ROBOTIC REPAIR OF INCARCERATED MORGAGNI HERNIA IN AN ADULT ON THE ACUTE CARE SURGERY SERVICE

REPARACIÓN ROBÓTICA DE HERNIA ATASCADA DE MORGAGNI EN UN ADULTO BAJO EL SERVICIO DE CIRUGÍA DE URGENCIAS

REPARAÇÃO ROBÓTICA DA HÉRNIA PRESA DE MORGAGNI EM UM ADULTO EM CIRURGIA DE EMERGÊNCIA

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This paper describes very briefly about the formation, manifestation and current treatments of Morgagni hernias, which is a congenital anterior defect or hole in the diaphragm that usually manifests at a young age, where viscera like stomach or intestine can go through that defect and lodge in the chest. Its presentation is unusual in the adult, but when it does it may manifest with signs of bowel obstruction (nausea, vomiting, dehydration and inability to pass gas or stool). Here, we describe the tribulation that a young obese man had to go through due to complications from the hernia and how the problem was fixed using robotic surgery (a robot with 4 arms that is controlled by a highly trained surgeon), making his post-operative recovery very fast and uneventful, by avoiding a large incision. Unfortunately few hospitals in developing countries have a Robotic surgical system, but we are hopeful that in the years to come, robots will become accessible to everyone.

Conceptos clave:

a. What do we know about the subject?

Morgagni hernia is a congenital anterior defect of the diaphragm with intraabdominal visceral content, seen mostly in the pediatric population. Its presentation is rare in adults and when it does, it may present with signs of bowel or gastric outlet obstruction.

b. How does this article contribute to the subject?

This article provides with information about a rare presentation of a symptomatic incarcerated Morgagni hernia in an adult and how robotic surgery can be applied to the resolution of the problem, especially on a patient with a large body mass index.

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Resumen:

Introducción: La hernia de Morgagni es un defecto diafragmático, infrecuente en adultos. Aquí describimos el caso de un paciente presentándose con una hernia de Morgagni atascada, reparada bajo el servicio de cirugía de urgencias.
Descripción: Varón de 29 años quien se presentó con un cuadro de oclusión gastrointestinal. La tomografía demostró una hernia de Morgagni atascada conteniendo estómago y colon. Fue llevado al quirófano para reparación asistida por robot. Una vez reducida la hernia, el defecto midió 10 x 7 cm, se interpuso una malla compuesta. El paciente fue dado de alta al quinto día post-quirúrgico, y al año de seguimiento, continua sin inconvenientes.
Conclusión: La cirugía robótica ofrece la ventaja de aplicar técnicas mini-invasivas en el tratamiento de urgencias quirúrgicas. Este es el primer caso reportado de una hernia de Morgagni atascada reparada de manera urgente utilizando tecnología robótica, por cirujanos de urgencias.

Palabras clave: hernias diafragmáticas congénitas; procedimientos quirúrgicos robotizados; obesidad mórbida

Abstract:

Introduction: Morgagni hernia is a relatively uncommon anterior diaphragmatic defect, particularly in adults. We describe the case of a patient who presented with an incarcerated Morgagni hernia and was repaired by an Acute Care Surgery service.
Description: The patient is a 29 year old male who presented with a picture of bowel obstruction. CT scan revealed a Morgagni hernia with incarcerated stomach and colon. He was taken to the operating room for robotic repair. The hernia was reduced. The defect measured 10 x 7cm, a composite mesh was interposed, and sutured in place. The patient was discharged on postoperative day 5 and has done well at 1 year follow up.
Conclusion: Robotic surgery offer the chance to apply minimally invasive techniques for urgent surgical care. This is the first reported case of an incarcerated Morgagni hernia repaired urgently using robotic techniques, and performed by acute care surgeons.

Keywords: congenital diaphragmatic hernias; robotic surgical procedure; morbid obesity

Resumo

Introdução: A hérnia de Morgagni é um defeito diafragático, incomum em adultos. Aqui descrevemos o caso de um paciente apresentando uma hérnia morgagni presa, reparada sob o serviço de cirurgia de emergencia.
Descrição: Homem de 29 anos que se apresentou com um quadro de oclusão gastrointestinal. A tomografia mostrou uma hérnia de Morgagni presa com estômago e cólon. Ele foi levado para a sala de cirurgia para reparo assistido por robô. Uma vez que a hérnia foi reduzida, o defeito mediu 10 x 7 cm, uma malha composta foi intercalada. O paciente teve alta para o quinto dia pós-cirúrgico, e o ano de acompanhamento continua tranquilo.
Conclusão: A cirurgia robótica oferece a vantagem da aplicação de técnicas miniinvasivas no tratamento de emergências cirúrgicas. Este é o primeiro caso relatado de uma hérnia morgagni presa urgentemente reparada usando tecnologia robótica, por cirurgiões de cuidados agudos.

Palavras-chave: hérnias diafragmáticas congénitas; procedimentos cirúrgicos robóticos; obesidade mórbida

INTRODUCTION

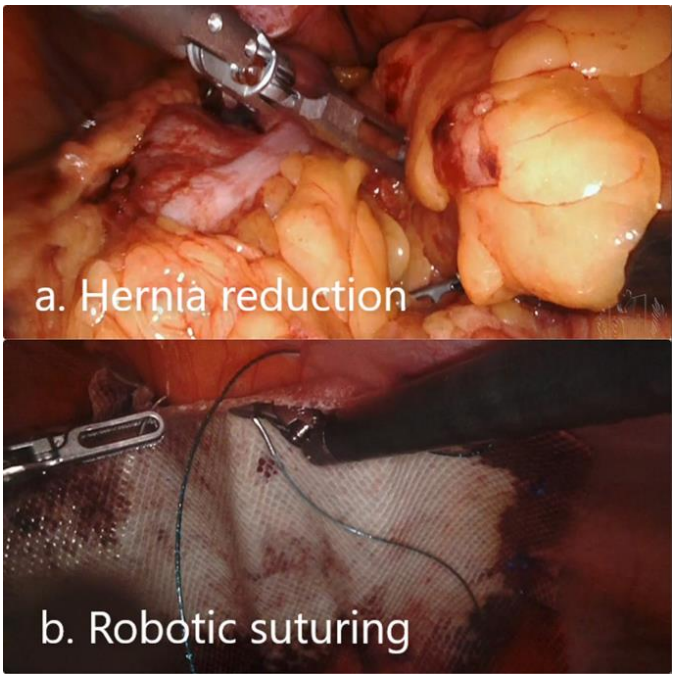
Morgagni hernia is a relatively uncommon type of congenital diaphragmatic hernia (CDH), particularly in adults, accounting for 3% of all diaphragmatic hernias [1]. It is characterized as a developmental retrosternal discontinuity of the diaphragm that allows abdominal viscera to herniate into the chest. The pathogenesis of CDH has not been well established. The leading theories are that it is due to failure of normal closure of the pleuro-peritoneal folds during the 4th to 10th weeks of gestation or to genetic or environmental triggers that disrupt differentiation of mesenchymal cells during formation of the diaphragm and other somatic structures [2-4].

It may remain asymptomatic for several years and in adult life is discovered on imaging due to vague gastrointestinal or cardiopulmonary symptoms. Some acquired conditions that increase the intraabdominal pressure, like obesity and pregnancy, are thought to be responsible for its progression [5].

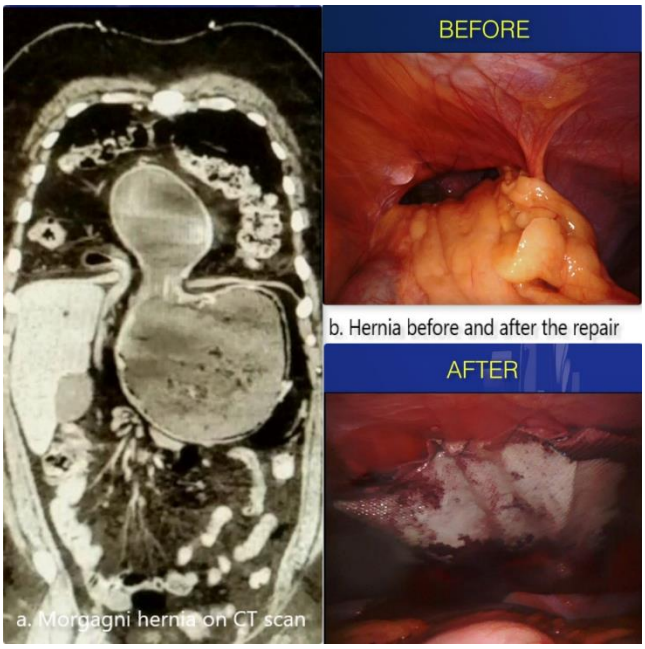
Surgical treatment is indicated once the diagnosis has been made. Traditionally, the preferred operation is the abdominal approach, especially with laparoscopic techniques, where the contents can be reduced and the defect closed by direct suturing or mesh placement. Others have advocated the thoracic approach by open or thoracoscopic techniques [6]. Only four cases have previously been reported using robotic techniques for the repair of Morgagni hernias in adults [7, 8]. This is the case of a patient who presented to the emergency room, due to signs and symptoms of bowel obstruction from an incarcerated Morgagni hernia, and was repaired after admission to the Acute Care Surgery service at a tertiary care center.

DESCRIPTION

The patient is a 29-year-old male with a body mass index of 55 kg/m2. He had a history of intermittent epigastric abdominal pain, nausea, and vomiting for the last year. The patient presented to the emergency department with signs and symptoms of a bowel obstruction. CT scan revealed gastric distention and the Morgagni hernia with incarcerated distal stomach, duodenum, and transverse colon. Figure 1a.



The patient was initially managed with nasogastric tube decompression, fluid resuscitation and taken to the operating room for robotic repair after 48 hours. Standard port placement for lower esophageal cases was used on a Da Vinci Xi system (Intuitive Surgical Inc., Sunnyvale, CA). Using atraumatic graspers, the incarcerated omentum, colon, stomach, and duodenum was reduced into the abdominal cavity. Figure 2a.



b. Hernia before and after the repair

There was omentum and distal stomach tightly adherent to the anterior and medial surfaces of the pericardium and the pleura. Once this tissue was lysed the remainder of the incarcerated contents easily reduced. The anterior diaphragmatic defect measured 10 x 7cm in the transverse and anterior-posterior dimensions respectively, however it would not approximate due to tension. Therefore, a composite mesh, cut to 20 x 15 cm, was interposed and non-absorbable sutures were used in an interrupted fashion to affix the mesh to the edges of the defect. Posteriorly, the interrupted sutures were placed by means of intracorporeal robotic suturing. Figure 2b. Whereas a trans-fascial suture passer was used to attach the mesh anteriorly in the upper abdomen. An absorbable tacking device, to reinforce the attachment circumferentially, was utilized. Two remaining areas of laxity were secured with barbed absorbable sutures. At the end of the procedure the mesh was seen in adequate position with at least 4 cm of overlap on each direction

The operative time was 259 minutes. There was minimal blood loss. The patient was discharged from the hospital on postoperative day #5 and has done well at 2 weeks and at 1 year follow up without recurrent symptoms.

DISCUSSION

This is one of the first cases of an incarcerated Morgagni hernia, infrequently presenting in an adult, repaired in the setting of an acute care surgery (ACS) service using robotic techniques. Our institution is a level I trauma center with an in-house ACS attending surgeon. Our patient was admitted to the service and underwent surgery after 48 hours by two acute care surgeons with training in robotic and minimal invasive procedures.

Diaphragmatic hernias are preferably repaired using a minimally invasive laparoscopic or thoracoscopic approach, as complication rates (0% and 5 %, respectively) are lower compared to those of open repairs (3% and 17 %, respectively) [9].

The advantages of the Da Vinci robot over standard laparoscopic instruments include more degrees of freedom due to wrist movements, tremor filtration and improved optics with the 3-Dimensional viewing [10]. These benefits become extremely important when it comes to operate the diaphragm of a morbidly obese patient.

Repair of large diaphragmatic hernias is a surgical challenge and the data available comes from pediatric surgeons. According to the CDH Registry, 48.3% of infants undergoing repair require a patch. When primary repair is not possible, diaphragmatic replacement with a prosthetic patch or autologous tissue becomes necessary. Comparative studies between patch and no-patch repairs in this age set have consistently shown increased morbidity and mortality in the patch groups, most likely due to the underlying defect size and the associated severity of the pulmonary hypoplasia [11]. However, these outcomes cannot be extrapolated to the adult population. In adults, pulmonary hypoplasia, if present, is unlikely to be serious; diaphragm growth is likely not an issue as would be the case for an infant receiving a mesh in a growing diaphragm that could create future complications with dislodgment or thinning of the patch, with a subsequent high recurrence rate.

In our case a composite mesh of macroporous non-absorbable polytetrafluoroethylene (PTFE) layer and non-porous absorbable film of polyglycolic acid/trimethylene carbonate was used, both synthetic materials have identifiable characteristics of reducing the risk of visceral attachment to the mesh and subsequent potential adhesive bowel obstruction.

CONCLUSION

Robotic surgery, in the hands of appropriately trained acute care surgeons, may offer the chance to apply minimally invasive techniques even for urgent surgical care in a safe and timely manner.

The aforementioned benefits include enhanced visualization and simplicity of intracorporeal suturing for patch placement. However larger studies are necessary to further investigate its outcomes in the management of Morgagni hernias.

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Reference

1. *Bortul M, Calligaris L, Gheller P. Laparoscopic repair of a Morgagni-Larrey hernia. J Laparoendosc Adv Surg Tech A. 1998 Oct;8(5):309-13. doi: 10.1089/lap.1998.8.309. PMID: 9820724.*
2. *Slavotinek AM. The genetics of congenital diaphragmatic hernia. Semin Perinatol. 2005 Apr;29(2):77-85. doi: 10.1053/j.semperi.2005.04.003. PMID: 16050525*
3. *Clugston RD, Klattig J, Englert C, Clagett-Dame M, Martinovic J, Benachi A, Greer JJ. Teratogen-induced, dietary and genetic models of congenital diaphragmatic hernia share a common mechanism of pathogenesis. Am J Pathol. 2006 Nov;169(5):1541-9. doi: 10.2353/ajpath.2006.060445. PMID: 17071579; PMCID: PMC1780206.*
4. *Bielinska M, Jay PY, Erlich JM, Mannisto S, Urban Z, Heikinheimo M, Wilson DB. Molecular genetics of congenital diaphragmatic defects. Ann Med. 2007;39(4):261-74. doi: 10.1080/07853890701326883. PMID: 17558598; PMCID: PMC2174621.*
5. *Ryan JM, Rogers AC, Hannan EJ, Mastrosimone A, Arumugasamy M. Technical description of laparoscopic Morgagni hernia repair with primary closure and onlay composite mesh placement. Hernia. 2018 Aug;22(4):697-705. doi: 10.1007/s10029-018-1760-x. Epub 2018 Mar 19. PMID: 29556855.*
6. *Nguyen T, Eubanks PJ, Nguyen D, Klein SR. The laparoscopic approach for repair of Morgagni hernias. JSLS. 1998 Jan-Mar;2(1):85-8. PMID: 9876719; PMCID: PMC3015255.*
7. *Arevalo G, Harris K, Sadiq A, Calin ML, Nasri B, Singh K. Repair of Morgagni Hernia in Adults with Primary Closure and Mesh Placement: First Robotic Experience. J Laparoendosc Adv Surg Tech A. 2017 May;27(5):529-532. doi: 10.1089/lap.2016.0360. Epub 2016 Aug 8. PMID: 27500540.*
8. *Fu SS, Carton MM, Ghaderi I, Galvani CA. Robotic-Assisted Simultaneous Repair of Paraesophageal Hernia and Morgagni Hernia: Technical Report. J Laparoendosc Adv Surg Tech A. 2018 Jun;28(6):745-750. doi: 10.1089/lap.2017.0385. Epub 2017 Dec 13. PMID: 29237144.*
9. *Chen B, Finnerty BM, Schamberg NJ, Watkins AC, DelPizzo J, Zarnegar R. Transabdominal robotic repair of a congenital right diaphragmatic hernia containing an intrathoracic kidney: a case report. J Robot Surg. 2015 Dec;9(4):357-60. doi: 10.1007/s11701-015-0530-3. Epub 2015 Sep 26. PMID: 26530841.*
10. *Meehan JJ, Torres JE. Robotic repair of Morgagni congenital diaphragmatic hernia in an infant. J Robot Surg. 2008 Jul;2(2):97-9. doi: 10.1007/s11701-008-0081-y. Epub 2008 Apr 24. PMID: 27637510*
11. *Tsao K, Lally KP. Innovations in the surgical management of congenital diaphragmatic hernia. Clin Perinatol. 2012 Jun;39(2):363-74. doi: 10.1016/j.clp.2012.04.002. Epub 2012 May 5. PMID: 22682385.*