International Journal of Medical Science and Clinical Research Studies

ISSN(print): 2767-8326, ISSN(online): 2767-8342

Volume 03 Issue 08 August 2023

Page No: 1560 -1564

DOI: https://doi.org/10.47191/ijmscrs/v3-i8-20, Impact Factor: 6.597

Renal Replacement by Thoracic Approach in Traumatic Diaphragmatic Hernia with Thoracic Kidney: Case Report

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ABSTRACT

An acquired diaphragmatic hernia usually occurs after thoracoabdominal trauma, causing a defect in the diaphragm that allows the migration of intraperitoneal structures into the thoracic cavity. The finding of renal involvement has a low incidence. The diagnosis of diaphragmatic hernias is based on chest x-ray and computed tomography. Treatment is surgical, due to the risk of strangulation, and consists of content reduction, resection of the sac, and closure of the hernia defect. It can be performed through the thoracic or abdominal approach, with an increasing number of minimally invasive techniques, which reduce trans and postoperative complications. We present the case of a patient with a diagnosis of late-onset post-traumatic diaphragmatic hernia with renal involvement, treated surgically through a thoracic approach with an attempt to preserve the kidneys, who finally underwent nephrectomy due to urinoma secondary to a lesion of the renal pelvis during the mobilization of the kidney to the abdominal cavity.

KEYWORDS: Diaphragmatic hernia, trauma, kidney, urinoma

ARTICLE DETAILS

Published On:
08 August 2023

Available on:
https://ijmscr.org/

INTRODUCTION

Diaphragmatic hernia is a defect of the diaphragm that allows passage of an intraperitoneal organ or structure into the thoracic cavity, which may be congenital or acquired. Diaphragmatic hernias occur in 1 to 6% of major thoracic traumas, commonly following high-velocity blunt trauma (1). In blunt abdominal or thoracic trauma, the incidence of diaphragmatic hernia has been reported in 0.8 to 20% of cases and up to 67%of these injuries are not diagnosed in their acute phase (2). Diaphragmatic rupture on the left side is more common, occurring in up to 88% of cases (3,4). The anatomophysiological structure and function of the diaphragm are responsible for the higher incidence of left-sided diaphragmatic trauma. A congenital weakness along the embryonic fusion of the costal and lumbar portions of the diaphragm predisposes the left hemidiaphragm to a higher incidence of blunt trauma injury (5).

Diaphragmatic hernias may involve one or several organs. The detection of a kidney withinthe thoracic cavity from a diaphragmatic hernia is a rare finding. In diaphragmatic hernias acquired by thoracoabdominal trauma, the incidence of this finding decreases even more (6,7). There is no consensus on the indications or timing for surgical management, however, in case of complications surgery is mandatory. Diaphragmatic plasty with or without prosthetic material is the treatment of choice.

We present the case of a patient diagnosed with post-traumatic diaphragmatic diaphragmatic hernia of late presentation with intrathoracic kidney who underwent renal replacement by open thoracic approach.

PRESENTATION OF THE CLINICAL CASE

A 54-year-old male with a personal history of systemic arterial hypertension diagnosed 8 years ago and treated with enalapril, right inguinal plasty, and a car accident with blunt trauma to the thorax and abdomen 20 years ago that did not require hospitalization.

The current condition began 3 years ago with the presence of medium effort dyspnea and palpitations, without treatment. She went to the family medicine unit due to exacerbation of previous symptoms, adding intermittent oppressive chest pain at the sternal body level, as well as productive cough of

two weeks of evolution. An anteroposterior chest X-ray was performed, showing effacement of the left costophrenic angle and radiopaque image at the base of the left hemithorax (Figure 1) suggestive of pleural effusion, a diagnosis with which he was sent to the emergency department. On admission, oxygen saturation was 90% withpulse oximetry. On examination he was conscious, chest with adequate amplexion and amplexation movements, decreased vesicular murmur in the left hemithorax without addednoises, rhythmic heart sounds, adequate intensity and frequency. During her stay in the emergency department, paraclinical tests were requested and reported hemoglobin 16.1 g/dL, hematocrit 50.1%, leucocytes
10.89 x 10^3 (normal parameters). A CT scan of the thorax showed a left diaphragmatic hernia and an ipsilateral intrathoracic extra pleural ectopic kidney (Figure 2), so a referralto the Cardiothoracic Surgery Service was requested and the patient was scheduled, together with the Urology Service, for diaphragmatic plasty and renal descent. It was approached by left thoracotomy in the sixth intercostal space, with finding of left diaphragmatic rupture, hernial defect of 7 cm x 7 cm, with hernial sac of 25 cm x 15 cm x 10 cm, occupying 50% of the thoracic cavity, with firm and lax adhesions to the lower face of left lung, with left kidney, renal Gerota and a portion of the transverse colon inside. Adherenceolysis was performed, resection of 80% of Gerota's fascia, the left kidney was descended to the abdominal cavity, thediaphragmatic defect was closed with prolene and ethicon left endopleural probe was placed for post-surgical control (Figure 3).

During the transoperative period, he presented hemodynamic alterations and cardiacarrhythmia and was discharged to the Intensive Care Unit for postoperative surveillance, where he presented adequate clinical postoperative evolution, without respiratory alterations, with an approximate daily output of 500 ml of serohematic fluid through endopleural catheter. He was discharged to the floor due to improvement on the fourth postoperative day without requiring vasopressors or antiarrhythmics, where he continued under respiratory and renal function monitoring, maintaining oxygen saturation levels of 92% with supplemental oxygen through nasal prongs at 3 liters/min and creatinine controls
<1.1 mg/dl. Subsequently, he presented fever, increased volume in the left flank and abdominal pain, so a CT scan was requested which showed an image suggestive of left urinoma (Figure 4), he was evaluated by Urology and an exploratory laparotomy was decided with the finding of abundant pyuria in the cavity and a lesion in the left renal pelvis of 5 mm, urinoma was drained and a nephrostomy tube was placed. During the postoperative period she presented minimal urine output due to the nephrostomy tube and high urine output due to drainage directed to the retroperitoneum. The patient underwent reintervention with surgical exploration where he found a left renal pelvis with necrosis and avulsed ureter inside the cavity, so a simple left nephrectomy was performed in the same surgical time. Clinical evolution was adequate and he was discharged home on the third post-surgical day. One month after his discharge he went to the outpatient clinic for follow- up, without complications, with chest X-ray without pathological findings (Figure 5).

DISCUSSION

A traumatic diaphragmatic hernia is characterized by the incursion of intraperitoneal structures into the thoracic cavity following trauma. Traumatic diaphragmatic hernias occurin about 1-5% of accident victims and in 10-15% of penetrating traumas of the lower thoracic region (8).

The onset of symptoms of diaphragmatic hernias is subsequent to the traumatic event due to the negative pressure within the thorax that displaces intra-abdominal contents into the thoracic cavity, which can occur within days to months or even years after the injury (9).

According to Grimes, there are three stages of diaphragmatic lesion: initial, latent and obstructive. Up to 50% of patients are diagnosed during the latent phase, which can have a variable duration; there are reports of cases in which the duration was up to 27 years. During this phase, dyspnea, cough and palpitations may occur due to the pressure exerted on the lung and heart (10). This clinical picture is presented in our patient seventeen years after blunt trauma of the thorax and abdomen.

Imaging studies are indicated in patients with suggestive symptoms or a history of thoracic or abdominal trauma. Chest radiography may show an opaque hemithorax with deviation of the mediastinum, in addition to a mild opacity in the thorax with or without gas, which may be a sign of a hernial sac (11). The patient's initial radiograph showed slight deviation of the mediastinum to the left, with effacement of the left costophrenic angle and radiolucent image in the basal region of the left hemithorax, making an initial erroneous diagnosis of pleural effusion.

Computed tomography has a sensitivity of 14-82% and a specificity of 87%, so it is considered the gold standard for diagnosis. It allows determining the presence, location and size of the diaphragmatic defect. This imaging study confirms The diagnosis of diaphragmatic hernia in our patient in addition to providing relevant information of the organ involved to make the surgical plan.

The left diaphragm is the most commonly involved, this is probably due to the protective effect provided by the liver (12), as in the case of our patient. Usually traumatic diaphragmatic hernias are constituted by a single organ, often: stomach, colon, spleen, small intestine and omentum; depending on the size of the defect there may be two or more organs (13). In this case the diaphragmatic hernia involves a portion of the transverse colon and the left kidney, little reported in the literature.

Thoracic kidneys are classified in 4 groups (14): thoracic renal ectopia with closed diaphragm, eventration of the diaphragm, congenital or acquired diaphragmatic hernia, and

traumatic rupture of the diaphragm. The case presented corresponds to group 3 (acquired diaphragmatic hernia) based on the etiology of intrathoracic kidney proposed by Pfister-Goedeke. Treatment in these cases consists of closure of the diaphragmatic defect,with or without prosthetic material, and repositioning of the kidney in the abdominal cavity or nephrectomy in case of functional exclusion, which can be confirmed by tomography or gammagraphy (15). In the case of our patient, scintigraphy was not performed due to difficult access to this resource and the absence of data suggestive of renal exclusion in the initial tomography.

The surgical approach can be abdominal or thoracic. Performing both approaches simultaneously is especially recommended in chronic hernias, to reduce visceral-pleural adhesions and to avoid visceral intrathoracic perforation (16). In this case, thoracotomy was performed due to the surgeon's experience, referring greater ease for the repositioning of the involved viscera, as well as visibility for the closureof the defect. It is likely that the repositioning of the kidney without direct visualization inside the abdominal cavity, as well as the wide dissection of the renal fascia, which surrounds the kidneys and abdominal ureters acting as a barrier to contain fluid collections, may have been the cause of the defect.

perirenal (17) favored the lesion and necrosis of the renal pelvis with the consequent formation of the urinoma with indication for nephrectomy. Cases similar to the one presented have been treated with thoracic and abdominal approach by minimal invasionfor mobilization and fixation of the kidney inside the abdominal cavity with success in renal preservation (18).

CONCLUSIONS

The low incidence of diaphragmatic hernias, as well as their latent clinical expression in which there are no sudden manifestations that put the patient's life at risk, make this diagnosis a challenge for the general surgeon. It is important to have a high suspicion of this type of lesions in patients with a history of blunt trauma of the thorax or abdomen in order to make a timely diagnosis and treatment. The choice of surgical approach should be individualized based on the organ involved, the available resources and the surgeon's experience. In cases where the kidney is the involved organ, the association of laparoscopy with thoracoscopy has had good results in renal preservation.

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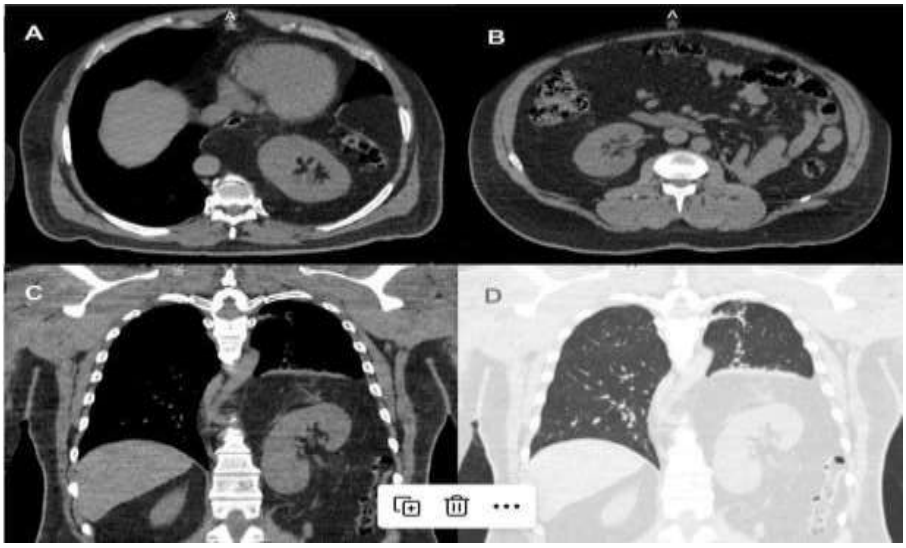
Annexes

AP chest X-ray with effacement of the left costophrenic angle and radiopaque image atthe base of the left hemithorax.



Computed tomography in axial (A, B) and coronal (C, D) sections. Kidney in left thoracic cavity (A), absence of left kidney in peritoneal cavity (B), left diaphragmatichernia with intrathoracic kidney (C and D).

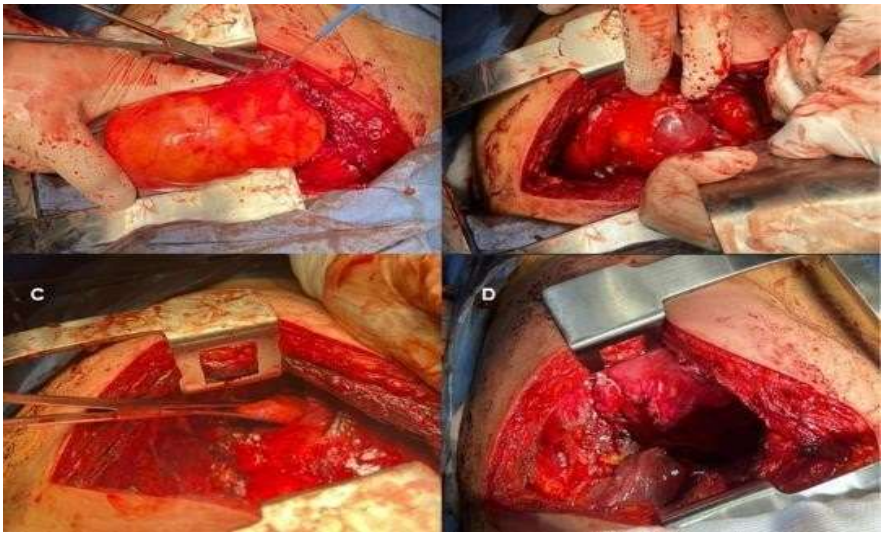


Figure 3. Left thoracotomy: Dissection of renal fascia (A), left kidney of normal characteristics in thoracic cavity (B), reposition of left kidney to abdominal cavity (C),primary closure of diaphragmatic defect (D).

Simple coronal (A) and axial (B) CT scan of the abdomen withperirenal collection measuring 32.5 cm longitudinally, 18.6 cm in transverse diameter and 17 cm in itsanteroposterior diameter, volume of 5354 ml, 2-5 Hounsfield Units.

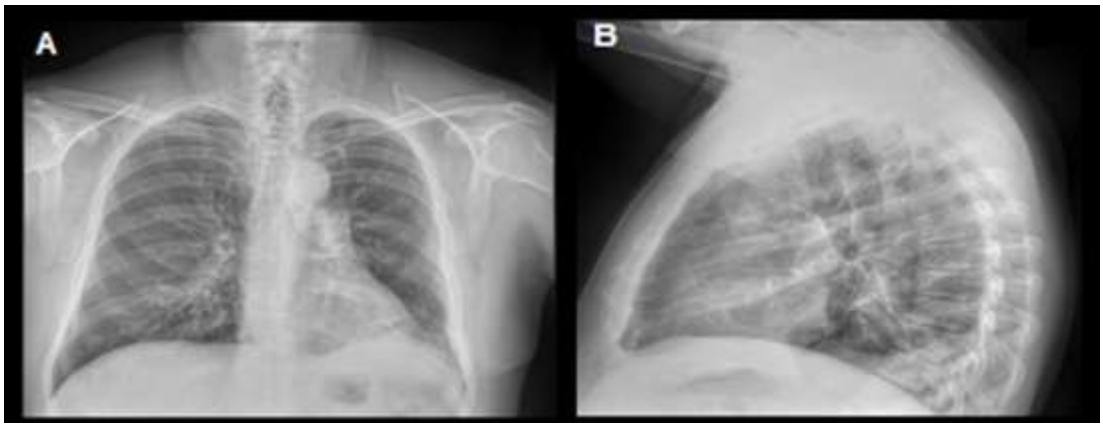


Figure 5. Chest X-ray after one month of diaphragmatic plasty.