



## Case report

## Reversal of unstable atrial fibrillation after surgical correction of hiatus hernia: A case report

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## ABSTRACT

**Introduction:** The presence of Atrial Fibrillation (AF) with herniation of abdominal content through the esophageal hiatus can be explained by the compression of the cardiac tissue by the viscera and, consequently, of its electrical transmission network, compromising the correct propagation of stimuli.

Due to the causal relationship, hernia correction is almost always able to reverse the arrhythmic picture.

**Presentation of the case:** A 75-year-old male with atrial fibrillation with a large hiatal hernia causing clinical decompensation was successfully treated after a laparoscopic correction- primary closure of the defect was made with barbed surgical thread plus and placing a biological mesh (porcine small intestine submucosa, non-cross-linked), fixed with cyanoacrylate; after the procedure, he was discharged asymptomatic and with sinus heart rhythm.

**Discussion:** It is noticed that for cases in which the patient presents with a type IV hiatal hernia associated with atrial fibrillation, the laparoscopic correction of hernia using a mesh for the correction of the defect has good results in the literature.

In the present case, it is noted that despite the severity of the condition denoted by hemodynamic instability and the need for electrical cardioversion, the surgical correction of the hiatal hernia was able to reverse the arrhythmic picture definitively.

**Conclusion:** the concomitance of AF and hiatal hernia can explain the difficulty to control the arrhythmic picture and is necessary to consider, as soon as possible, the surgical correction of the defect as part of the treatment.

## 1. Introduction

The presence of Atrial Fibrillation (AF) in young patients with herniation of abdominal content through the esophageal hiatus is a common commemorative but not always explored by physicians. The concomitance of the pictures can be explained by the cardiac tissue's compression by the viscera and, consequently, of its electrical transmission network, compromising the correct propagation of stimuli.

Due to the causal relationship, hernia correction is usually able to reverse the arrhythmic picture. This article aimed to report the reversal of a chronic, severe, and unstable AF after laparoscopic correction of hiatus hernia, causing surgeons, cardiologists, and emergency specialists to consider surgical treatment as their choice in these conditions even

when unstable.

This case report has been reported in line with de SCARE criteria [1], and approved by the ethics committee of Oswaldo Cruz German Hospital, São Paulo, SP, Brazil (register: 45941821.1.0000.0070).

## 2. Case report

A 75-year-old male patient seeks the emergency department complaining of chest pain with irradiation to the abdominal region, which started 12 h before admission. He denied other associated symptoms and reported that the symptoms started after a stressful situation. He had a relevant morbid history of systemic arterial hypertension (SAH), congestive heart failure (CHF), chronic AF, and a history of left upper

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lobectomy for squamous cell carcinoma of the lung one year ago.

Due to comorbidities and cardiovascular risk, the first diagnostic hypothesis included cardiovascular emergencies, and it was necessary to discard them to continue the evaluation. Thus, general laboratory tests and an electrocardiogram, which showed a rhythm compatible with AF, were requested. An angiogram was also performed, ruling out aortic dissection but showing a massive diaphragmatic hernia with a 6.0 cm neck and herniation of the gastric body to the left hemithorax (Fig. 1). In the meantime, the patient evolved with hemodynamic instability. It was necessary to perform electrical cardioversion and hospitalization with intensive support since the arrhythmia was maintained. Full anticoagulation and amiodarone were prescribed.

After stabilizing clinical signs, upper digestive Endoscopy (UDE) was performed, which showed a large hiatal hernia not reducible on examination, without signs of gastric mucosa ischemia. An esophagus stomach duodenogram (ESD) was requested to elucidate the clinical picture better, showing tertiary waves and delay of gastric emptying (Fig. 2). Thus, the clinical assistant team suspected that diaphragmatic hernia was the common etiology of the clinical decompensation. So, the general surgery team was requested for an evaluation.

After surgical risk evaluation, the surgical team opted for laparoscopic surgery to correct the hernia. Intraoperatively, a diaphragmatic hernia was evidenced with approximately 10 cm and herniation of 2/3 of the stomach (body and bottom), omentum, and spleen (Fig. 3A). Adhesion lysis and reduction of hernial content were performed, then primary closure of the defect was made with barbed surgical thread. It was chosen to place a biological mesh, fixed with cyanoacrylate, due to the dimensions of the hernial neck (Fig. 3B). In the immediate post-operative period, still in the operating room, the patient evolved with a new episode of AF, reverted with electrical cardioversion.

During postoperative follow-up, the patient remained under intensive care, with no evidence of hernia recurrence, with a satisfactory evolution, with no new episodes of AF or desaturation. He was discharged ten days after the surgical procedure, asymptomatic and with sinus heart rhythm.

After a six months follow-up a new tomography shows no signs of recurrence, and no evidence of new episodes of atrial fibrillation in the

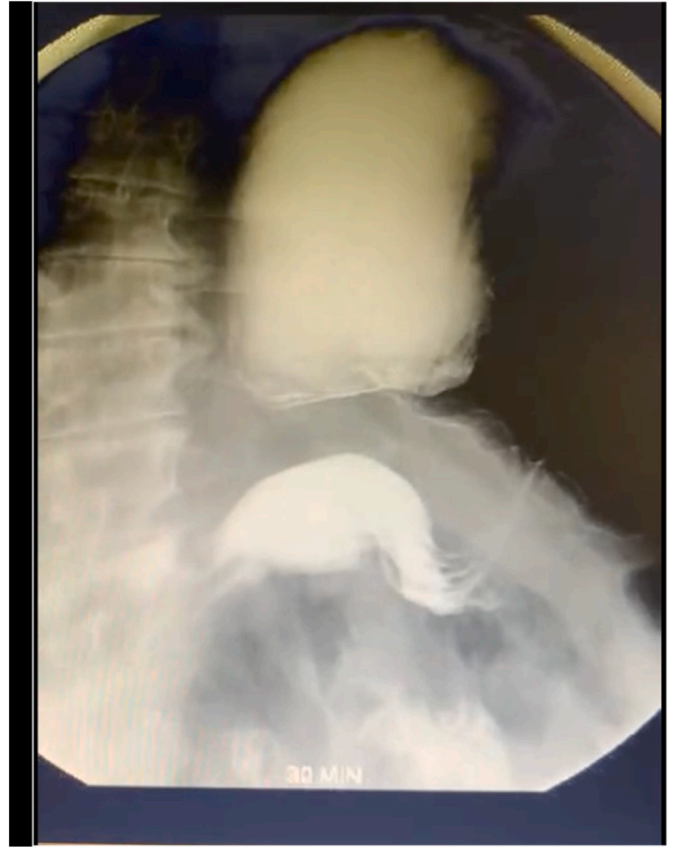


Fig. 2. esophagus stomach duodenogram (ESD): delay of gastric emptying.

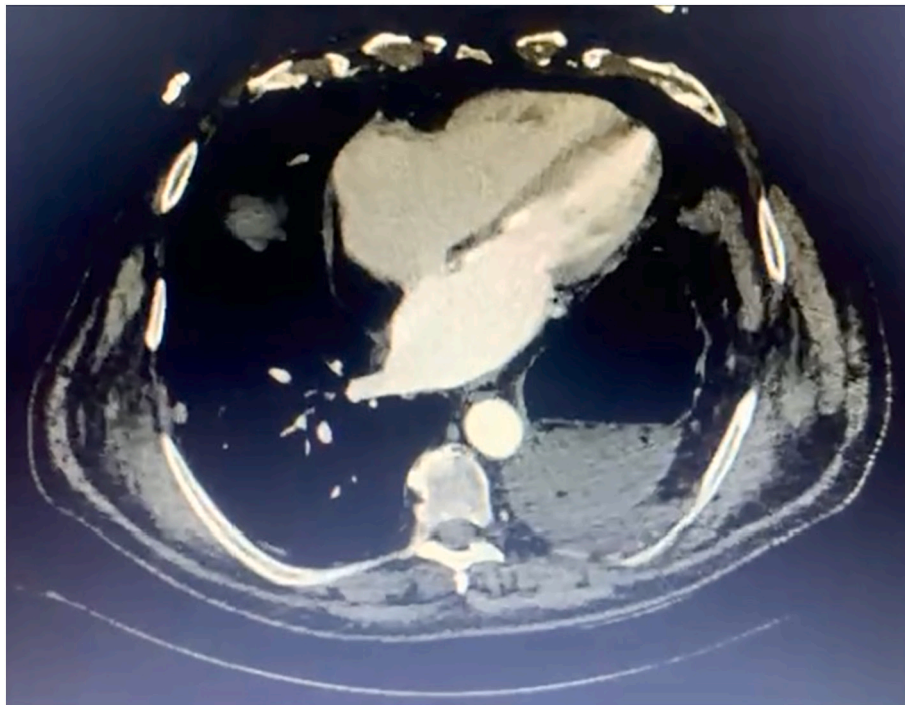
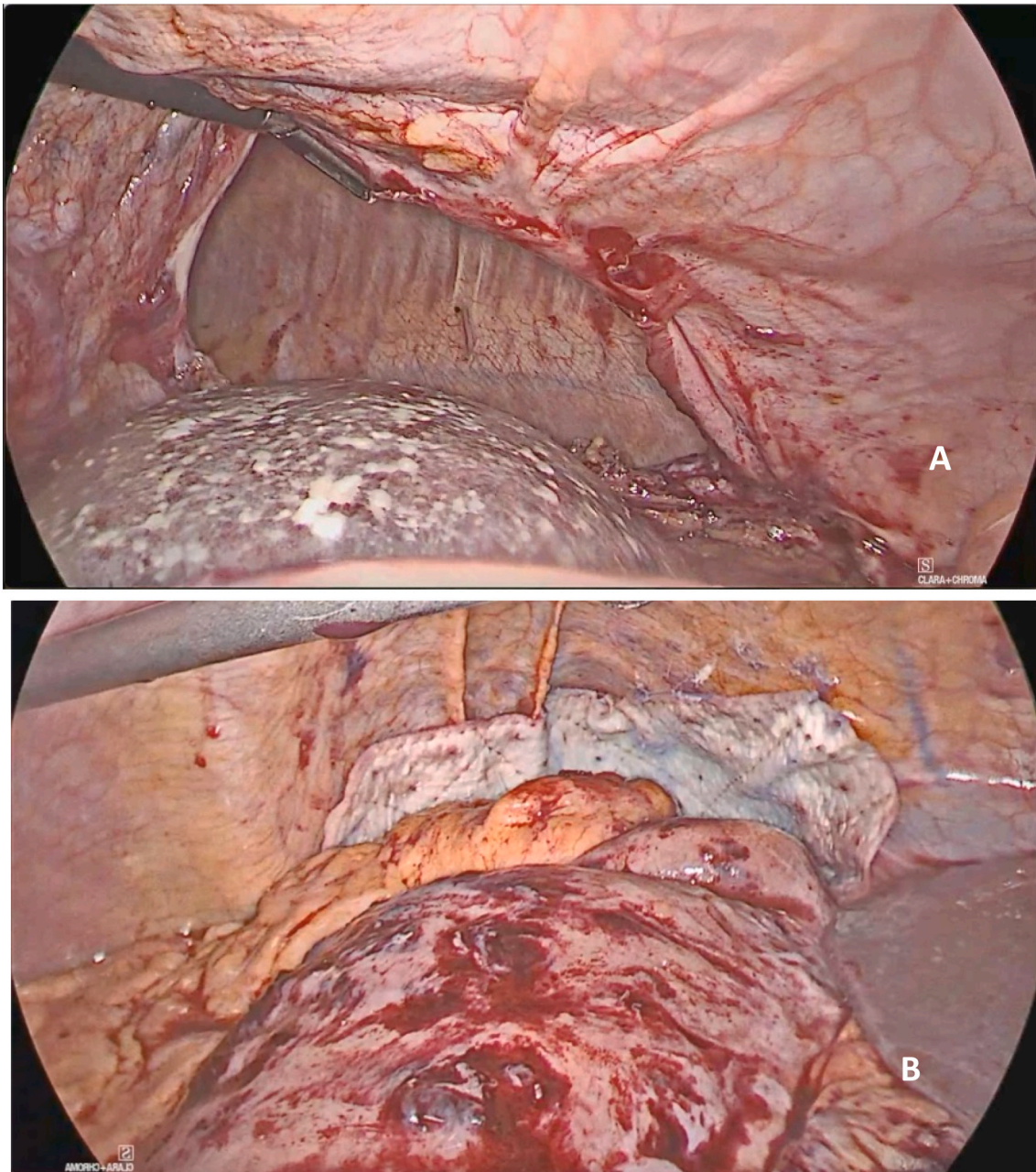


Fig. 1. angiotomography showing a massive diaphragmatic hernia with a 6.0 cm neck and herniation of the gastric body to the left hemithorax.



**Fig. 3.** intraoperative images: A) diaphragmatic hernia was evidenced with approximately 10 cm B) primary closure of the defect was made with barbed surgical and a biological mesh in place.

past year (Fig. 4).

### 3. Discussion

Hiatus hernia (HH) is a relatively frequent condition in the general population. It is caused by increased intra-abdominal pressure, which leads to protrusion of the stomach and other abdominal viscera in the mediastinum [2,3]. Overweight and elderly are the main risk factors for its development [4,5]. Other known risk factors include multiple pregnancies, previous esophageal surgery history, partial or total gastrectomy, and some skeletal system diseases associated with bone decalcification [3].

Currently, hiatus hernias are classified into four types [6], which mainly guide the approach of surgical treatment:

- Type I or sliding hernias - associated with symmetrical rise of the stomach through the diaphragmatic dome. Type I hernias represent

more than 90% of cases of hiatus hernia and are known for their frequent association with GERD. They are also associated with more severe degrees of Barrett's esophagus and esophagitis.

- Type II hernias or pure paraesophageal hernias (PEH) - a section of the gastric fundus herniates through the diaphragmatic hiatus adjacent to the esophagus, while the gastroesophageal junction remains in its usual anatomical position.

- Type III hernias, which are a combination of types I and II, when both the bottom and the esophagogastric junction are herniated through the hiatus. The gastric fundus is above the gastroesophageal joint.

- Type IV hernias consist on a different structure of the stomach herniating through the thoracic cavity (small intestine, colon, omentum, peritoneum, or spleen) – a type presented by the patient in question.

Types II-IV are called paraesophageal hernias (PEH); their main clinical importance is due to their potential for ischemia, obstruction, or volition [7].

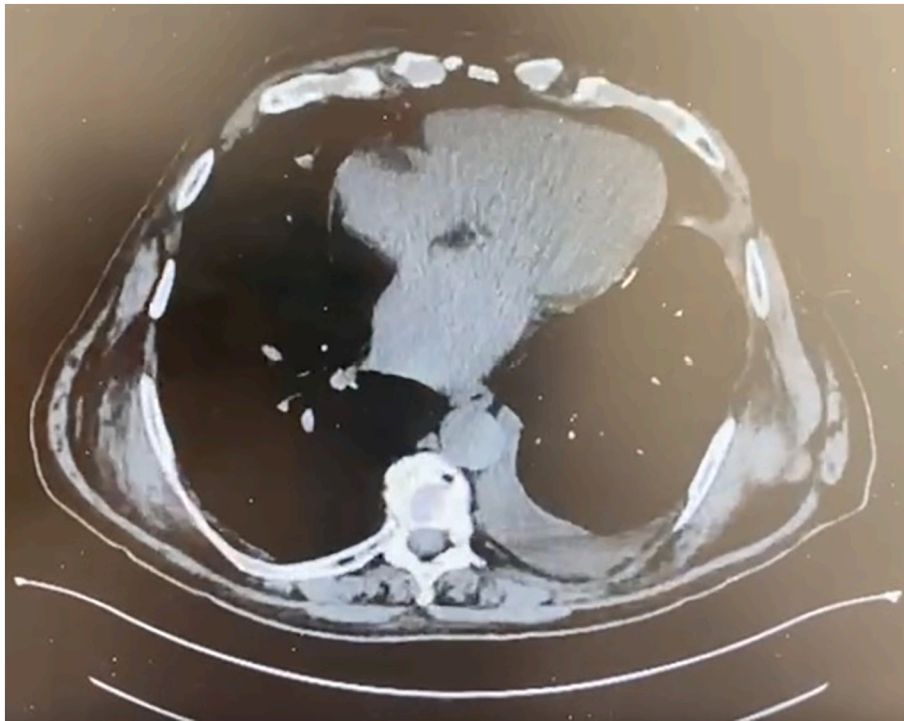


Fig. 4. tomography, after 6 months of follow-up, shows no signs of recurrence.

To obtain an accurate diagnosis of the type of hiatus hernia that the patient presents, we have several complementary tests, among them [2]:

- ESD
- UDE
- Manometry
- pHmetry

- CT scan: This test is especially important in type IV hernias, such as presented by the patient. This because it is the only test able to show the presence of gastric volume, identify herniated structures and signs of complication, such as the presence of pneumoperitoneum or pneumomediastinum [8].

Regardless of the type of the hernia, when the patient has an indication for surgical correction, the laparoscopic approach has gained more space in the surgeon's therapeutic arsenal [9]. The use of a mesh in the correction of hernia, according to Köckerling et al., is necessary in about 20% of cases of type I hiatal hernia, without a major change in this percentage between 2013 and 2019. In relation to hernias types II to IV, the use of meshes increased from 33% to 38.9% of cases [10].

The most feared non-ischemic complication in patients with type IV hernias is the development of atrial fibrillation resulting from compression of cardiac structures by bulky herniated content. According to Roy et al., atrial fibrillation is considerably more frequent in patients with type IV hiatal hernia, especially in young patients (<55 years) [11]. It is noticed that for cases in which the patient presents with a type IV hiatal hernia associated with atrial fibrillation, the laparoscopic correction of hernia associated with the use of a mesh for the correction of the defect presents international scientific basis, with good results available in the literature.

#### 4. Conclusion

In the present case, it is noted that despite the severity of the condition denoted by hemodynamic instability and the need for electrical cardioversion, the surgical correction of the hiatal hernia was able to reverse the arrhythmic picture definitively. Thus, it is extremely important that both physicians who are dedicated to the clinical and emergency management of AF, as well as surgeons, specialized in hernia

correction, pay attention to the concomitance of clinical presentations and consider, as soon as possible, the surgical correction of the defect as the first-line treatment.

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#### Ethics approval

this case report was approved by the ethics committee of Oswaldo Cruz German Hospital, São Paulo, SP, Brazil (register:45941821.1.0000.0070).

#### Informed consent

informed consent was obtained from the patient.

#### Guarantor

João P V Carvalho

#### CRediT authorship contribution statement

João P V Carvalho, conceptualization, Validation, Writing - Original Draft; Pedro H F Amaral: Methodology, Validation; Eduardo R M Dias, Formal analysis, Data Curation; Marcelo Lopes Furtado, Formal analysis, Data Curation; Pedro de Souza Lucarrelli: Formal analysis, Methodology; Sergio Roll, Writing - Review & Editing, Supervision, Project administration; Luca G A Pivetta, Methodology, Writing - Review & Editing.

#### Declaration of competing interest

No conflicts of interest relevant to this article.

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