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Case Report

Diagnostic challenges of hiatal hernia Type IV: An imaging perspective ☆

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ABSTRACT

Type IV hiatal hernia is a mixed type of hiatal hernia characterized by the herniation of visceral organs other than the stomach into the mediastinum. It is the least common type of hiatal hernia. We report a case of a 4-month-old male infant who presented with shortness of breath and persistent vomiting. Initial chest X-ray suggested a mediastinal mass, but further evaluation with chest computed tomography (CT) scan revealed herniation of the stomach and duodenum through the hiatal oesophagus into the thoracic cavity. Radiological imaging was crucial in confirming the diagnosis of hiatal hernia.

Introduction

A hiatal hernia occurs when elements of the abdominal cavity protrude into the mediastinum through the hiatal oesophagus of the diaphragm. Pathologically, hiatal hernias are commonly divided into 4 types. Type I, known as a sliding hernia, is the most frequent type, accounting for about 95% of cases. The other types, which are type II, III, and IV (also known as rolling hernias or paraoesophageal hernias), comprise only about 5% to 15% of cases, with Type IV being the rarest [1,2].

Patients with a hiatal hernia may be asymptomatic or present with a spectrum of symptoms. Common clinical signs include weight loss, loss of appetite, cough, and mild shortness of breath. However, in rare cases, patients may also present with intractable vomiting [3].

The diagnosis of a hiatal hernia can be challenging due to the anatomical changes of the esophagogastric junction during swallowing, respiration, and movement. Therefore, radiological examination, particularly chest CT scan, is essential to provide a clearer anatomical picture [1,2].

Case presentation

A 4-month-old male infant was brought to the emergency room with complaints of fever, persistent cough for 1 week,

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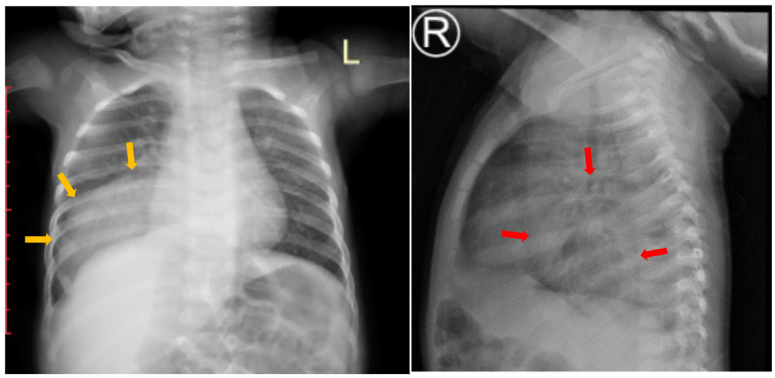

Fig. 1 – Frontal and lateral chest radiograph shows a well-defined, homogeneous radiopaque mass (yellow arrow) with an obtuse angle in the right paracardial area, located posterior to the heart (red arrow).

and continuous vomiting, which made weight gain difficult. The infant had a history of shortness of breath since the age of 1 month and had been treated twice at a peripheral health care facility for pneumonia. One month prior, a pediatrician had diagnosed the patient with a mediastinal mass based on a chest radiograph.

The initial frontal chest radiograph showed a well-defined, homogeneous radiopaque mass in the right mediastinum, with an obtuse angle in the right paracardial area. The lateral projection confirmed that the mass was located posterior to the heart, pushing the heart anteriorly (Fig. 1).

Chest CT scan showed herniation of the stomach and duodenum, surrounded by a hernia sac, into the right mid to lower hemithorax through the oesophageal hiatus, measuring approximately 3.33 × 3.87 cm. This herniation compresses the inferior lobe of the right lung and pushes the heart anteriorly. CT images also reveal oesophageal shortening (Figs. 2 and 3), consolidation in the right upper lobe consistent with compressive atelectasis (Fig. 4), and a right pleural effusion, estimated at ±100 cc, was incidentally found (Fig. 5).

Discussion

Hiatal hernia is a common pathological condition [4]. Among the different types, Type IV is considered the rarest. The Society of American Gastrointestinal and Endoscopic Surgeons reported that Type I hiatal hernia (sliding hernia) is the most common, accounting for approximately 95% of cases, with types II, III, and IV, considered to be the true paraoesophageal hernias, constituting the remaining 5% [1,2]. The incidence of type I hiatal hernia is around 59%, type II is 36%, type III is 4.2%, and Type IV is 0.4%. The pathomechanism behind Type IV hiatal hernia involves the progressive enlargement of the oesophageal hiatal and a defect in the phrenooesophageal membrane, allowing other abdominal organs to be displaced above the diaphragm. The presence of organs other than the stomach within the hernia sac is even rarer [1,2,5,6].

Hiatal hernia is often overlooked, as many cases are asymptomatic. However, Kamil et al. found that types II, III, and IV can present with respiratory impairment or cardiac involvement due to direct compression, as well as dysphagia

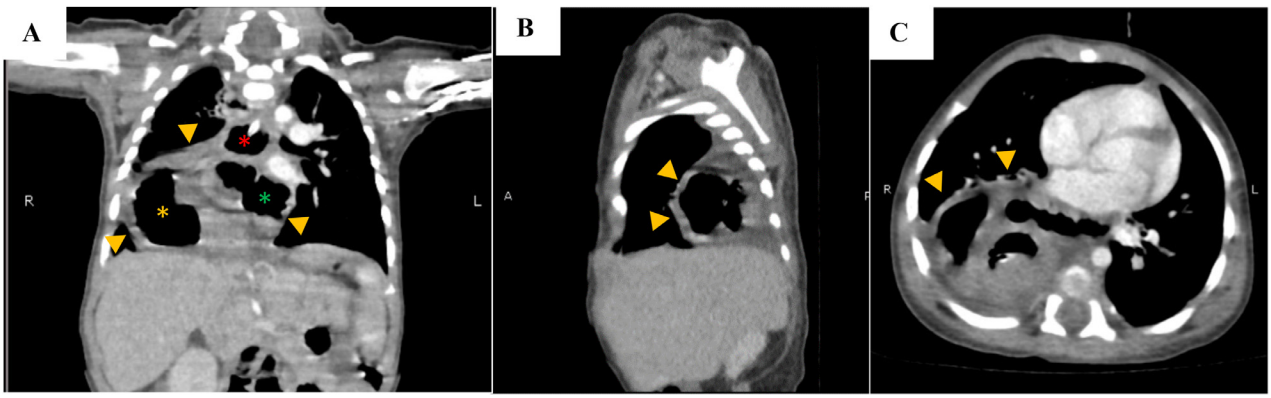

Fig. 2 – Mediastinal window chest CT shows a Type IV hiatal hernia. Coronal (A), sagittal (B), and axial (C) reconstructions all shows the hernial sac (yellow arrowhead). Coronal (A) and axial (C) views also show the short oesophagus (red star), stomach (yellow star), and duodenum (green star).

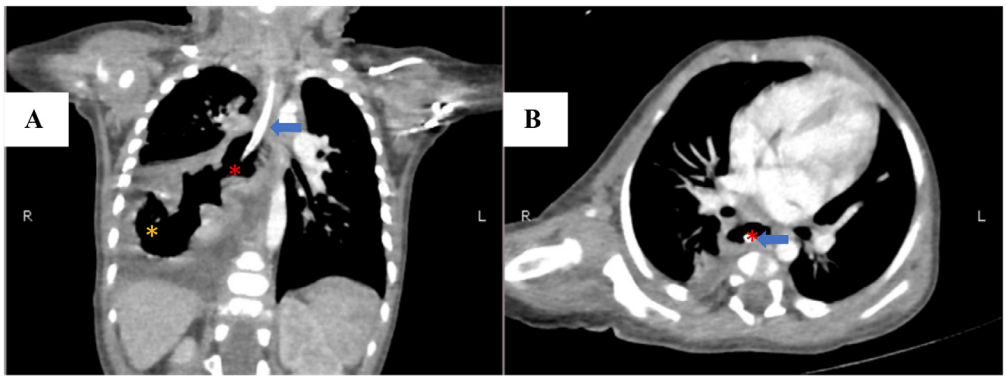

Fig. 3 – Coronal (A) and axial (B) mediastinal window chest CT show the nasogastric tube (blue arrow) in the oesophagus (red star) entering the stomach (yellow star), with widening of the gastrooesophageal junction.

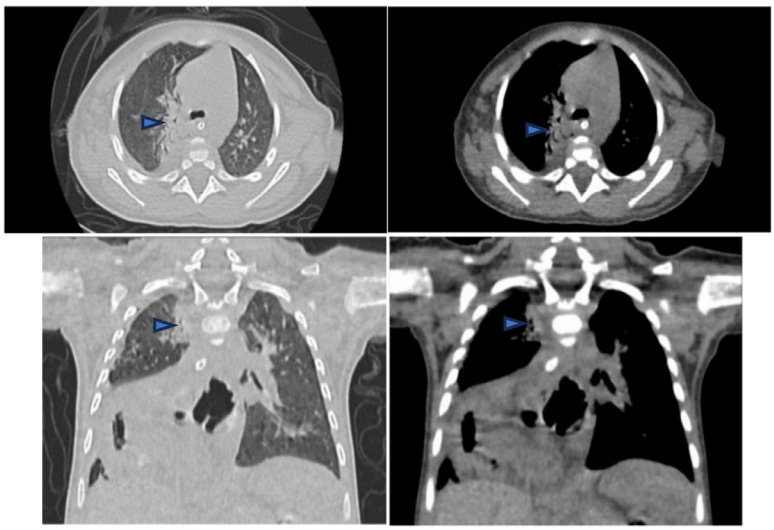

Fig. 4 – Axial and coronal views in lung and mediastinal window show consolidation (blue arrowhead), consistent with compressive atelectasis.

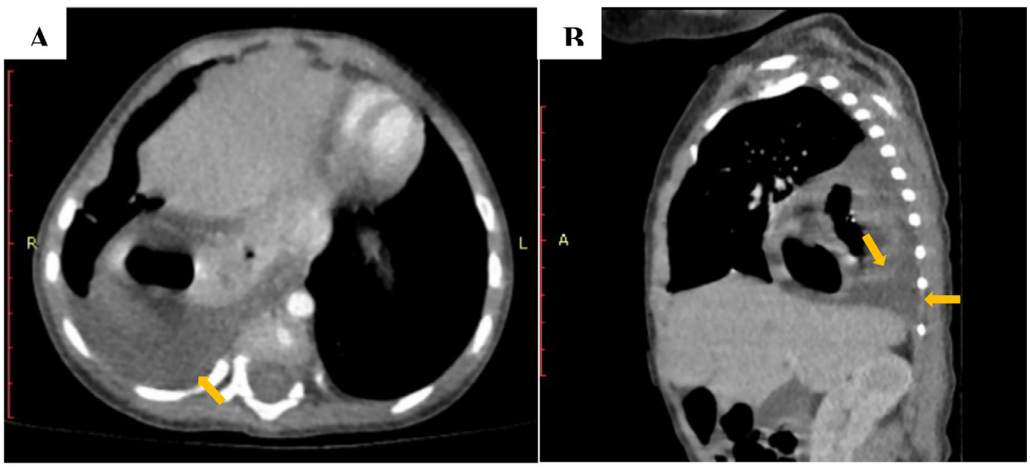

Fig. 5 – Axial (A) and sagittal (B) chest CT scans show right pleural effusion (yellow arrow).

due to gastroesophageal reflux. Özturk et al. reported a case of a paraesophageal hiatal hernia in a 2-month-old infant with vomiting and decreased respiratory sounds at the right lung base [7]. In the present case, the patient presented with shortness of breath and persistent vomiting. Studies have shown that patients diagnosed with hiatal hernia are likely to exhibit GERD symptoms (50% to 94%), with reflux being the most common finding, followed by mechanical symptoms (59%) such as nausea, vomiting, postprandial pain, early satiety, and retching [7,8].

Pleural effusion, the accumulation of fluid in the pleural space, is not commonly associated with hiatal hernia. However, in rare cases, complications arising from a hiatal hernia may lead to pleural effusion due to inflammation and pressure from the herniated tissue. Chronic acid reflux may also cause micro-aspiration of stomach contents, leading to pleural effusion. In our case, a rare presentation of right pleural effusion was observed [8].

Accurate diagnosis of the type and location of hernia is essential. A plain chest radiograph with an upper gastrointestinal (GI) series is sufficient to define the type of hernia. The border between the heart, gastric cavity, and diaphragmatic hiatus can usually be identified using a computed tomography (CT) scan [9]. Upper GI series of hiatal hernia are typically characterized by the "B" ring or mucosal ring that corresponds with the squamocolumnar junction (SCJ) separation and a diaphragmatic indentation greater than 2 cm. In most cases, the herniated region and organs can be visualized. If there is a possibility of intestinal obstruction or strangulation, segments of the bowel may appear dilated with air-fluid levels in the abdomen and chest. CT plays a role in visualizing herniated organs and locating region within the thorax. The challenges in CT imaging include assessing the integrity of the diaphragm at the costal attachment, occult hernias, and the diaphragm dome. Sensitivity can be significantly increased with 3D reformatted images, sagittal multislice CT, and coronal images. CT imaging with oral contrast can visualize the gastrooesophageal junction or the displacement of gastric fundus in hiatal hernias, especially with the addition of a Valsalva manoeuvre, although it was not performed in this study. Epiphrenic oesophageal diverticulum, gastric pull-up surgery performed for oesophageal tumors, and retrocardiac lung abscess should be considered as differential diagnoses of hiatal hernia on CT-Scan. There is no standardized protocol regarding whether imaging should be performed in supine or upright position, leading to inconsistent diagnosis of hiatal hernia. Larger hiatal hernias are easier to diagnose, while smaller ones are often misdiagnosed [2,10]. Accurate assessment is crucial for identifying hiatal hernia. Ayyildiz et al. [2] stated that CT-Scan is the most effective method for diagnosing a hernia due to its ease of use and short acquisition time.

The management of hiatal hernia can be challenging, primarily due to the lack of a consensus on treatment principles and indications. Dr Mattioli discusses 3 important aspects of hiatal hernia treatment: the shortened oesophagus, the definition of a 'giant' hiatal hernia, and the clinical significance of recurrent small hiatal hernias. Most oesophagi appear short on preoperative imaging are actually of normal length. Therefore, it is helpful to evaluate the oesophagus' length in the operating theatre. Symptomatic hernias that are unresponsive to medical therapy, such as Type IV hiatal hernias, should be managed surgically. Recurrences of hiatal hernias are common, with approximately 50% of hiatal hernias recurring after surgical repair. Careful consideration of the size and risk factors is necessary when planning hiatal hernia intervention [7,11–13].

Conclusion

Hiatal hernia is often overlooked or underdiagnosed by primary care physicians. Accurate diagnosis based on radiographic findings is crucial for proper management. Radiological assessment is essential for confirming the diagnosis of hiatal hernia. While a chest CT scan is useful for determining the type of hiatal hernia, in peripheral health care facilities with limited resources, conventional radiograph, including chest and abdominal radiograph, supported by upper GI series examination is often sufficient for diagnosis.

Patient consent

I confirm that written informed consent for the publication of this case report has been obtained from the patient.

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