as an umbilical hernia when is located 3 cm above and 3cm below the umbilicus (1). Is the second most common type of hernias in adults constituting between 6-14% of the abdominal wall hernias. A 90% of hernias are acquired and have a much higher recurrence in woman with a 5:1 relation (2). In the United States 175,000 hernias are repaired by surgery annually (3).

In order to classify hernias, they have to be divided into 3 types: Omphalocele and gastroschisis, infant umbilical hernias and acquired umbilical hernias (4). The 90% of umbilical hernias are present in adult population which are the acquired type: Any process that shows an increase of intra-abdominal pressure must be considered as a risk factor for the appearance of an abdominal hernia, which is more frequently founded in obese patients, cirrhotic with ascites, woman with multi-births or patients with peritoneal dialysis. Malnutrition and deterioration of the connective tissue of the abdominal muscles also favors its appearance.

Umbilical Hernia: Basic Concepts, Diagnosis and Treatment Options

PHYSIOPATHOLOGY

The abdominal wall originates through embryonic mesoderm. Which is also divides in two: the splanchnic layer and the somatic layer. The last one is responsible for the formation of the abdominal wall. With the embryonic growth, the components of the abdominal wall are getting closer and the ventral edge is getting reduced till they form the umbilical cord, which is going to contain the omphalomesenteric conduct, the allantoises and the blood vessels which will be communicated with the placenta. At the end of the 3rd gestation month the walls will be closed, with the exception of the umbilical ring (4). During the normal embryonic development, the mid intestine shows a herniation through the umbilical ring and keeps growing. In the 11th gestation week, the intestine must re-enter the abdominal cavity to be fixed correctly for the umbilical ring closure to happen. If this does not occur, it will appear an umbilical type hernia (6).

The congenital Omphalocele is a malformation in which persists the herniation of the abdominal content of the proximal part of the umbilical cord (7), which causes a viscera protrusion in the base of the umbilical cord. This defect cannot be founded covered by skin, but only by amnion and peritoneum. Usually is accompanied by other congenital malformations (4).

The gastroschisis is a congenital anomaly of the anterior abdominal wall. This defect often occurs to the right of the umbilical cord and the intestine is not covered either by skin nor amnion (7). The direct exposition to amniotic liquid causes thickening and edemas with intestinal inflammation (6).

Umbilical hernias on infants often appears days or weeks after the fall of the umbilical cord stump and is caused by a weakness in the adherence among the scarring remains of the umbilical cord and the umbilical ring. This is different of the Omphalocele, given that this defect is only covered by skin. Usually appears on the superior edge of the umbilical cord, and it is reduced with ease and stand out when the infant cries (4). This defect tends to close by itself in the 80% of the cases and program for reparation must be proposed when the defect has not been remitted at 5-year-old. It can be considered a surgical treatment earlier when the hernia seems to grow with the time or the fascial defect is greater than 2cm (6).

Acquired type hernias appears much later of the ring closure. The umbilicus is considered as a defect in the and it is the thinnest area of the anterolateral abdominal wall. It is composed of 4 elements mainly, which are founded in the next order from the deepest to the most superficial: peritoneum, umbilical fascia, umbilical ring and teguments.

The parietal peritoneum covers the deep face of the umbilical region. The umbilical fascia corresponds to a thickening of the transversal fascia y covers the deep surface of the umbilicus. Taking into account this structure, hernias, can be classified in direct (if the structures externalizes or through them) or indirect (if the structures externalizes above or below it). The umbilical ring is fibrous and resistant and

inserts in the linea alba, which provokes an interruption of it. The teguments constitute the visible parts of the umbilicus (8).

The most frequent localization is in the superior edge of the umbilicus due to a thickening in the umbilical ring which is mediated by abdominal hypertension, the traction made by the abdominal muscles and the degradation of the collagen (4,8). This weakening can be secondary to an exaggerated distention of the abdominal wall as may occur during pregnancy or ascites.

Unlike hernias in infants, these hernias always are going require surgical treatment for its remission, in case this does not happen, will keep growing eventually (4). The umbilical hernia can contain peritoneum adipose tissue, epiploon and small intestine, according to the degree of severity and the size of the defect. The aponeurotic orifice size usually is smaller than the herniary sack, which is why locking and strangulation are common complications, which can happen till a 17% of the times and present a much higher risk for women (1,8). It is recommended an elective reparation after the treatment (1).

DIAGNOSIS

The Omphalocele and gastroschisis, considered abdominal wall malformations must be diagnosed in the valuation echography of the second trimester of gestation.

The diagnosis for patients which present umbilical hernias must be correlated with the clinic, even though these patients are asymptomatic and don't shows any other complications besides from an esthetic factor, usually can be presented as a 1-3 cm under-skin tumor, reducible with manual pressure and can increase size with the Valsalva maneuver; which can be stable or been increasing size over time. It must be examined exhaustively the abdominal wall in order to estimate the content of the hernia and the size of the herniary defect (1,5,8) In case the clinical diagnose is complicated, as occurs with obese patients, or in case the defect is too small, it can be required image studies as abdominal ultra-sound (1). An echography must be done, to valorize the existence of the hernia, the size of it and the content of the protrusion. Tomography or magnetic resonance are barely used, but it can be useful to diagnose orifices in the abdominal wall, as is to valorize protrusion blockages.

Is always necessary to check image studies, if the patients start to present complications such as, pain, vomits, or the hernia cannot be reduced manually. There are two main complications with umbilical hernias, which are: hernias locking, which is the content protrusion by an increase of pressure which prevents its returnal to the abdominal cavity, which can cause an intestine obstruction. And also it can present a strangled hernia, which is the when the locking hernia stays too much time, which causes a vascular compromise which will progress towards an ischemia and visceral necrosis.

Umbilical Hernia: Basic Concepts, Diagnosis and Treatment Options

TREATMENT

The treatment of umbilical hernias can be divided in two categories based on the original approach established by the surgeon: open, or laparoscopic techniques. When it comes to open surgery techniques, there is a debate in whether to use mesh, or not (10). The choice of surgery depends on the current situation of the hernia, the availability of resources, and the size of the hernia. In a study consisting of 979 patients, it was proved that a high body mass index, smoking, diabetes, and postoperative infection, are associated with a greater risk recurrence (11).

For asymptomatic umbilical hernias, the watchful waiting strategy can be safe (12). The reasoning behind this choice of this method, is to avoid postoperative morbidity, and recurrence. In a cohort study of 789 patients, 15% of patients required a surgery in the following 5 years, and 4% required emergency repair (13).

In the treatment of umbilical hernia without mesh, the method of choice is suture repair. Suture repair is only recommended in hernias smaller than 1 cm, because in bigger defects the use of this treatment has a higher recurrence rate (12). Even though there are multiple type of suture techniques for this defect, the one more commonly used is the simple closure technique. It consists of a primary dissection of the herniary sack with its posterior introduction to the preperitoneal cavity. The direction of the suture depends on the shape of the orifice, with a simple continuous suture, with Prolene 1.0 as a preference (10,14,15). In a study constituted by 332 patients, the recurrence of umbilical hernia after suture repair was shown to be approximately of 9.3% (16).

On the other hand, mesh is recommended for hernia defects bigger than 1 cm, to minimize recurrence (17). Mesh choice is based on the type of technique that is going to be used. The position of mesh can vary, as it can be placed a sublay, inlay, or onlay. It is suggested the placement of a flat permanent mesh in the preperitoneal space (10,12). For this suggestion, the technique of choice is the technique of Umbilical Rives. To carry out this procedure, the preperitoneal space is dissected 4 cm surrounding the internal herniary orifice. Following this, a polypropylene mesh that surpasses the whole diameter of the herniary orifice by 4 cm is introduced in the preperitoneal space. To keep the mesh in placement, horizontal mattress sutures are done at the border of the prothesis (14,15).

The laparoscopic approach is suggested for large umbilical hernias, typically bigger than 4 cm, or if the patient has an increased risk of wound infection. Due to the low percentage of umbilical hernias larger than 3 cm, this approach is used rarely (10,14). Laparoscopic surgery significantly reduces the risk of wound infection (12). The traditional technique to perform this approach is IPOM (Intraperitoneal Onlay Mesh). IPOM has the same recommendations as open approach with mesh, as it carries the same surgery concepts, only changing the instrumentalization to laparoscopic. Some novel techniques, most of them robot-assisted, are gaining

popularity to treat umbilical hernias; this is due to there being smaller incisions, decreased hospital stay, and an improved post-operative pain (12,14,18).

CONCLUSIONS

The umbilical hernias are a frequent pathological condition, which affects pediatric patients and adults as well. Its diagnosis is usually clinical, however, image studies as ultrasounds and abdominal tomography are very useful for the integration of a definitive diagnosis in case of doubts or precise limitations of the affected anatomy. Though in many cases therapeutic behavior can be expectant, if a surgical intervention was decided, there are two treatment alternatives: open surgery and laparoscopic surgery.

It is important to know each patient characteristics, in order to define the best possible treatment, taking into consideration surgical risks, early and late complications, as well as the benefit-cost of each therapeutic decision.

Also is important to identify those risk factors, which predispose those patients to acquire an umbilical hernia, in order to know the population in risk and make aware to them about this condition of structural anomaly, and it's complications, such as incarcerated hernias or strangled.

Nowadays we count with excellent therapeutical options for the resolution of the umbilical hernia; therefore, it is always important to keep ourselves actualized in the future surgical improvements in order to offer the best possible treatment to patients.

REFERENCES

- I. Coste AH, Jaafar S, Parmely JD. Umbilical Hernia. 2023.
- II. Lora-Aguirre A, Vega-Peña NV, Barrios-Parra AJ, Ruiz-Pineda JP. Hernia umbilical: un problema no resuelto. *Iatreia*. 2019 Oct 1;32(4):288–97.
- III. Appleby PW, Martin TA, Hope WW. Umbilical Hernia Repair. *Surgical Clinics of North America*. 2018 Jun;98(3):561–76.
- IV. Privratsky AM, Barreto JCamilo, Turnage RH. Pared abdominal, ombligo, peritoneo, mesenterios, epiplón y retroperitoneo. In: Elsevier, editor. *Sabiston Tratado de cirugía*. 21st ed. 2022. p. 1080–104.
- V. Sagrario Fuerte Ruiz. *Hernia Umbilical*. Madrid. España.; 2018.
- VI. Chung DH. *Cirugía pediátrica*. In: Elsevier España, editor. *Sabiston Tratado de cirugía*. 21st ed. 2022. p. 1844–82.
- VII. Moore KL, BMSPDs (OSU), Ds (WU), FFFAAA. Sistema alimentario. In: *Embriología clínica*. 11th ed. 2020. p. 193–221.
- VIII. P. Cossa, E. Péliissier, O. Armstrong. Tratamiento quirúrgico de las hernias umbilicales y epigástricas en adultos. *Tratados EMC*. 2021 Jul 1;37:1–18.

Umbilical Hernia: Basic Concepts, Diagnosis and Treatment Options

- IX. Fidalgo Conde AM, García González C, Gil Mira M^a del M. Valoración fetal en el segundo trimestre: defectos congénitos. In: Elsevier, editor. *Obstetricia y Ginecología*. ClinicalKey; 2022. p. 38–44.
- X. Appleby PW, Martin TA, Hope WW. Umbilical Hernia Repair: Overview of Approaches and Review of Literature. *Surgical Clinics of North America*. 2018 Jun 1;98(3):561–76.
- XI. Donovan K, Denham M, Kuchta K, Denham W, Linn JG, Haggerty SP, et al. Predictors for recurrence after open umbilical hernia repair in 979 patients. *Surgery*. 2019 Oct 1;166(4):615–22.
- XII. Henriksen NA, Montgomery A, Kaufmann R, Berrevoet F, East B, Fischer J, et al. Guidelines for treatment of umbilical and epigastric hernias from the European Hernia Society and Americas Hernia Society on behalf of the European and Americas Hernia Societies (EHS and AHS). 2020 [cited 2023 Sep 22]; Available from: www.bjs.co.uk
- XIII. Kokotovic D, Sjølander H, Gögenur I, Helgstrand F. Watchful waiting as a treatment strategy for patients with a ventral hernia appears to be safe. *Hernia* [Internet]. 2016 Apr 1 [cited 2023 Sep 23];20(2):281–7. Available from: <https://pubmed.ncbi.nlm.nih.gov/26838293/>
- XIV. Pico-Sánchez L, Hinojosa-Arco LC, Cuba-Castro JL, Cabrera-Bermón JM, Monje-Salazar C, Corrales-Valero E, et al. Técnicas de reparación de hernia umbilical: descripción y comparación.
- XV. Vega Peña NV, Hanssen Londoño A, Ceballos Muriel C, Navarro Alean JA, Hernández JD. Surgery of the umbilical hernia: the complexity due to smallness. *Revista Hispanoamericana de Hernia*. 2021.
- XVI. Katzen MM, Sacco J, Ku D, Scarola GT, Colavita PD, Heniford BT, et al. Hernia recurrence after primary repair of small umbilical hernia defects. *The American Journal of Surgery*. 2022 Dec 1;224(6):1357–61.
- XVII. Henriksen NA, Jensen KK, Bisgaard T, Helgstrand F. Suture or Mesh Repair of the Smallest Umbilical Hernias: A Nationwide Database Study. *World J Surg* [Internet]. 2022 Aug 1 [cited 2023 Sep 23];46(8):1898–905. Available from: <https://link.springer.com/article/10.1007/s00268-022-06520-1>
- XVIII. Scrushy MG, Jacobson JC, Pandya SR, Gillory LA. Robotic repair of pediatric hernias: Current techniques and practices. *Semin Pediatr Surg*. 2023 Feb 1;32(1):151261.