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# A rare case report of Morgagni Hernia with Organo-Axial Gastric Volvulus and concomitant Para-esophageal hernia, repaired laparoscopically in a Septuagenarian

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## ABSTRACT

**INTRODUCTION:** Simultaneous occurrence of Morgagni and the Para-esophageal hernia is a rare clinical condition with eight case reports in the English-language literature and only four managed laparoscopically. We describe a case of a Septuagenarian patient with Morgagni and concomitant Para-esophageal hernia treated laparoscopically.

**PRESENTATION OF A CASE:** A 71-year-old male patient, presented with a one-month history of regurgitation of acid, retrosternal burning and vomiting after eating. Computed tomography (CT) imaging demonstrated a large anterior diaphragmatic hernia, with herniation of bowel loops and anterosuperior displacement of the gastric antrum along with a grade III Para-esophageal hernia. The patient underwent simultaneous laparoscopic repair of Morgagni and Para-esophageal hernia with mesh reinforcement with Nissen's total anti-reflux fundoplication. The patient's postoperative recovery was uneventful.

**DISCUSSION:** A Morgagni Hernia is a rare congenital condition consisting of a Subcosto-sternal defect in the diaphragm. A Para-esophageal hernia is a rare variant of a hiatus hernia. Morgagni and Para-esophageal hernia may present with gastric volvulus or incarceration, requiring emergency treatment. Minimally invasive surgery is the preferred treatment, particularly for elderly patients and patients with comorbidities. The laparoscopic operation can provide excellent exposure and repair the hernia defect easily with minimal invasiveness and fewer complications.

**CONCLUSION:** This case report highlights the co-existence of Morgagni and Para-esophageal hernias and validates the feasibility of laparoscopic repair of both hernias simultaneously.

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## 1. Introduction

In Hiatus hernia contents of the abdominal cavity is displaced through the esophageal hiatus of the diaphragm into the mediastinum, most common being the stomach. The less common types of a hiatus hernia, Types II, III, and IV are considered as Para-esophageal Hiatal hernias and account for less than 5% of all Hiatal hernias [1].

Herniation of abdominal contents into the thorax via a Subcosto-sternal defect, as first illustrated by Morgagni in 1769, is a congenital disorder that rarely presents in adults and accounts for 2–3% of diaphragmatic hernias [2,3].

As first reported by Lund et al. Simultaneous occurrence of Morgagni and the Para-esophageal hernia is a rare clinical condition with eight cases in the English-language literature and only four managed laparoscopically [Table 1] [2,4–10]. We describe a case profile of a Septuagenarian patient with Morgagni and concomitant Para-esophageal hernia treated laparoscopically in a tertiary community care hospital. The work has been reported in line with the SCARE criteria [11].

## 2. Presentation of case

A 71-year-old male patient of Asian Origin referred by a general physician, without significant comorbidities, family, and personal history presented with a one-month history of regurgitation of acid, retrosternal burning and vomiting after eating. Physical examination revealed bowel sounds upon chest auscultation and decreased breath sounds in the base of the right lung. Clinical findings were as follows: blood pressure, 110/76 mm Hg; pulse rate, 88/min; his body temperature, 36.3 °C; and oxygen saturation, 94%. Upper GI esophagogastroduodenoscopy revealed an upward migration of Z

**Abbreviations:** CT, Computed Tomography; MRI, Magnetic Resonance Imaging; GI, Gastrointestinal.

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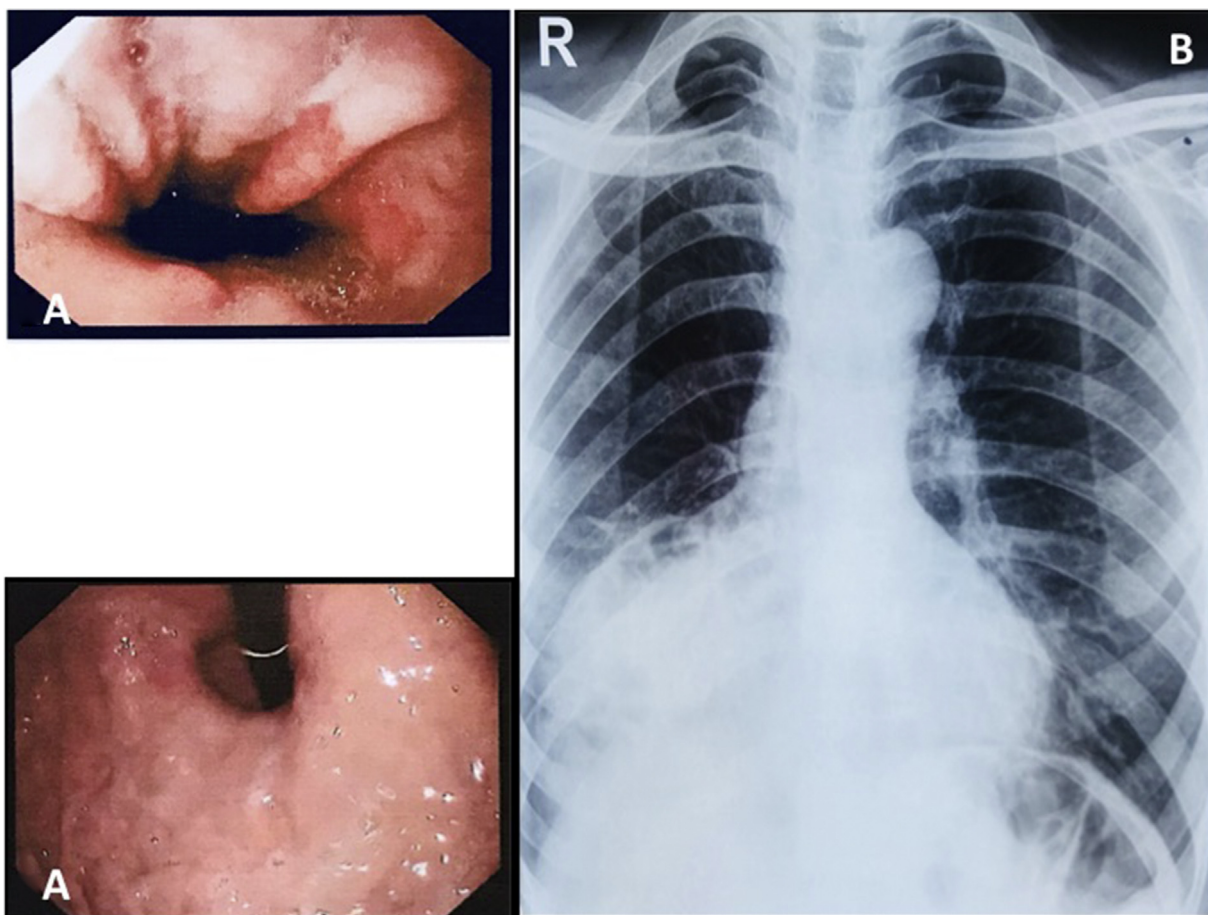
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**Table 1**  
Co-Existence of Morgagni and Hiatus Hernia [2,4–10].

S No.	YEAR	AUTHOR	AGE	GENDER	SYMPTOM	TREATMENT	COMPLICATION
1	1958	Ronald Lund	62	F	Chest Pain	Surgery	Not Mentioned
2	2001	Dumbor Ngaage	74	M	Respiratory Distress	Laparotomy	None
3	2003	A. Eroglu	67	M	Dyspnea, Chest Pain	Laparotomy	None
4	2003	A. Cokmez	65	F	Not Mentioned	Laparoscopy	None
5	2006	Zsolt Szentkereszty	67	F	Epigastric Pain, Dysphagia	Laparoscopy	None
6	2015	Ann Bettini	76	M	Abdominal Pain	Laparotomy	Pulmonary Embolism, Atrial Fibrillation, C. difficile Colitis
7	2015	Zhou ZL	73	F	Chest Pain, Dyspnea	Laparoscopy	None
8	2017	Hiroki Ozawa	91	F	Vomiting	Laparoscopy	None
9	2018	Present Case	71	M	Regurgitation of food, Vomiting	Laparoscopic	None

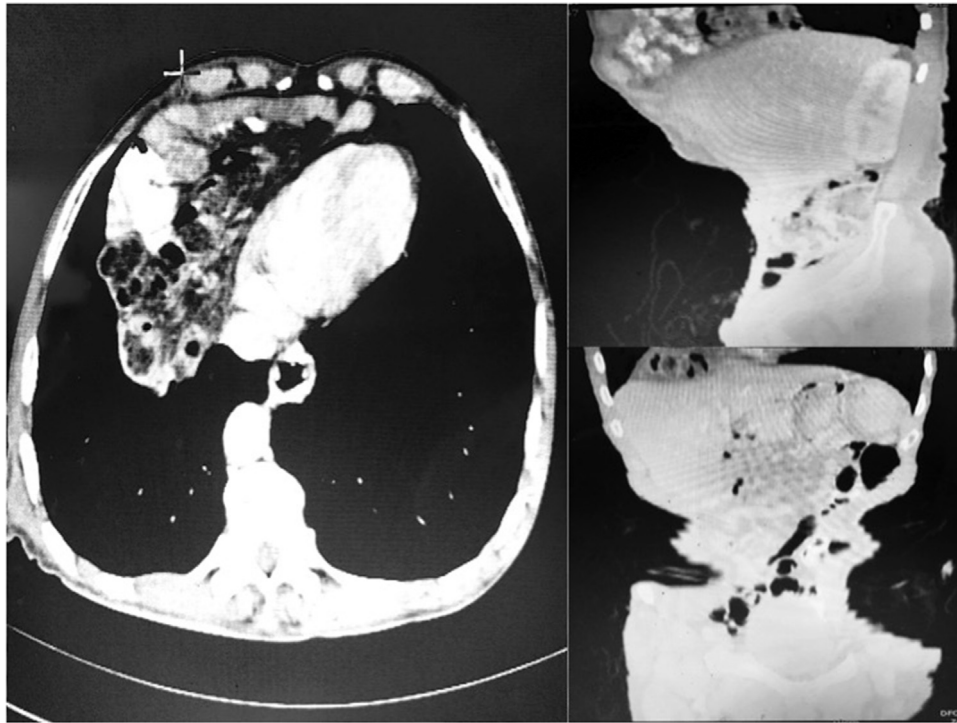


**Fig. 1.** Upper esophagogastroduodenoscopy showing proximal migration of Z line along with Hiatus Hernia [1A]. Chest X-Ray showing showed an air-fluid level with obscuration of right heart border [1B].

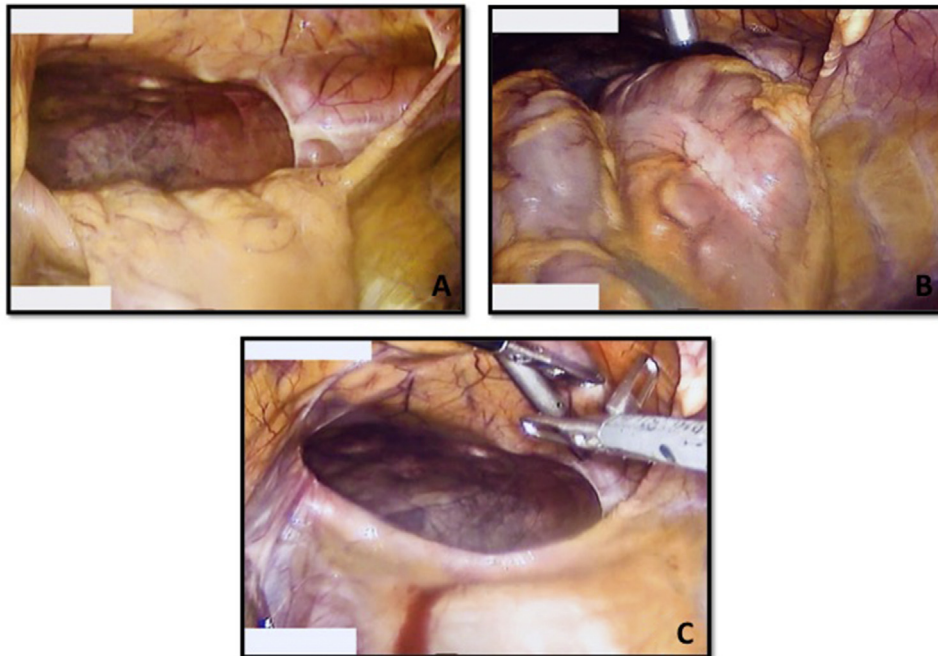
line with Grade III Hiatus Hernia (Fig. 1A). Chest X-ray showed an air-fluid level with obscuration of right heart border (Fig. 1B). A manometric examination revealed the average pressure of lower esophageal sphincter was ten mmHg.

CT demonstrated a significant 3.4cm defect in the anterior diaphragmatic wall, with herniation of bowel on the right side of the chest. The stomach is present on the left side with the anterosuperior displacement of the gastric antrum along with a grade III Para-esophageal hernia (Fig. 2). The Diagnosis of Morgagni Hernia, Para-esophageal Hernia (Grade III) with Organo-Axial Gastric volvulus was made based on the patient symptoms, clinical findings, imaging, and endoscopy results. Because of the patient's symptoms and possible severe complications caused by the two hernias, the decision was taken to go for mesh reinforcement, laparoscopic Hiatal reconstruction with fundoplication.

Before the elective surgery, the patient was started on Incentive Spirometry and administered antibiotic and VTE prophylaxis. Under general anesthesia in the Fowler position, with the surgeon (specializing in minimal access surgery) standing between the patient's legs, a laparoscopic approach was achieved. A Morgagni Hernia containing omentum, stomach and transverse colon was noticed (Fig. 3A, B). The contents were removed from the hernia sac relatively easily using two atraumatic graspers (Fig. 3C). We also found the gastric fundus herniated into the thoracic cavity at a diameter of about 5 cm (Fig. 4A). The stomach is pulled back into the abdominal cavity, and then the hiatus was reconstructed with interruptedly tied 2/0 Prolene sutures behind the esophagus after ensuring that the lower esophagus was at least 3 cm in length in the abdominal cavity (Fig. 4B). Mesh Reinforcement of the Hiatus defect with the bioabsorbable composite mesh. The gas-



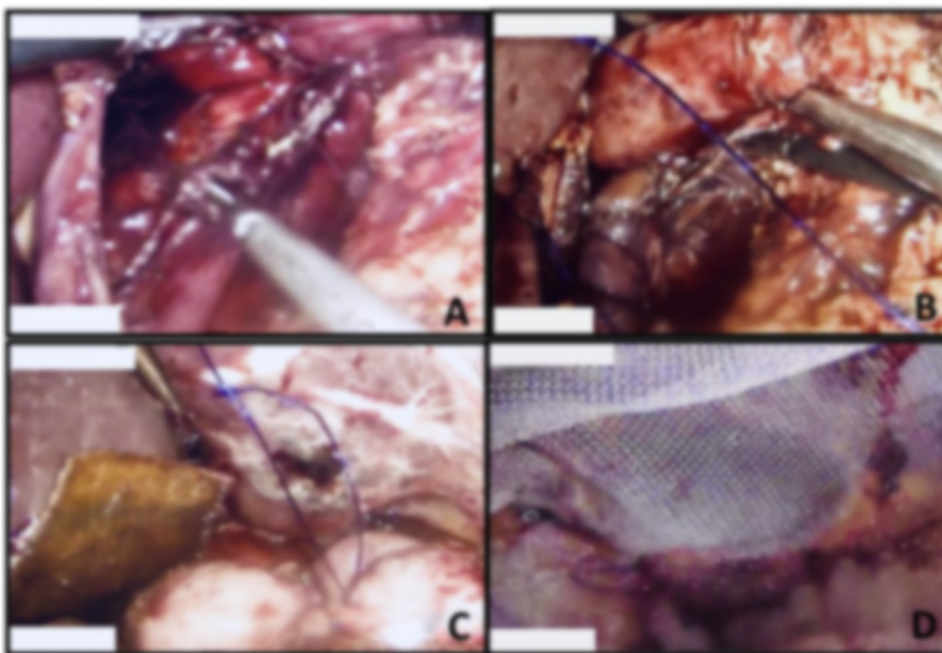
**Fig. 2.** CT (Axial, Coronal, Sagittal) showing a 3.4 cm Defect in the anterior diaphragmatic wall, with herniation of bowel loops on the right side of the chest along with a grade III Para-esophageal hernia.



**Fig. 3.** A Morgagni Hernia containing omentum, stomach and transverse colon was noticed [3A, 3B]. The contents were removed from the hernia sac relatively easily using two atraumatic graspers [3C].

trophrenic ligament mobilized, short gastric vessels ligated, and gastro-splenic ligament was cut to have an adequate Fundic wrap. The vagus nerves were recognized and preserved. Intra-operative esophagogastroduodenoscopy was performed to confirm that the dentate line was 3 cm below the hiatus. A 360° Nissen’s fundoplication was then performed to complete the Hiatal closure (Fig. 4C). The 3.4 cm Subcosto-sternal defect was too large to approximate using the trans-abdominal trans-fixation suture. Hence, the deci-

sion was taken to close the anterior diaphragmatic defect with the Polypropylene mesh. The mesh was fastened to the diaphragm with the help of tackers and interrupted sutures using Prolene 2/0, taking special precaution to avoid damage to the pericardium (Fig. 4D). The patient was kept Nil by mouth for three days after which he was resumed on a liquid diet advancing to soft food one week after the surgery. The patient reported a single port site infection, which required removal of the skin suture without any need of an antibi-



**Fig. 4.** Herniation of gastric fundus herniated into the thoracic cavity [4A]. Post Hiataloplasty [4B]. Mesh Reinforcement of the Hiatus defect along with 360° Nissen's fundoplication [4C]. The 3.4 cm Subcosto-sternal defect closed with the use of mesh, fastened to the diaphragm with the help of tackers and interrupted sutures using Prolene 2/0 [4D].



**Fig. 5.** Follow-Up Computed Tomography showed adequate repair of a diaphragmatic and Para-esophageal hernia without any evidence of herniation of Greater Omentum, stomach, and bowel.

otic [Clavien-Dindo classification Grade I]. The patient returned home eight days post operation on proton pump inhibitors medication. At one-month follow-up, the patient did not report any dysphagia, heartburn or symptoms related to reflux. The scars were normal without any pain. Follow-Up CT showed adequate repair of a diaphragmatic and Para-esophageal hernia without any evidence of herniation of Greater Omentum, stomach, and bowel (Fig. 5).

There were no gastric complaints at follow-up six months after discharge.

### 3. Discussion

The diaphragm begins formation in Cranio-caudal direction and muscular component in a dorsal to ventral orientation. Hence, the

anterior aspect of the Diaphragm is the last to develop. Any errors lead to congenital disabilities or weakness in the diaphragm [12].

Most of Morgagni hernias present in childhood. However, it is a rare clinical condition among adults making up 2–3% of cases without a well-described natural history [2,3]. The average age at presentation in adults was 58 years for the women and 50 years for the men. The anatomic distribution of Morgagni Hernia was found to be 91% for the right, 5% for the left, and 4% for bilateral cases. In a review of 298 cases by Horton et al. revealed only 28% patients were symptom-free at the time of presentation and 72% of patients presented with pain and pulmonary complaints usually related to the content of Hernia or pressure in the chest [13]. Rarely, bowel obstruction and bleeding could also happen. According to Minneci et al. the most common contents in the Morgagni hernia sac were omentum (94%), colon (58%), stomach (25%) and small bowel (17%) [14]. The most common diagnostic imaging used to evaluate patients with Morgagni Hernia is the Chest X-ray (93%). Other includes CT scan, contrast enema, upper GI study, Upper GI endoscopy, and MRI [13].

Surgical repair of Morgagni Hernia is indicated both in asymptomatic and symptomatic patients to avoid morbidity due to incarceration or ischemic changes of abdominal contents in the chest [3,13,14]. Laparoscopic surgery offers the best treatment outcome for patients with a diaphragmatic hernia, with short convalescence, fewer complications, and higher patient satisfaction, with no reported recurrences or deaths after laparoscopic repair. Management of the hernia sac is controversial, left in situ by some surgeons, while others believe resection of the Sac is safe and adhere more strictly to traditional surgical principles of hernia repair [13]. The preferred treatment is laparoscopic Mesh repair for repair of Morgagni Hernia. Achieving at least 1.5–2.5 cm overlap of the mesh is preferred. Till now, it has not been possible to demonstrate pre-clinically, or clinically, the superiority of one type of mesh over another [15]. Non-Absorbable Polypropylene mesh can be used to repair the defect, as 29% surgeons believe that round ligament, liver, and Greater Omentum provide ample protection for the bowel [16,17]. As the biological meshes are costly and do not have any significant advantages over the synthetic meshes, we chose to use Synthetic mesh [18–20]. Mesh can be fixed either with surgical tacks or laparoscopic suturing.

#### 4. Conclusions

This case aims to emphasize the importance of two forms of a hernia, which forms a very rare association. It highlights that even congenital abnormalities of the gastrointestinal tract may be asymptomatic until late in life and validates the feasibility of laparoscopic repair of both hernias simultaneously.

#### Conflict of interest

All authors declare that we have no conflict of interests.

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This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

#### Ethical approval

Institutional ethics committee exempted the approval required for clinical case report.

#### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Author contribution

AM managed the patient, performed primary literature review and drafted the manuscript. MP supported the operation, helped in the treatment and reviewed the literature. SB reviewed the manuscript and revised for content. ST supervised the case report. All authors have read and approved the final manuscript.

#### Guarantor

Amol Mittal.

#### References

- [1] A. Park, C. Doyle, Laparoscopic Morgagni hernia repair: how I do it, *J. Gastrointest. Surg.* 18 (2014) 1858–1862, <http://dx.doi.org/10.1007/s11605-014-2552-y>.
- [2] A. Eroğlu, I.C. Kürkçüoğlu, N. Karaoğlanoğlu, O. Yilmaz, Combination of paraesophageal hernia and Morgagni hernia in an old patient, *Dis. Esophagus Off. J. Int. Soc. Dis. Esophagus* 16 (2003) 151–153 (Accessed 12 February 2018) <http://www.ncbi.nlm.nih.gov/pubmed/12823218>.
- [3] E. Durak, S. Gur, A. Cokmez, K. Atahan, E. Zahtz, E. Tarcan, Laparoscopic repair of Morgagni hernia, *Hernia* 11 (2007) 265–270, <http://dx.doi.org/10.1007/s10029-006-0178-z>.
- [4] R.R. Lund, E.C. Crisler, B.P. Sammons, C. Gartenlaub, Simultaneous occurrence of subcostosternal (Morgagni) hernia and hiatus hernia, *Radiology* 70 (1958) 561–563, <http://dx.doi.org/10.1148/70.4.561>.
- [5] D.L. Ngaage, R.A. Young, M.E. Cowen, An unusual combination of diaphragmatic hernias in a patient presenting with the clinical features of restrictive pulmonary disease: report of a case, *Surg. Today* 31 (2001) 1079–1081, <http://dx.doi.org/10.1007/s595-001-8061-8>.
- [6] A. Cokmez, E. Durak, Laparoscopic repair of Morgagni hernia and paraesophageal hernia on the same patient, *Surg. Endosc.* 1 (2003) 1, <http://dx.doi.org/10.1007/s00464-002-4238-x>.
- [7] Z. Szentkereszty, G. Csáky, M.G. Boland, R. Weisz, L. Sasi-Szabó, E.M. Gamal, P. Sápy, Laparoscopic treatment of simultaneously occurring Morgagni and paraesophageal hernias, *J. Laparoendosc. Adv. Surg. Tech. A* 16 (2006) 626–628, <http://dx.doi.org/10.1089/lap.2006.16.626>.
- [8] Z.L. Zhou, H. Li, J.F. Li, Y.G. Liu, C. Wang, J. Wang, A rare case of laparoscopic repair of simultaneously occurring morgagni and paraesophageal hernias, *Ann. Thorac. Cardiovasc. Surg.* 22 (2016) 112–115, <http://dx.doi.org/10.5761/atcs.cr.15-00159>.
- [9] A. Bettini, J.G. Ulloa, H. Harris, Appendicitis within morgagni hernia and simultaneous paraesophageal hernia, *BMC Surg.* 15 (2015) 15, <http://dx.doi.org/10.1186/1471-2482-15-15>.
- [10] H. Ozawa, H. Shinozaki, M. Kimata, S. Ozawa, Case of giant paraesophageal hiatal hernia associated with Morgagni hernia, *Asian J. Endosc. Surg.* 11 (1) (2018) 43–46, <http://dx.doi.org/10.1111/ases.12398>, Epub 2017 Jun 30.
- [11] R.A. Agha, A.J. Fowler, A. Saeta, I. Barai, S. Rajmohan, D.P. Orgill, R. Afifi, R. Al-Ahmadi, J. Albrecht, A. Alsawadi, J. Aronson, M.H. Ather, M. Bashashati, S. Basu, P. Bradley, M. Chalkoo, B. Challacombe, T. Cross, L. Derbyshire, N. Farooq, J. Hoffman, H. Kadioglu, V. Kasivisvanathan, B. Kirshtein, R. Klappenbach, D. Laskin, D. Miguel, J. Milburn, S.R. Mousavi, O. Muensterer, J. Ngu, I. Nixon, A. Noureldin, B. Perakath, N. Raison, K. Raveendran, T. Sullivan, A. Thoma, M.A. Thorat, M. Valmasoni, S. Massarut, A. D'cruz, B. Vasudevan, S. Giordano, G. Roy, D. Healy, D. Machado-Aranda, B. Carroll, D. Rosin, The SCARE Statement: consensus-based surgical case report guidelines, *Int. J. Surg.* 34 (2016) 180–186, <http://dx.doi.org/10.1016/j.ijsu.2016.08.014>.
- [12] J.M. Swain, A. Klaus, S.R. Achem, R.A. Hinder, Congenital diaphragmatic hernia in adults, *Semin. Laparosc. Surg.* 8 (2001) 246–255 (Accessed 12 February 2018) <http://www.ncbi.nlm.nih.gov/pubmed/11813142>.
- [13] 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 (2008) 1413–1420, <http://dx.doi.org/10.1007/s00464-008-9754-x>.
- [14] P.C. Minneci, K.J. Deans, P. Kim, D.J. Mathisen, Foramen of Morgagni hernia: changes in diagnosis and treatment, *Ann. Thorac. Surg.* 77 (2004) 1956–1959, <http://dx.doi.org/10.1016/j.athoracsur.2003.12.028>.
- [15] A.C. Gasior, S.D. St. Peter, A review of patch options in the repair of congenital diaphragm defects, *Pediatr. Surg. Int.* 28 (2012) 327–333, <http://dx.doi.org/10.1007/s00383-012-3059-9>.
- [16] T. Nguyen, P.J. Eubanks, D. Nguyen, S.R. Klein, The laparoscopic approach for repair of morgagni hernias, *JSLJ Soc. Laparoendosc. Surg.* 2 (1998) 85

- (Accessed 12 February 2018) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3015255/>.
- [17] C.S. Ramachandran, V. Arora, Laparoscopic transabdominal repair of hernia of Morgagni-Larrey, *Surg. Laparosc. Endosc. Percutan. Tech.* 9 (1999) 358–361 (Accessed 12 February 2018) <http://www.ncbi.nlm.nih.gov/pubmed/10803399>.
- [18] E. Schmidt, A. Shaligram, J.F. Reynoso, V. Kothari, D. Oleynikov, Hiatal hernia repair with biologic mesh reinforcement reduces recurrence rate in small hiatal hernias, *Dis. Esophagus.* 27 (2014) 13–17, <http://dx.doi.org/10.1111/dote.12042>.
- [19] F. Köckerling, N.N. Alam, S.K. Narang, I.R. Daniels, N.J. Smart, Biological meshes for inguinal hernia repair – review of the literature, *Front. Surg.* 2 (2015) 48, <http://dx.doi.org/10.3389/fsurg.2015.00048>.
- [20] S. Huerta, A. Varshney, P.M. Patel, H.G. Mayo, E.H. Livingston, Biological mesh implants for abdominal hernia repair, *JAMA Surg.* 151 (2016) 374, <http://dx.doi.org/10.1001/jamasurg.2015.5234>.

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