A NONTRAUMATIC, RIGHT-SIDED DIAPHRAGMATIC HERNIA, IN AN ADULT, DIAGNOSED DURING AN ASTHMA ATTACK.

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Abstract

Background: A diaphragmatic hernia is a serious medical condition in which an abnormal opening or defect in the diaphragm allows organs from the abdomen, such as the stomach or intestines, to move into the chest cavity. It can be congenital or acquired. Congenital diaphragmatic hernias are rare and usually occur on the left side (80%) of the diaphragm. Acquired diaphragmatic hernia usually occurs following trauma.

Case report: This is a rare case of a right-sided diaphragmatic herniation of the ascending colon, in a 76-year-old severe asthmatic patient with a non-congenital diaphragmatic hernia, no history of trauma, surgery or radiation. Before the pandemic, this patient needed hospitalization 3-4 times a year for her asthma, but for the last 2 years, the patient was not hospitalized because she was afraid of Covid-19, resulting in a badly controlled asthma with daily symptoms and repeated doses of oral or intravenous corticosteroids, beside her regular combined inhaler with maximal dose of corticosteroids. Due to the persistent cough, chronic steroid use, severe asthma, and advanced age this unusual complication has happened. Computed tomography showed right diaphragmatic hernia of ascending colon without incarceration and hiatal hernia.

Conclusion: Non-traumatic right-sided diaphragmatic hernia involving the colon is an extremely rare condition in adults. In this case, persistent coughing, along with other contributing factors, likely played a role in the development of the hernia. Diagnostic imaging, particularly chest X-rays and CT scans, proved essential in confirming the diagnosis by revealing the herniated colon. Given the rarity of such hernias, they should be included in the differential diagnosis to ensure timely identification and appropriate treatment.

Keywords: diaphragmatic hernia, asthma, cough, non-traumatic, right-sided.

NJË RAST KLINIK DIAGNOSTIKUAR ME HERNIE DIAFRAGMALE JOTRAUMATIKE TË ANËS SË DJATHTË GJATË NJË KRIZE ASTMATIKE.

Abstrakt

Hyrje: Patologjia e hernies diafragmale është një gjendje e rëndë mjekësore në të cilën një defekt në diafragmë lejon që organet nga abdomeni, si stomaku ose intestini të lëvizin brenda në kafazin torakal. Mund të jetë kongjenitale ose e fituar. Herniet diafragmale kongenitale janë të rralla dhe zakonisht ndodhin në anën e majtë (80%) të diafragmës. Hernia diafragmale e fituar zakonisht ndodh pas traumës.

Rasti klinik: Po paraqesim një rast të rrallë me hernie diafragmale të kolonit ashendent në anën e djathtë të diafragmës, në një paciente 76-vjeçare me astma bronkiale të formës së rëndë me një hernie diafragmale jo të lindur, pa histori traume, operacioni apo rrezatimi. Para pandemisë, kjo paciente hospitalizohej 3-4 herë në vit për astmën e saj të rëndë, por 2 vitet e fundit pacientja nuk u shtrua në spital, për shkak të frikës së Covid-19, duke rezultuar në një astmë të pakontrolluar me simptoma të përditshme dhe e mjekuar me kortikosteroidë orale ose intravenoze përveç terapisë inhalatore të kombinuar me dozë maksimale. Për shkak të kollës së vazhdueshme, përdorimit kronik të steroideve, astmës së rëndë dhe moshës ndodhi ky ndërlikim spontan i pazakontë.

Konluzion: Hernia diafragmale jo-traumatike e anës së djathtë e kolonit ashendent është një gjendje jashtëzakonisht e rrallë tek adultët. Në pacienten tonë, kolla e vazhdueshme, së bashku me faktorë të tjerë kontribues, ka patur një rol të rëndësishëm në shkaktimin e hernies. Imazhet diagnostike, veçanërisht grafia pulmonare dhe tomografia e kompjuterizuar, rezultuan thelbësore në konfirmimin e diagnozës duke zbuluar hernien e kolonit ashendent. Duke pasur parasysh raste të tilla, herniet diafragmale duhet të përfshihen në diagnozën diferenciale për të siguruar identifikimin në kohë dhe trajtimin e duhur.

Fjalë kyç: hernie diafragmale, astma, kollë, jo traumatike, djathtas.

Introduction

The diaphragm is a primary respiratory muscle separating the thoracic and abdominal cavities. Its cyclical contractions and expansions facilitate the inhalation and exhalation of air. A diaphragmatic hernia, characterized by the abnormal protrusion of an organ or tissue through a weakened muscle wall, can compromise its functionality and potentially lead to severe health consequences if not addressed promptly (1). There are two main types of diaphragmatic hernia (DH), namely, congenital and acquired (2). A diaphragmatic hernia, though uncommon, can be a complication for individuals with asthma. Spontaneous diaphragmatic hernias are difficult to diagnose, as early symptoms may be absent (3). Additionally, right-sided hernias are rare, with only a few cases reported in the literature.

Case presentation

A 76-year-old woman, a well-known patient to our department, with a 40-year history of severe persistent allergic asthma presented to the emergency department with more than usual respiratory distress. Her symptoms included shortness of breath, a non-productive cough, wheezing, tachypnea, chest tightness, and respiratory failure (Table 1). Despite maximal treatment with inhaled medications and oral corticosteroids over the past two weeks, her condition worsened.

An initial chest X-ray, done at the emergency room, revealed abnormalities in the lower right lung, including a pleural effusion. To further evaluate the extent of lung involvement and guide treatment, a CT scan was scheduled upon hospital admission, while receiving the appropriate treatment for her asthma.

Table 1 Laboratory findings

Arterial Blood Gas (ABG)		
Parameter	**Value**	**Reference Range***
pCO2	37.9 mmHg	35–45 mmHg
pO2	62 mmHg	>80 mmHg
pH	7.43	7.35–7.45
HCO3	25.3 mmol/L	22–26 mmol/L
Base Excess (BE)	1.1 mmol/L	-2 to +2 mmol/L
tHb	12 g/dL	12–16 g/dL
SatO2	92.4%	>95%
O2Hb	91.3%	>95%
COHb	0.5%	<1.5%
MetHb	0.7%	<1.5%
Glucose	150 mg/dL	70–110 mg/dL
NT-proBNP	891.9 pg/mL	high

Summary:

1. Mild hypoxemia is suggested by low pO2, SatO2, and O2Hb levels.
2. NT-proBNP is elevated, potentially indicating cardiac strain or heart dysfunction.
3. Glucose is elevated, possibly reflecting hyperglycemia.

** NT-proBNP reference varies by age, gender, and clinical condition. Typically, values >300–900 pg/mL can be elevated.

Laboratory results, including the complete blood count, inflammatory markers, liver and kidney function tests (urea, creatinine, hepatic enzymes, total bilirubin), troponin, CRP, and D-dimer, are all within normal limits.

Spirometry: resulted with severe obstruction.

CT-scan interpretation: trachea and main bronchi were normal, heart with normal dimensions, no sign of pericardial fluid. Sinister scissuritis. Right diaphragmatic hernia of ascending colon without incarceration and hiatal hernia. No pleural effusion. (Fig.1)

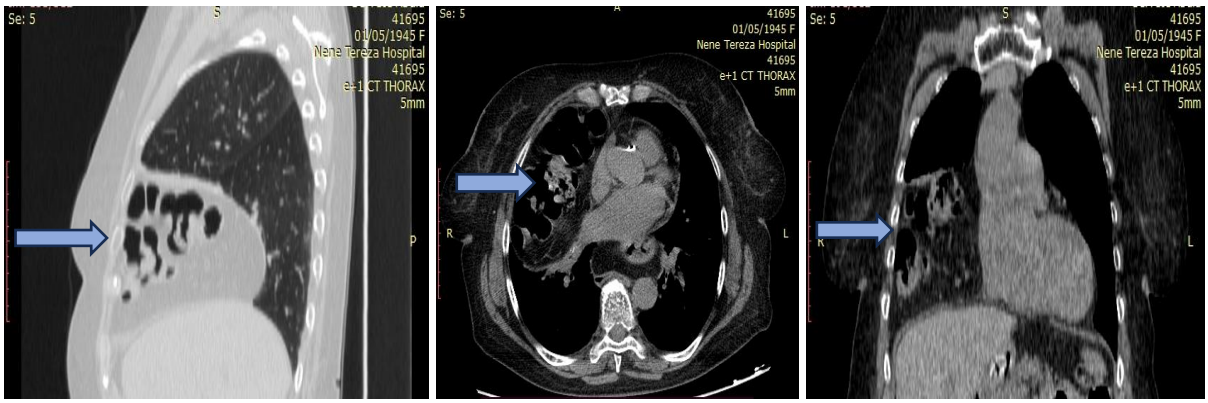

Figure 1: The CT scan revealed that the trachea and main bronchi were normal. It also identified a right-sided diaphragmatic hernia involving the ascending colon, without signs of incarceration.

Echocardiography: left ventricular septal hypertrophy, calcified mitral valve, no other abnormal findings.

Medical history: in skin prick test she was sensitized to Dermatophagoides pteronysinuss and Dermatophagoides farinae (house dust mites), allergic rhinitis, severe persistent bronchial asthma, treated with Beclomethasone dipropionate\formeterol fumarate 100\6mcg, 2x2 puffs and Salbutamol 0.1mg 2pufs as needed. She was a patient who required several hospitalizations each year. However, since the pandemic began, she had refused to visit the hospital, opting instead for home-based treatment, which was insufficient to effectively control her symptoms. She had undergone chest X-rays on previous occasions. We compared the diagnostic imaging available from those instances and found no evidence of these herniations at that time. She also suffered from congestive heart failure NYHA 2 with peripheral edema (Table 1). She had no history of any chirurgical intervention, no malignancies, no radiotherapy.

Discussion

This is a fascinating case, involving an elderly patient from our clinic with a long history of hospitalizations due to unstable asthma.

The diaphragm, is indispensable for the process of respiration. Congenital diaphragmatic hernia (CDH) is a birth defect that occurs when the diaphragm fails to fully develop. This allows abdominal organs to herniate into the chest cavity. CDH affects approximately 1 in 3000 newborns and is associated with significant health problems and a high mortality rate. It often leads to underdeveloped lungs (pulmonary hypoplasia) and high blood pressure in the lungs (pulmonary hypertension). The most common location for a CDH is the left side of the

diaphragm (75-90% of cases), but it can also occur on the right side (10-15%) or both sides (1-2%). Some studies suggest a slightly higher incidence of CDH in male fetuses. The prevalence of CDH does not seem to be related to the mother's age. (4,5) This is not the case for our patient, as she is of advanced age and has undergone numerous chest X-rays and CT scans throughout her life, none of which previously revealed any signs of herniation.

Meanwhile acquired diaphragmatic hernias (ADHs) are typically seen in adults. They can be classified into three main types:

1. *Hiatal Hernia*: This occurs when part of the stomach protrudes through the diaphragm into the chest cavity. While often included in ADH classifications, it's not considered a true diaphragmatic hernia.
2. *Traumatic Diaphragmatic Hernia (TDH):* This type arises from a traumatic event, such as a car accident or a penetrating injury, that causes a tear in the diaphragm. This rupture allows abdominal organs to migrate into the chest cavity. Diaphragmatic rupture is estimated to occur in around 2.1% of blunt trauma cases and 3.5% of penetrating trauma cases.
3. *Iatrogenic Hernia:* This type is caused by a surgical procedure that inadvertently creates a hole in the diaphragm (6,7).

Other causes of adult diaphragmatic hernia include delayed presentation of congenital diaphragmatic hernia, persistent infections such as pneumonia or empyema, and stress on the diaphragm from straining or coughing (8). Spontaneous diaphragmatic rupture following coughing, childbirth, or extensive exercise is very rare (9). We believe this is the case with our patient, who suffered a hernia due to coughing and uncontrolled asthma

Clinically, right-sided diaphragmatic hernias are less common than left-sided ones. The percentages of right and left sided CDH vary, with published incidences ranging from 8 to 24% right-sided CDH, 73%–90% left-sided CDH (10). Additionally, the majority of herniated organs are the omental fat, bowel, spleen, stomach, kidney, and pancreas. The liver and colon as the herniated organ are extremely rare. This may be owing to the protective effect of the liver on the right side (11). Another theory suggests that right-sided hernias rarely occur because the right side of the pleuroperitoneal canal closes earlier (12).

Chronic coughing, a hallmark symptom of asthma, can exert significant pressure on the diaphragm, potentially weakening or tearing it. This weakening may allow abdominal organs to herniate into the chest cavity, leading to respiratory symptoms such as shortness of breath, decreased oxygen levels, and chest pain. The worsening of these symptoms prompted our patient to seek medical care.

Additionally, individuals may experience gastrointestinal symptoms such as abdominal pain, nausea, vomiting, and difficulty swallowing; however, this was not observed in our patient.

Early diagnosis and appropriate treatment are essential to manage symptoms and prevent further complications. To diagnose a diaphragmatic hernia, imaging tests are typically employed. Chest X-rays can reveal displaced abdominal organs or fluid accumulation in the chest cavity. For a more detailed assessment, CT or MRI scans are used to visualize the

hernia, its size, and the organs involved. In some cases, ultrasound may be helpful to evaluate diaphragm movement.

Treatment for diaphragmatic hernia primarily involves surgical repair, particularly when organs are significantly displaced or causing symptoms. Before surgery, stabilizing the patient's condition is crucial, often involving managing asthma symptoms with medications like bronchodilators and corticosteroids (13,14).

After surgery, effective asthma management is essential to prevent recurrence. This includes avoiding triggers and adhering to prescribed medication regimens. With timely surgical intervention and proper asthma management, most patients recover well. However, delayed treatment can lead to complications like lung infections, bowel obstructions, or persistent respiratory issues (13,14).

During this hospitalization, despite being diagnosed with right diaphragmatic hernia, the patient experienced symptom improvement with the treatment provided. After discussing with her family, she declined surgical intervention to repair the hernia.

Her medical history includes two vaginal deliveries, no malignancies, no history of trauma, and no prior surgical interventions. In this case, the most plausible explanation for the herniation of the colon is persistent coughing in the context of advanced age, chronic steroid use, and severe asthma.

Conclusions

Non-traumatic, right-sided diaphragmatic hernia of the colon in adults is extremely rare. Persistent coughing, along with other predisposing factors in this patient, likely contributed to the development of the hernia. Chest X-rays and CT scans were instrumental in making the diagnosis. Rare hernias like this should be considered during differential diagnosis to ensure timely and accurate treatment.

Conflict of interests. None

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