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CASE REPORT

REVISED Case Report: Total intragastric mesh migration six years after diaphragmatic rupture and hiatal hernia surgery

[version 2; peer review: 2 approved]

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Abstract

Background

Mesh implementation to repair the hiatal space is already justified. Nevertheless, the use of this procedure is debated in regard of complications that may occur. Mesh erosion and migration are considered the most serious complications of mesh repairs.

Case presentation

It has not yet been well described in the literature. We describe a case of mesh erosion of stomach, many years later after a prosthetic repair of a diaphragmatic rupture associated to hiatal hernia, is presented here because of its rarity.

Conclusion




Few explanations have been put forward to explain this incident. Could it be due to inflammatory processes, or to the composition of the Meshes? As yet, there is no definitive explanation.

Keywords


diaphragmatic rupture, hiatal hernia, mesh repair, complications

Open Peer Review

Approval Status  

	1	2
version 2 (revision) 07 Mar 2025		 view
version 1 24 Jul 2023	 view	 view

1. **Ivan Romic**, University Hospital Centre
Zagreb, Zagreb, Croatia

2. **Nir Messer** , Cleveland Clinic Foundation,
Cleveland, USA

Any reports and responses or comments on the article can be found at the end of the article.

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Author roles: Sghaier A: Writing – Review & Editing; Elghali MA: Writing – Review & Editing; Daadoucha A: Visualization; Letaief A: Visualization; GHARBI I: Visualization; Hamila F: Writing – Review & Editing; Youssef S: Writing – Review & Editing

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REVISED Amendments from Version 1

A few revisions were introduced to improve the scientific quality of the manuscript in accordance with the reviewers' comments.

Any further responses from the reviewers can be found at the end of the article

Introduction

Delayed presentation of traumatic diaphragmatic rupture is a challenging diagnostic and treatment with necessity of mesh reinforcement.¹ Mesh repair can also be proposed for hiatal hernia.² Reduction of the hernial sac and repair of the defect using the insertion of the folds of the diaphragm were performed.

There are a few published observational studies supporting the use of mesh, convincing lower rates of recurrence with lack of long-term follow-up. Likewise, there are sparse published studies proving the complications associated with mesh in the long-term,³ which provided the importance for this case. Limited related complications of mesh in such localization have been described. We describe one case of late dysphagia due to intragastric mesh migration six year after surgical reparation for diaphragmatic rupture associated with hiatal hernia.

Case report

A 52-year-old white man, with history of epigastric pain and gastroesophageal reflux disease, was operated for mixt hiatal hernia (Type III). During the operation we found that it was a left diaphragmatic rupture with a large collar with gastric migration into the thorax. The diaphragmatic hernia is located 5 cm from a wide hiatus with a sliding hiatal hernia (Figure 1).

Intraperitoneal gastric reduction and Nissen fundoplication was performed. A two-face mesh 15×15 cm was put in place covering the orifice of the diaphragmatic rupture and the hiatal orifice by tying the esophagus (Figure 2). We used a two-sided polypropylene plate with one side adapted to the digestive tract and a rough parietal side. Fixation was performed by crown tacks. Post-operative course was simple. The patient required level I analgesics. Transit was restored after 24 hours. The patient described no complaints, particularly no dysphagia, and the physical examination was normal.

By interviewing the patient post-operatively, we discovered that the patient, who belongs to the forces of order. He was a security officer and he was a victim of an accident during a pursuit and was violently struck with the wheel of his car. He consulted as a matter of emergency and had an abdominal ultrasound and was put out with analgesic treatment.

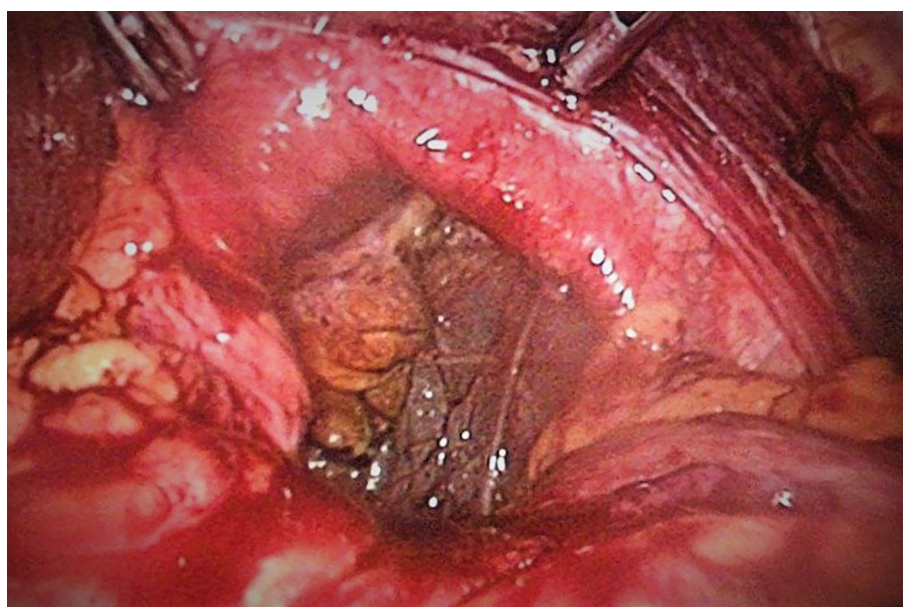


Figure 1. Diaphragmatic defect.

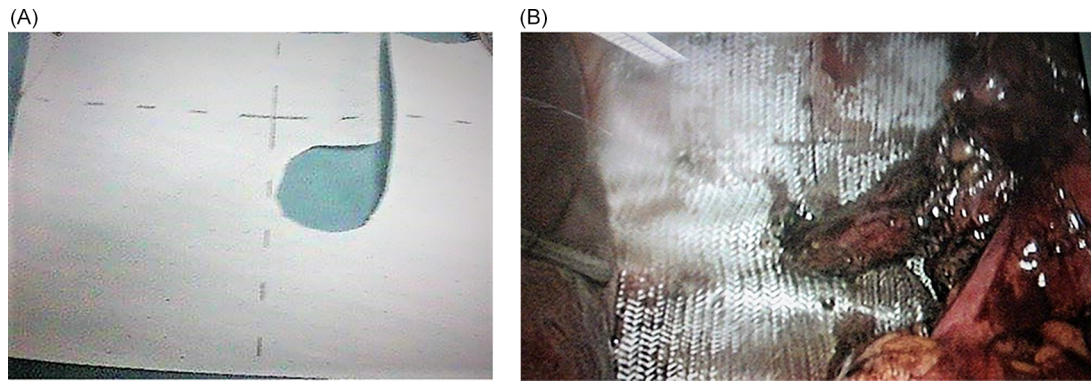


Figure 2. A: Plaque double face. B: Intraoperative view of mesh placement.

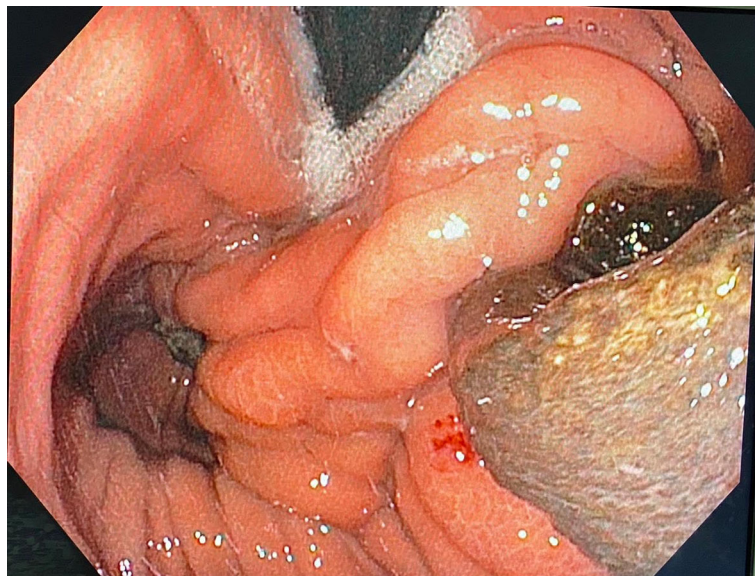


Figure 3. Endoscopic view of the mesh into stomach.

The patient remained asymptomatic for more than six years postoperatively. When, he had progressive complaints of dysphagia and weight loss. An upper gastro-intestinal endoscopy showed a dilated esophagus, crossed cardia easily without protrusion with evidence of anti-reflux montage and migration of mesh into the stomach. Pneumatic dilation of antireflux montage with a 30-mm balloon was performed (Figure 3).

An attempt at endoscopic removal of the mesh had failed. A magnetic resonance imaging examination had not described any signs in favor of a diaphragmatic defect.

The decision was then made to operate the patient laparoscopically and to remove the mesh.

The patient was operated on, the per operative exploration discovered the presence of several adhesions at the supra mesocolic level. There were several fibrous adhesions which were difficult to dissect. Attempts to access the supra-mesocolic floor and hiatal region were unsuccessful and not safe. Conversion to open surgery was mandatory. A longitudinal gastrotomy was carried out which made it possible to reveal the mesh that was inside and to extract it with the few staples that were attached (Figure 4).

The postoperative course was simple. The patient was discharged at day six.



Figure 4. Mesh after surgical extraction.

Discussion

Mesh repair is becoming increasingly necessary to manage large diaphragmatic rupture.⁴ But use of mesh at the hiatus is yet controversial because of possible complications that may occur.^{5–7} Recommendation with a fairly high level of evidence concerning indications of prosthetic mesh does not clearly developed. Many procedures were proposed. Tension-free procedure consist of mesh setting without tight suture to procure excessive tension whereas the on-lay technique with consolidation of the defect closure by mesh. The materiel could be placed in an anterior, posterior, or circular position with a hole for the passage of the esophagus.⁷

The mesh used for hiatal reinforcement are made usually of non-resorbable material. It should have a very low risk of post-operative adhesions, and can be easy to be manipulate proceeding by laparoscopic approach.

Polypropylene mesh seems to offer most of these requirements; however, it is susceptible to be responsible of intraperitoneal adhesions and also sometimes fistulas.⁸ Prosthetic reinforcement, though associated with a low rate of hernia recurrence, has particular drawbacks like this case of migration into stomach that we described in this article. Indeed, there are two considerable complications due to meshes: Parietal erosion and esophageal stenosis. The incidences of these two main complications ranged in literature between 0%–0.49%⁸ and 3.9%⁹ respectively depending on the series. However, surgical management is crucial to treat both conditions. A predisposition to esophageal stenosis succeeding the setting up of meshes produced by biological materials and toward parietal erosion after the use of polytetrafluoroethylene and polypropylene meshes has been developed by retrospective studies.¹⁰ Furthermore, stitches around a mesh placed above the fundoplication may be responsible of dysphagia, and contact of the mesh with the esophagus may leads to erosion, as illustrated in our case. Moreover, a surgical approach might provide a crucial role in decreasing the incidence of complications due to mesh.¹⁰ The techniques proposed for this purpose are tension-free repair with mesh placement without crus suturing to avoid excessive tension and the on-lay technique with reinforcement of the crucial closure by mesh. The on-lay technique is usually performed in all cases of hiatal hernia, independently of hernia size.¹¹

Further recent studies concluded that mesh might be associated with fewer short-term recurrences, and the biological mesh was involved with improved short-term quality of life. Nevertheless, these advantages were offset by more

dysphagia,¹² which is why most experienced practitioners recommend mesh use exclusively for carefully selected cases.¹³ For our patient we could not explain this intragastric migration of the Mesh. Would it be related to the fixation by the tackers and the nature of the Mesh? We do not have valid proof and explanations.

Conclusions

Our case, even though it is rare, demonstrates this, as we are led to re-operate a patient and to be faced with technical difficulties and often even a conversion to open surgery to retrieve the mesh that migrated inside the digestive tract. The mesh type may provide a role in the complication rate, with synthetic mesh being more implicated. The simultaneous co-existence of an intraperitoneal infection may also be responsible, although that must be proven by well-conducted studies and further controlled randomized trials.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Data availability

No data are associated with this article.

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Reviewer Report 12 March 2025

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Nir Messer 

Cleveland Clinic Foundation, Cleveland, USA

I have read the authors' responses and reviewed the updated version of the manuscript. The authors have made significant revisions in response to the feedback provided, and although there are still some imperfections, the manuscript has improved substantially. I believe that it now meets the requirements of the journal and is suitable for acceptance.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Abdominal Wall reconstruction, paraesophageal hernia repair, endocrine surgery, and general surgery.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 29 January 2024

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Nir Messer 

¹ Cleveland Clinic Foundation, Cleveland, USA

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Cleveland Clinic Foundation, Cleveland, USA

Total intragastric mesh migration six years after diaphragmatic rupture and hiatal hernia surgery

I value the opportunity to assess the study "Total intragastric mesh migration six years after diaphragmatic rupture and hiatal hernia surgery". The manuscript presents a case study involving mesh migration following diaphragmatic rupture and hiatal hernia repair with permanent mesh. I find this case to be interesting and challenging, and I would like to provide the following comments:

Case presentation

1. "A 52-year-old white man, with history of epigastric pain and gastroesophageal reflux disease, was operated for mixt hiatal hernia (Type III)". The presentation is confusing. The authors initially label the patient with type III paraesophageal hernia, yet later, it is characterized as a sliding hiatal hernia (type I). Kindly provide an accurate clarification regarding the suspected and confirmed diagnosis for the patient.
2. Please specify the preoperative diagnostic procedures employed for the patient.
3. "Intraperitoneal gastric reduction and Nissen fundoplication were performed". Was there concurrent hiatal hernia repair involving hernia sac reduction and crural reapproximation?
4. "A two-face mesh 15×15 cm was put". Kindly specify the precise type of mesh utilized in the procedure.

Discussion

1. "Polypropylene mesh seems to offer most of these requirements; however, it is susceptible to be responsible of intraperitoneal adhesions and also sometimes fistulas". Polypropylene mesh is generally not recommended for intraabdominal application unless it is coated with an anti-adhesive material, attributed to its elevated adhesion and bowel erosion characteristics.
2. "The techniques proposed for this purpose are tension-free repair with mesh placement without crus suturing to avoid excessive tension and the on-lay technique with reinforcement of the crucial closure by mesh. The on-lay technique is usually performed in all cases of hiatal hernia, independently of hernia size". As highlighted in numerous studies, the predominant method for para-esophageal hernia repair involves crural reapproximation, even when incorporating mesh. The term "on-lay technique" is inaccurately applied in this context.

"whereas the on-lay technique with the consolidation of the defect closure by mesh". This sentence lacks clarity. Additionally, the term "on-lay" is typically employed to describe mesh positioning in abdominal wall hernias, not diaphragmatic hernias.

General comments

1. The manuscript lacks clarity, requiring repeated readings for comprehension. Furthermore, authors utilize inappropriate surgical jargon for diaphragmatic hernia repairs and attempt to extrapolate motives from abdominal wall hernia repairs to diaphragmatic hernias, a mismatch that warrants attention.
2. The figures lack clarity and fail to enhance the comprehension of the presented case.

Is the background of the case's history and progression described in sufficient detail?

No

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

Partly

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

No

Is the case presented with sufficient detail to be useful for other practitioners?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Abdominal Wall reconstruction, paraesophageal hernia repair, endocrine surgery, and general surgery.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 16 Feb 2025

Asma SGHAIER

Detailed Response to Reviewers

Submission date: 16/02/2025

Dear Professor Nir Messer

Thank you for your letter and for the reviewers' comments concerning our manuscript. Thank you very much for your consideration, and we really appreciate the comments and have learned a lot. Appropriate changes were made according to the suggestions of reviewers and editor.

Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied comments carefully and have made correction which we hope meet with approval.

1-The investigations carried out preoperatively were in favour of a type III hernia, but intraoperatively it was more likely to be a type I hernia. Interpretations were performed by an expert medical staff. These lapses are to be expected and should not in any way be allowed to interfere with therapeutic management.

2-The preoperative diagnosis was based on endoscopic and CT scan findings, which are not the aim of this report.

3-reduction of the hernial sac and repair of the defect using the insertion of the folds of the diaphragm were performed.

We have made the required changes to improve the quality of our manuscript.

We would hope to provide you with a response to all your comments.

We express once again our sincere appreciation and deep gratitude to all the reviewers and to the editorial board for providing us with the opportunity to revise our manuscript and to improve the quality of our submission.

We hope, nevertheless, to receive positive feedback and acceptance of our work by allowing it to be published in this prestigious journal.

Sincerely
The corresponding author

Competing Interests: No competing interests were disclosed.

Reviewer Report 10 October 2023

<https://doi.org/10.5256/f1000research.152335.r205919>

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Ivan Romic

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Very interesting article on rare complication of hiatal hernia surgery. It provides details of diagnostic and management.

- I suggest to state what kind of MESH was used, which material and company.
- Also, reformulate 'belongs' to 'belonged'.
- "2. Our case, even though it is rare, demonstrates this, as we are led to re-operate a patient and to be faced with technical difficulties and often even a conversion to open surgery to retrieve the mesh that migrated inside the digestive tract." - this is unclear, reformulate.
- Please find and cite all articles on MESH migration. One of them is attached¹.

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Is the background of the case's history and progression described in sufficient detail?

Yes

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

Yes

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Yes

Is the case presented with sufficient detail to be useful for other practitioners?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Abdominal surgery, gastric surgery

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 16 Feb 2025

Asma SGHAIER

Detailed Response to Reviewers

Dear Professor Ivan Romic

Thank you for your letter and for the reviewers' comments concerning our manuscript. Thank you very much for your consideration, and we really appreciate the comments and have learned a lot. Appropriate changes were made according to the suggestions of reviewers and editor.

Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied comments carefully and have made correction which we hope meet with approval.

The MESH used is a polypropylene material with two faces, one water- resistant and the other water-repellent. we are under a moral obligation to refrain from using the brand name for ethical reasons and to avoid any conflict of interest.

There were several fibrous adhesions which were difficult to dissect. Attempts to access the

supra-mesocolic floor and hiatal region were unsuccessful and not safe. Conversion to open surgery was mandatory.

The necessary revisions were included in the manuscript

We express once again our sincere appreciation and deep gratitude to all the reviewers and to the editorial board for providing us with the opportunity to revise our manuscript and to improve the quality of our submission.

We hope, nevertheless, to receive positive feedback and acceptance of our work by allowing it to be published in this prestigious journal.

Sincerely
The corresponding author

Competing Interests: No competing interests were disclosed.

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