



Case report

Laparoscopic repair of an incarcerated Morgagni Hernia in a COVID-19-positive patient: A video case report

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ABSTRACT

Introduction: Morgagni Hernia (MH) is a type of congenital diaphragmatic hernia (CDH). CDH is a diaphragmatic discontinuity that permits abdominal viscera to herniate into the chest during development. It does not only occur in early childhood but also has been reported in adults. The most prevalent clinical sign of MH is respiratory disorder of all ages.

Case presentation: An elderly woman with a known history of diabetes, ischemic heart disease, hypertension, and constipation presented to us with increased abdominal pain. Besides, her PCR test results were positive for COVID-19. She underwent diagnostic laparoscopy surgery. The incision was closed with an intracorporeal suture, and then dual mesh was fixed to diaphragmatic wall. The postoperative progress was satisfactory two weeks after surgery. Based on a negative PCR test, the patient was discharged from the hospital.

Discussion: The foramina of Morgagni is a defect in the costosternal trigons produced by a lack of anterior pleuroperitoneal membrane muscularization. Although gastrointestinal symptoms and cardiorespiratory discomfort are typically connected with the diagnosis and treatment of MH in youngsters, there are a few middle-aged people who, like our case, develop symptoms suddenly. Albeit a paradigm change in the 21st century deems less invasive laparoscopic surgery to be the treatment of choice, open surgical procedures via a trans-thoracic or trans-abdominal route are still used.

Conclusion: MH is indeed uncommon in adults, but in patients with an acute onset of intestinal obstruction, the possibility of MH should be in mind. It can be fatal if it is misdiagnosed.

1. Introduction

Foramen of Morgagni, known as the sternocostal triangle, is an anterior parasternal or retrosternal herniation via the right sternocostal hiatus. Giovanni Battista Morgagni, an Italian anatomist, originally characterized it in 1769 [1]. MH is a congenital condition, especially among children, accounting for just 2% to 3% of all diaphragmatic hernias [2]. The exact mechanism of MH formation is unknown, although it is thought that mesenchymal cell differentiation during the creation of the diaphragm and other somatic structures may be disrupted by genetic and/or environmental stimuli [3,4]. Howbeit there

have been family occurrences of CDH involving autosomal recessive, autosomal dominant, and X-linked inheritance patterns, the vast majority of CDH cases are sporadic, with no obvious familial link [5]. The omentum, stomach, small bowel, colon, and portions of the liver are among the contents of the hernia sac [6]. The most prevalent clinical signs of MH in adults include dyspnea and chest pain in the respiratory system, as well as nausea and vomiting in the digestive system but respiratory insufficiency and chronic pulmonary hypertension are the most serious problems during birth [7]. Though some are symptomatic, many remain asymptomatic and are often incidentally discovered on chest radiography [8].

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This case report has been reported in line with the SCARE 2020 criteria [9].

2. Presentation of case

This is a case of a 69-year-old female who presented with a significant weight loss, abdominal muscle weakness due to cachexia, and change in bowel habits, along with constipation, nausea, and vomiting for the last few months. She was a known case of diabetes mellitus and hypertension in her medical history for the last 10 years. Her vital signs were normal, but a physical examination revealed mild abdominal tenderness. There had been no previous abdominal or thoracic injuries in her medical history. Routine blood investigations and PCR tests were done. PCR test results were positive for COVID-19. We suspected the malignancy because cachexia often being associated with cancer patients. In a colonoscopy, there was an infiltrative lesion in the transverse colon. To rule out malignancy as a differential diagnosis, a mucosal biopsy of colon mass was done. The serial section failed to reveal malignancy. Considering the lung involvement and our suspicion of intestinal obstruction, a computed tomographic (CT) scan was done. In CT scan of the chest and abdomen, a right-sided MH (Fig. 1), bilateral pleural effusion with collapse consolidation (Fig. 2A), and ground glass pattern, the most common finding in COVID-19 infections, were detected (Fig. 2B). The choice was taken to correct the hernia through laparoscopic surgery. The patient was positioned supine. Three trocars were used, each one in the umbilical (12 mm), epigastric (10 mm), and right lumbar (5 mm) regions in the midclavicular line. The defect (Fig. 3) was repaired with prolene suture and then the reinforcement of the diaphragmatic wall with the fixation of non-absorbable dual mesh (Fig. 4). The goal of the surgery was to reduce the contents of the hernia completely, as well as to bridge the diaphragmatic wall defect with a double synthetic mesh. Hernia recurrence was significantly reduced following a double mesh surgery, whether open or laparoscopic [10,11]. The total operative time was 120 min. After surgery, the patient was treated in ICU for about 2 weeks due to her COVID-19 complications. Her oxygen saturation was $<90\%$ on $\geq 50\%$ oxygen. COVID-19 and being old gave cause for concern. Age and coexisting disease are the factors to be considered when assessing suitability for admission to intensive care. Early referral increases the likelihood of recovery and minimizes the risk of organ failure [12]. The drain was removed by the second day. The operation was uneventful, and there were no post-operative complications. The patient was discharged based on a negative PCR test. During the follow-up, the patient was doing well and reported an excellent recovery.

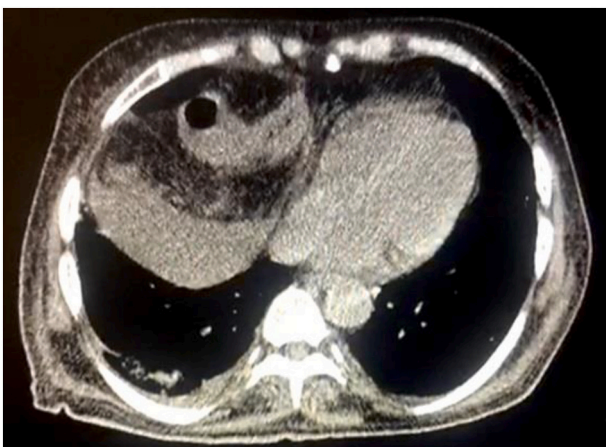


Fig. 1. CT scan showing a Morgagni Hernia.

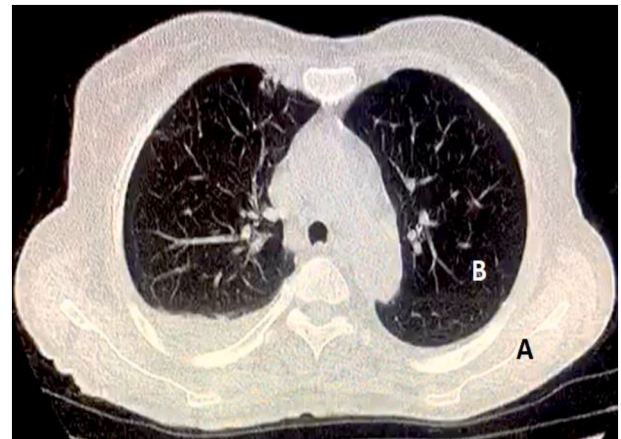


Fig. 2. (A) Bilateral pleural effusion with collapse consolidation. (B) Ground glass pattern.

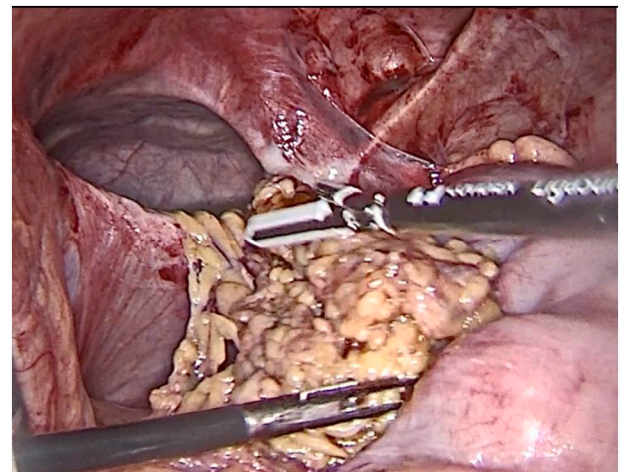


Fig. 3. A 5- × 5- Cm hernia defect.

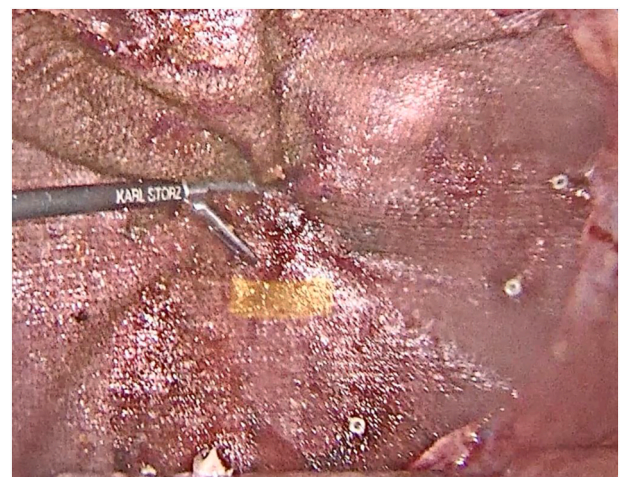


Fig. 4. A 15- × 15- Cm dual mesh was fixed to the diaphragmatic wall.

3. Discussion

The foramina of Morgagni is an imperfection in the costosternal trigons caused by a lack of muscularization or fusion of the

pleuroperitoneal membrane anteriorly. An MH occurs through the right sternocostal hiatus, while a Larrey hernia occurs through the left. Although right side MH predominates in the literature, left side MH is also seen [7]. The abnormality is thought to form during embryological development when the diaphragm fails to close properly. Failure to close the pleuroperitoneal folds correctly during the 4th to 10th weeks after fertilization permits viscera to herniate into the thoracic cavity, interfering with normal lung development and posing several risks [13]. Boys are more likely to have MH as youngsters, while women are more susceptible in the group of adults [14]. Although gastrointestinal symptoms and cardiorespiratory discomfort are frequently associated with the diagnosis and treatment of MH in children [15], there are a few middle-aged individuals, just the same as our case, who experience the same abrupt onset of symptoms. Chronic obstructive lung disease, obesity, multiparity, and constipation are all found to be predisposing variables in half of the cases [16]. In our case, a combination of pre-existing asthma and COVID-19 may have contributed to the development of MH. We think that COVID-19 may be a spark of underlying disease manifestations. A plain chest radiograph and computed tomography, are critical in the diagnosis, identification of the hernia's contents, and subsequent care of this problem, as well as determining the presence of any associated abnormalities [17]. The operational procedure is still a source of contention. Some authors advocate a laparotomy or thoracotomy approach, while others prefer video-assisted endoscopic surgery also known as Minimally Invasive Surgery like laparoscopy and thoracoscopy. All abdominal organs can be evaluated with laparoscopy in a minimally invasive manner. Thoracoscopy, on the other hand, enables the examination and maybe treatment of anomalies of the organs in the thorax, such as the heart, esophagus, and lungs [18]. The benefits of minimally invasive surgery are well established, including better post-operative outcomes, a positive cosmetic aspect, and a meaningful reduction in hospitalization time. Many common acute abdominal problems can be evaluated and treated with emergency laparoscopic surgery [19]. In the literature, a variety of procedures for laparoscopically repairing MH have been documented, including primary closure with a continuous suture, interrupted suture, and mesh. Smaller defects can usually be healed without tension with sutures, but larger defects require the use of mesh [20]. In all cases identified with an MH, the danger of incarceration and visceral strangulation exists [21]. The excision of the hernia sac during an MH repair is a contentious subject. The hernia sac was removed in this case, and we did not affect its recurrence. During the COVID-19 pandemic, surgical specialties will confront significant obstacles, and the consequences will be long-lasting. Performing surgery on patients who have COVID-19, whether asymptomatic or symptomatic, increases the risk of perioperative morbidity and mortality [22]. Herein, we present a successful laparoscopic approach to emergency gastrointestinal surgery in an elderly patient with COVID-19, which was an unusual case.

4. Conclusions

This video presentation shows the laparoscopic repair of MH. This technique is considered the best approach to this disorder and is associated with reducing intraoperative morbidity, hospital stay, and post-operative complications. It can be safely performed in patients with an MH. MH is indeed uncommon in adults, but in patients with an acute onset of intestinal obstruction, the possibility of MH should be in mind. Higher clinical suspicion is needed for the diagnosis of MH. A missed diagnosis can lead to life-threatening complications.

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Ethical approval

Cause all data was acquired from clinical records and imaging systems for normal pre-operative planning and follow up, our institution was exempt from institutional review board approval.

Registration of research studies

This paper just contains the patient's medical history. This is not a report on human participation in research.

Guarantor

Abdolreza Pazouki.

CRedit authorship contribution statement

AP, SA.M, FE, and BG operated. FM acquired and analyzed the data and wrote the manuscript. SA.M organized the writing of manuscript. FM narrated over the video and made the final approval of the manuscript. The final manuscript has been read and approved by all writers.

Declaration of competing interest

No competing interests have been declared by the authors.

References

- [1] E. Gedik, M.C. Tuncer, S. Onat, A. Avcl, I. Tacyildiz, B. Bac, A review of morgagni and bochdalek hernias in adults, *Folia Morphol. (Warsz)* 70 (1) (2011) 5–12.
- [2] T.P. Comer, O.T. Clagett, Surgical treatment of hernia of the foramen of morgagni, *J. Thorac. Cardiovasc. Surg.* 52 (4) (1966) 461–468.
- [3] A.M. Slavotinek, The genetics of congenital diaphragmatic hernia, *Semin. Perinatol.* 29 (2) (2005) 77–85.
- [4] R.D. Clugston, et al., Teratogen-induced, dietary and genetic models of congenital diaphragmatic hernia share a common mechanism of pathogenesis, *Am. J. Pathol.* 169 (5) (2006) 1541–1549.
- [5] D.L. Gibbs, H.E. Rice, J.A. Farrell, N.S. Adzick, M.R. Harrison, Familial diaphragmatic agenesis: an autosomal-recessive syndrome with a poor prognosis, *J. Pediatr. Surg.* 32 (2) (1997) 366–368.
- [6] J.D. Horton, L.J. Hofmann, S.P. Hetz, Presentation and management of Morgagni hernias in adults: a review of 298 cases, *Surg. Endosc.* 22 (6) (2008) 1413–1420.
- [7] V. Abraham, Y. Myla, S. Verghese, B.S. Chandran, Morgagni-Larrey hernia—a review of 20 cases, *Indian J. Surg.* 74 (5) (2012) 391–395.
- [8] F.S. Rakas, K.G. Dayma, D.B. Gabukamble, Obstructed Morgagni's hernia (A case report), *Indian J. Surg.* 50 (1988) 144–146.
- [9] R.A. Agha, et al., The SCARE 2020 guideline: updating consensus surgical CARE REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230.
- [10] R.Y. Afifi, M. Hamood, M. Hassan, The outcome of a. Double mesh intraperitoneal repair for complex ventral hernia: a retrospective cohort study, *Int. J. Surg.* 53 (2018) 129–136.
- [11] F. Puglisi, P. Capuano, O.C. Iambrenghi, N. Armenise, Laparoscopic repair of morgagni hernia in an adult, *Chir. Ital.* 61 (3) (2009) 351–356.
- [12] G. Smith, M. Nielsen, Criteria for admission, *BMJ* 318 (7197) (1999) 1544–1547.
- [13] H.L. Hedrick, N.S. Adzick, D. Levine, Congenital diaphragmatic hernia: prenatal issues, *UpToDate* (2019).
- [14] E. Tarcoveanu, et al., Laparoscopic management in morgagni hernia—short series and review of literature, *Chir.* 113 (4) (2018) 551–557.
- [15] Y. Aydin, B. Altuntas, A.B. Ulas, C. Dahrli, A. Eroglu, Morgagni hernia: transabdominal or transthoracic approach? *Acta Chir. Belg.* 114 (2) (2014) 131–135.
- [16] M.K. Pattnaik, S.P. Sahoo, S.K. Panigrahy, K.B. Nayak, Morgagni hernia: a rare case report and review of literature, *Lung India Off. Organ Indian Chest Soc.* 33 (4) (2016) 427.
- [17] F. Burdan, et al., Anatomical classification of the shape and topography of the operated stomach, *Folia Morphol. (Warsz)* 71 (3) (2012) 129–135.
- [18] M.E. Saleh, W.H. Mohammed, Morgagni hernia: how to approach!, *J. Egypt. Soc. Cardio-Thoracic Surg.* 25 (2) (2017) 171–176.
- [19] O. Warren, J. Kinross, P. Paraskeva, A. Darzi, Emergency laparoscopy—current best practice, *World J. Emerg. Surg.* 1 (1) (2006) 1–9.

- [20] S. Dutta, C.T. Albanese, Use of a prosthetic patch for laparoscopic repair of morgagni diaphragmatic hernia in children, *J. Laparoendosc. Adv. Surg. Tech.* 17 (3) (2007) 391–394.
- [21] J.L. Vinard, A. Palayodan, P. Collomb, Emergency laparoscopic treatment of a strangulated morgagni hernia, *Eur. J. Coeliosurg.* 1 (1997) 35–40.
- [22] M.R. Kibbe, Surgery and COVID-19, *JAMA* 324 (12) (2020) 1151–1152.