Case report / *Prikaz primera*

Tension gastrothorax, a threatening complication of diaphragmatic hernia: a case report

Tenzijski gastrotoraks, grozeč zaplet diafragmalne hernije: prikaz primera

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***Ključne besede**: šok, diafragmalna kila, črevesna obstrukcija, dihalna odpoved*

ABSTRACT

Tension gastrothorax is a rare potentially life-threatening condition where air and fluid gradually fill the stomach herniated through a previous diaphragmatic defect. It is a mimicker of tension pneumothorax. We present a case of a 68-year-old male patient with a history of large hiatal hernia presenting with non-traumatic tension gastrothorax who developed shock and required intensive care despite the initial unremarkable physical examination. A fast and correct early diagnosis and decompression of the stomach is crucial in these patients, preventing further complications and a virtuous cycle of obstructive shock, respiratory failure and bowel obstruction.

IZVLEČEK

Tenzijski gastrotoraks je redko, potencialno smrtno nevarno stanje, pri katerem z zrakom in tekočino napolnjen želodec skozi diafragmalno hernio povzroči tenzijski pnevmotoraks. Predstavljamo primer 68-letnega moškega, pacienta z anamnezo velike hiatalne kile z netravmatskim tenzijskim gastrotoraksom, ki je razvil šok, kar je zahtevalo intenzivno nego kljub začetnemu nepomembnemu fizičnemu pregledu. Pri teh bolnikih je ključnega pomena hitra in pravilna zgodnja diagnoza ter dekompresija želodca, ki preprečuje nadaljnje zaplete in uspešen cikel obstruktivnega šoka, odpovedi dihanja in črevesne obstrukcije.

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INTRODUCTION

Hiatal hernia is a common gastroenterological diagnosis with a prevalence of up to 10% in the general population. Patients can be either asymptomatic or present with a range of dyspeptic symptoms and are at higher risk of developing gastroesophageal reflux disease (1). Defects in the diaphragm might also be of congenital aetiology or grow as a result of trauma, mostly due to motor vehicle accidents (2, 3). A rare complication of the herniation of abdominal contents into the thoracic cavity can mimic tension pneumothorax by compressing the large vessels, heart and lungs, thus leading to respiratory distress and obstructive shock. In a case report of a patient with a post-traumatic rupture of the diaphragm in 1984, this condition was first described as tension gastrothorax (2).

CASE REPORT

A 68-year-old male patient with known hiatal hernia, Barrett's oesophagus, Type 2 diabetes and coronary artery atherosclerosis presented to the Internal Medicine Emergency Room with melena and hematemesis. He has vomited black-coloured liquid at least twenty times and reported black stool at least six times since that previous day. He saw his primary care physician two days beforehand because of his dizziness and general weakness that had been persistent for the past two months. He felt particularly weak in the mornings and was dyspnoeic while walking.

His past medical history revealed that he had been visiting the gastroenterologist for the past seven years because of his known large hiatal hernia and Barrett's oesophagus. He had his last esophagogastroduodenoscopy (EGDS) done 2 years before which revealed a persistent large hiatal hernia with a large part of the stomach above the diaphragm. He was recommended a visit to the thoracic surgeon for a hiatal hernia repair and an EGDS after 6 months at the University Medical Centre for possible ablation of Barrett's oesophagus. The patient did not undergo the recommended examinations.

The initial physical examination in the ER revealed a slightly elevated BP of 149/96 mmHg and blood oxygen saturation of 90%. He looked tired but was eupnoeic, breath sounds were symmetrically heard bilaterally and he reported only mild pain in deep palpation of the stomach on his left side. In the initial laboratory results taken in the ER, he had a low serum haemoglobin level of 90 g/l (reference levels 130–170 g/l) with a low haematocrit and MCV. Other results were unremarkable. He was admitted to the gastroenterology ward for further diagnosis. On the second day of the hospitalisation, he developed shock with respiratory failure, hypotension and acute kidney injury. The initial arterial blood gas (ABG) results showed respiratory alkalosis with hypoxemia and elevated lactate levels of 11.2 mmol/l (ref. < 1,8 mmol/l) on 3 litres of supplemental oxygen. He was transferred to the ICU, where he required non-invasive positive-pressure ventilation and vasopressors. CT of the abdomen and thorax with contrast (Figures 1 and 2) revealed a large paraesophageal hiatal hernia with an extremely dilated stomach and oesophagus, taking up to two-thirds of the left hemithorax. The left inferior lung lobe was atelectatic. A high mechanical bowel obstruction was present on the level of the pylorus, most likely due to the compression from the distended stomach. A diagnosis of tension gastrothorax was determined. We performed emergent EGDS, through which we drained roughly 3,5 litres of fluid from the distended stomach. Immediately after the procedure, his symptoms were relieved. We prescribed empirical antibiotic therapy due to the aspiration pneumonia he developed and later moved him from the ICU back to the gastroenterology ward. There, he started consuming regular meals without further issues. He was put on the priority waiting list for a procedure with a thoracic surgeon for a definitive hernia repair. Later that same day, eight days after the presentation, while walking in the hall with a physiotherapist, he went into cardiac arrest and more than 30 minutes of CPR proved unsuccessful. It was later determined that the cause of death was a massive pulmonary embolism.

Figure 1. CT thorax with contrast taken on day 2. On the right is a large fluid-filled stomach filling the left hemithorax, in level with the heart

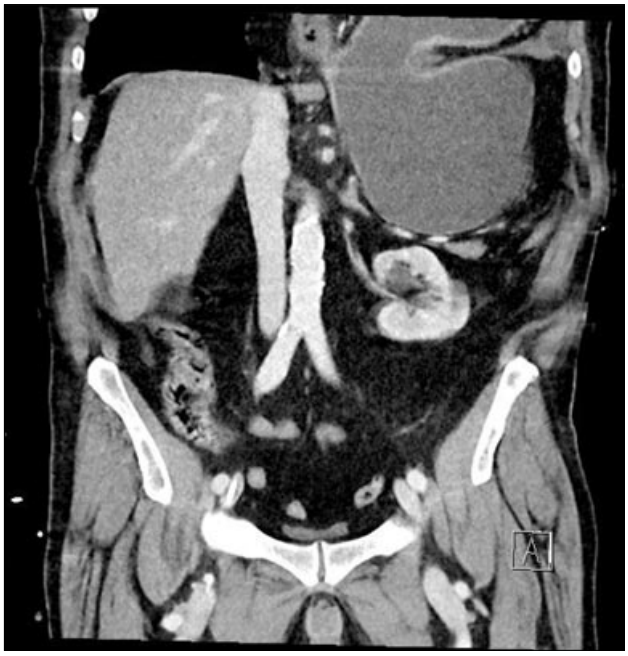

Figure 2. CT abdomen with contrast, frontal view

DISCUSSION

ETIOLOGY AND THE PATHOPHYSIOLOGICAL BACKGROUND

Tension gastrothorax is a clinical condition where trapped gastric contents in the thoracic cavity have led to respiratory distress, obstructive shock and in extreme cases cardiac arrest (4). A previous diaphragm defect must be present for this to occur. The most common cause was reported to be a congenital diaphragmatic hernia in children (usually through a posterolateral defect), followed by blunt trauma in motor vehicle accidents and penetrating injury of the diaphragm (5, 6). In adults, there were also reports of herniation secondary to thoracoabdominal aortic aneurism repair and a gastrothorax occurring in a patient years after repair of traumatic rupture of the diaphragm (7, 8).

The pathophysiological mechanism of tension gastrothorax is quite straightforward. The herniation is precipitated mainly by increased intraabdominal pressure (performing Valsalva manoeuvre, coughing, blunt trauma to the abdomen) which provides a driving force for the stomach to further shift into the thoracic cavity. Fluid, air and other gastric contents accumulate above the diaphragm, which causes the gastroesophageal junction to function as a one-way valve. The progressively increasing intrathoracic pressure leads to a decreased cardiac output due to mediastinal shift and to symptoms of tension gastrothorax (6, 9, 10). In the case of our patient, we suspect that air and fluid gradually filling the pre-existing large hiatal hernia obstructed the bowel at the pyloric level. This led to further increase of the hernia, entrapment of gastric contents, melena and hematemesis. The vomiting further increased intra-abdominal pressure, thus leading to a virtuous cycle and tension gastrothorax.

CLINICAL PRESENTATION AND TREATMENT

Symptoms of diaphragmatic hernia can be nonspecific, especially in children who may present with fever, retrosternal or abdominal pain, diarrhoea and failure to thrive (5). Tension gastrothorax is an extreme manifestation with respiratory distress, acute bowel obstruction and shock (2). An important piece of information is the patient's history of hiatal hernia or trauma. They can present with chest pain, tachycardia, tachypnea, hypotension, acute respiratory distress, diminished consciousness, and in some cases cardiac arrest (8, 9, 10). Children without a history of respiratory disease can present with progressive respiratory fai-

lure (3). Most cases reported a hypo-resonant left hemithorax with diminished breath sounds, and in some audible bowel sounds in the thorax, a rightward deviation of the trachea was noted (2, 9).

Initial imaging is usually a chest X-ray, where we can visualise a large and dilated structure filled with air and fluid above the diaphragm in the left hemithorax. The compression of the ipsilateral lung with a contralateral (rightward) mediastinal shift is associated with left lung atelectasis (5, 9, 11). A potential danger is misdiagnosing the condition as tension pneumothorax as the signs and symptoms can be hard to distinguish. In tension gastrothorax, the left diaphragm on chest X-ray is poorly defined, the left compressed lung is not surrounded by free pleural air, there is an absence of the normally seen gastric bubble and we can visualise an air-fluid level in the left hemithorax (5, 6, 8, 10). If misdiagnosed as tension pneumothorax, an intercostal drainage tube could lead to stomach perforation (7). Another easily accessible possibility is using bedside ultrasound, which can identify left pleural sliding, excluding pneumothorax (9). A chest and abdomen CT scan is usually required to correctly determine whether the air and fluid entrapped in the thoracic cavity is part of the bowel (8, 9).

Immediate treatment is resolving obstructive shock by decompressing the distended stomach. The first approach is to insert a nasogastric tube, which in most cases results in dramatic improvement (4, 8, 10). If this proves to be unsuccessful, for patients in or near cardiac arrest, a percutaneous needle or tube thoracostomy is recommended. As in the case of our patient, for those not near cardiac arrest, it is possible to attempt endoscopic decompression. The definitive treatment is surgery to repair the diaphragmatic defect (10).

In contrast to previously published cases, we did not observe unilateral lung sounds upon the initial clinical examination but observed a mediastinal shift on chest x-ray (Figure 3) and the patient developed a typical constellation of symptoms later on. Despite a nasogastric tube insertion having proven to be sufficient in many cases reported in the literature, because of our patient's rapidly declining condition, EGDS was the preferred choice. More than 3 litres of fluid and air were drained, thus relieving the pressure inside the thoracic cavity.

Figure 3. Chest X-ray taken on day 2. A mediastinal shift can be observed

CONCLUSION

Tension gastrothorax is a rare potentially life-threatening condition presenting with obstructive shock, and respiratory failure and can lead to cardiac arrest. Patients with known diaphragmatic hernia presenting with distended neck veins, decreased lung sounds across one hemithorax, respiratory distress and haemodynamic instability increase the clinical suspicion for diagnosis. Distinguishing tension gastrothorax from tension pneumothorax and providing appropriate treatment by stomach decompression is crucial to these patients' survival.

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