



## Case Report

# Gangrenous Colon in a Congenital Diaphragmatic Hernia at 23 years: A Case Report

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### Abstract

Diaphragmatic hernias are congenital and commonly occur in neonates. A gangrenous transverse colon in a congenital diaphragmatic hernia is even rarer in adults. The study aims to demonstrate a gangrenous colon in congenital diaphragmatic hernia at 23 years.

The patient presented with features of intestinal obstruction and respiratory distress. The chest radiograph indicated a large bowel in the left chest cavity. CT scan of the chest confirmed a diaphragmatic hernia with its complications. The histological diagnosis was gangrenous colon in keeping with strangulated hernia. At laparotomy, a left diaphragmatic defect of 4-5 cm and a gangrenous transverse colon in the left chest cavity were found. The gangrenous colon was resected and created a transverse colostomy. A left thoracostomy tube was inserted. After 3 months the colostomy reversal was done and the recovery was uneventful.

The report demonstrated a rare case of gangrenous colon in a congenital diaphragmatic hernia at 23 years managed by surgery via an abdominal approach.

## Introduction

A diaphragmatic hernia (DH) is a congenital or acquired diaphragm defect that allows intra-abdominal viscera to navigate into the chest cavity.<sup>1,2</sup> DH is classified into posterolateral, anterior, or central with the posterolateral hernia (Bochdalek hernia) being the commonest congenital DH (95%).<sup>1,3,4</sup> Congenital diaphragmatic hernia (CDH) arises from the failed fusion of the diaphragmatic embryonic component (around 8 weeks of gestation) with resultant abnormal lung development.<sup>5</sup> Congenital DH is common in neonates with an incidence of 0.8–5/10,000 live births.<sup>1,4,6</sup>

Among adults, CDH is rare and usually incidental.<sup>4</sup> Arguably, the prevalence could be as high as 20% even though mostly asymptomatic.<sup>3</sup> Furthermore, acquired diaphragmatic hernias are rare and due to trauma (<1% of all trauma).<sup>6</sup> Its rate increases to three percent in abdominal injuries.<sup>6</sup> DH is more common in males.<sup>7</sup> DH risks incar-

cerating and strangulating abdominal viscera.<sup>6</sup> Complicated DH is associated with a high mortality rate of up to 31%.<sup>6</sup>

The symptomatic cases present with nonspecific abdominal and respiratory complaints. However, pain is the most common symptom (69%).<sup>4,6,7</sup>

Besides the clinical assessment, several modalities exist to diagnose DH. They include chest radiographs, barium studies, Computer Tomography (CT) scans, and Magnet Resonance Imaging (MRI). However, the CT scan is the most preferred modality as it confirms the diagnosis and detects herniated contents and complications.<sup>2,5</sup>

DH is managed by surgery either via laparotomy (commonest), or laparoscopic approach.<sup>6,7</sup> Operative approach is influenced by the patient's hemodynamic stability, associated conditions, and the surgeon's expertise.<sup>6</sup> Patients who present with features of incarceration, gangrene, or perforation of hernia content warrant emergency surgery.<sup>5</sup> The abdominal approach remains the most preferred



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(64.8%) to the thoracic approach as it allows the surgeon to assess the viability of herniated contents, and manage abdominal visceral complications.<sup>5,8</sup> Arguably the thoracoabdominal approach enables evaluation and adequate surgical treatment of both cavities. Depending on the size of the defect, diaphragmatic hernia can be primarily repaired with sutures or tension-free mesh.<sup>6</sup>

The case report aims to demonstrate a gangrenous colon in a congenital diaphragmatic hernia at 23 years.

## Case presentation

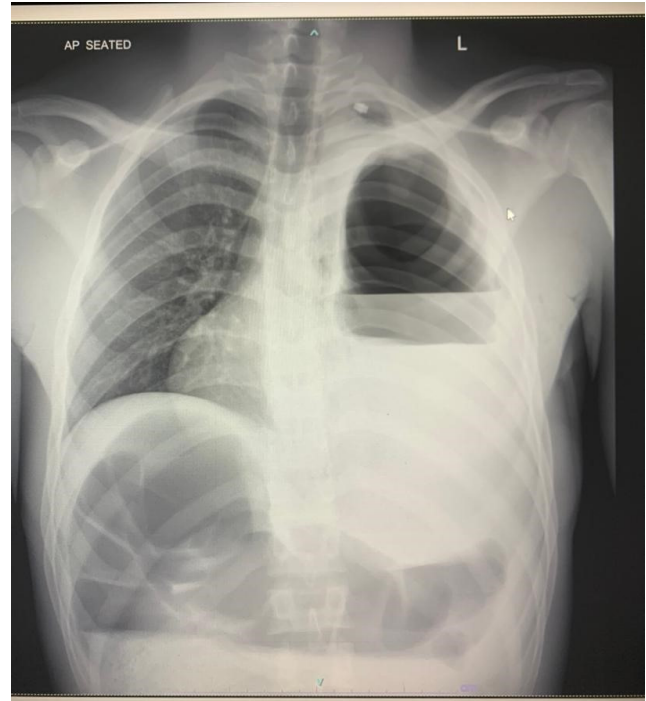
A male 23 years old presented with abdominal pain, distension, vomiting fecal matter, and constipation. He had difficulties breathing. There was no history of thoracoabdominal trauma or surgery. The drug history was unremarkable and a cattle herder who never smoked or consumed alcohol.

On examination, BP 120/76mmhg, P-120bpm, Sat 84% room air and 96% on oxygen. Temp 37.5 degrees Celsius, respiratory rate 24. The patient was fully conscious and had dry mucous membranes. There was neither pallor nor jaundice. Chest examination revealed reduced air entry and dullness on the left side. A cardiovascular exam revealed heart sounds in the right hemithorax. The abdomen revealed epigastric fullness, tenderness, and guarding. The digital rectal exam was non-revealing.

The laboratory revealed hemoglobin of 15.00g/dl, leucocytosis (WCC  $27.01 \times 10^9/L$ ), neutrophilia 83.1%, and elevated C-reactive protein CRP 474.5mg/l. The biochemistry revealed potassium of 3.9 mmol/L, sodium of 141 mmol/L, elevated urea of 16.6 mmol/L, creatinine (150  $\mu\text{mol/L}$ ), hypoalbuminemia of 32 with elevated bilirubin of 61 $\mu\text{mol/L}$ , alkaline phosphates 152U/l and normal transaminases.

The chest /X-ray showed left pleural effusion and shifting of the mediastinum to the right side ([Figure 1](#)). The abdominal X-ray revealed a distended loop of large bowel in the left and right upper quadrants ([Figure 2](#)). The CT scan of the chest confirmed herniation of the colon into the left chest cavity, mediastinal shift to the right, pleural effusion and significant compression of the left lung ([Figure 3](#)).

Once the diagnosis was made, intravenous (IV) fluid resuscitation, administered IV antibiotics ceftriaxone 1g BD 5/7 and metronidazole 500mg TDS 5/7, kept the patient nil per mouth, inserted a nasogastric tube, catheterized, and consented to emergency laparotomy. In the emergency room, a left thoracostomy tube was inserted for left pleural effusion (serosanguinous fluid). At laparotomy, a left diaphragmatic defect of 4 to 5cm ([Figure 4](#)) and a gangrenous transverse colon in the left chest cavity were found ([Figure 5](#)). The gangrenous part of the transverse colon was resected and created a temporary transverse end colostomy ([Figure 6](#)) while the distal descending colon stump was closed. Peritoneal and chest lavage was with copious amounts of warm saline. The histological diagnosis was gangrenous colon in keeping with strangulated hernia. After 3 months, reversal of transverse end colostomy was



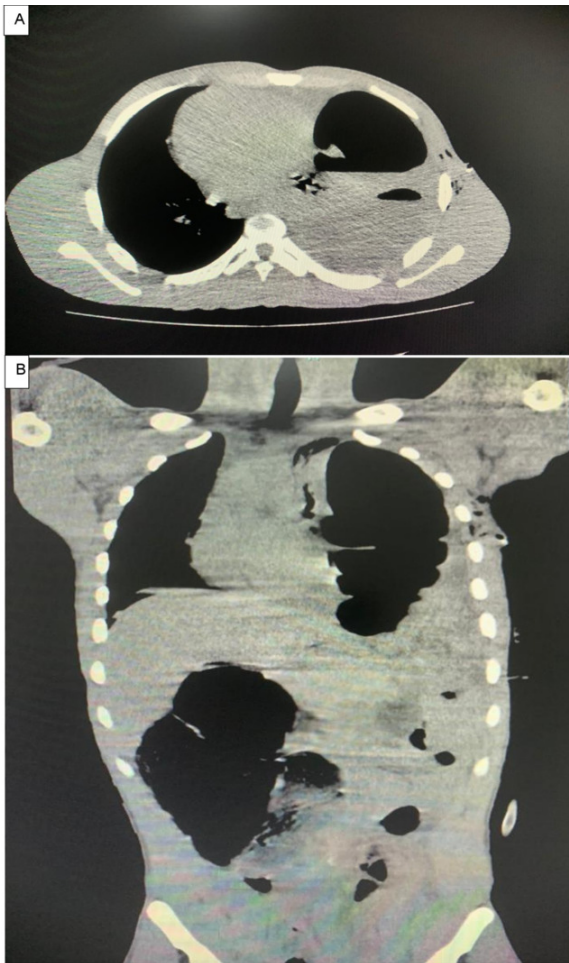
**Figure 1. Chest radiograph showing left pleural effusion and shifting of the mediastinum to the right side**



**Figure 2. Abdominal X-ray demonstrated a distended loop of large bowel in the left and right upper quadrants." replace "intrathoracic abdominal region" with left and right upper quadrants.**

performed ([Figure 7](#)). The recovery from both laparotomies was uneventful and the patient was discharged on day 8 following the colostomy reversal.





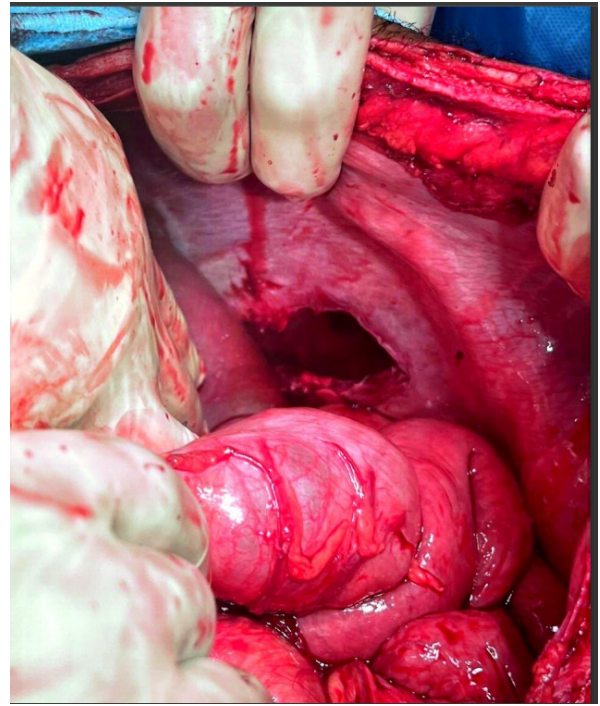
**Figure 3. Axial view (A), Coronal view (B). Chest CT scan showing herniation of the colon into the left chest cavity, mediastinal shift to the right, compression of the left lung and left pleural effusion.**

## Discussion

The final diagnosis was gangrenous transverse colon in left congenital diaphragmatic hernia. A diaphragmatic hernia at 23 years old is a rare entity and the Bochdalek hernia remains the most common in 70 to 95% of cases.<sup>5,8</sup> Even though common in neonates, it could be due to blunt or penetrating thoracoabdominal trauma in adults.<sup>2</sup> Nonetheless, our patient did not have a history of trauma.

In a systematic review of 192 cases of left-sided CDH, there was a male predominance (50.5% males) with a mean age of  $45.41 \pm 20.26$  years.<sup>8</sup> Generally, CDH is more common in males and other studies support our finding.<sup>2</sup> In contrast, CDH in female adult has been documented.<sup>9-11</sup> Furthermore, CDH are more on the left side due to protective effect of the liver and earlier closure of the pleuroperitoneal canal on the right diaphragm.<sup>9,10</sup>

In adults, it is diagnosed incidentally in radiological studies for other medical conditions.<sup>2,4,12</sup> The patient could remain asymptomatic for years until the herniated abdom-

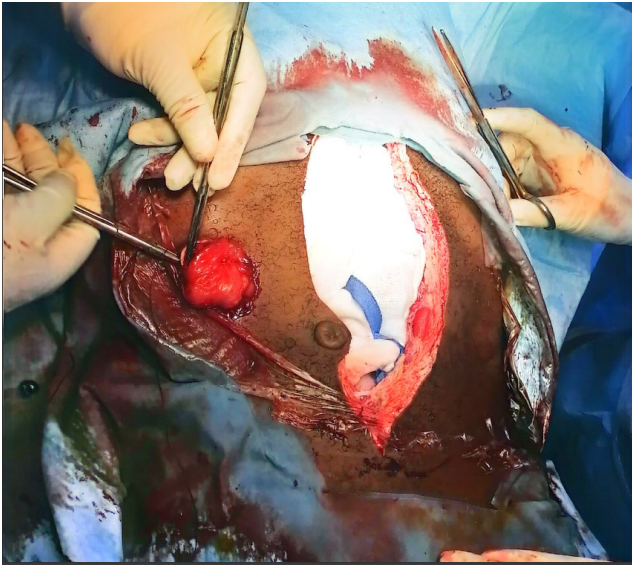


**Figure 4. At laparotomy, a left diaphragmatic defect after reduction of herniated colon**



**Figure 5. A gangrenous transverse colon retrieved from the left chest cavity.**





**Figure 6. Transverse colostomy creation**



**Figure 7. The healing abdominal wounds after reversal of the colostomy**

inal contents compress the lungs causing respiratory distress.<sup>2,9</sup> For the symptomatic cases, they present with vague, non-specific chest or abdominal complaints or as an emergency with strangulation, stomach perforation, colonic necrosis/perforation, or a tension pneumothorax.<sup>4,6,10</sup> Features of adult CDH include shortness of breath, food intolerance, gastroesophageal reflux, nausea, vomiting, abdominal cramping, distension, and abdominal pain.<sup>2,7</sup> In a review of 173 cases and 192 cases of adult CDH, pain was the most common complaint in 69% and 62%, respec-

tively.<sup>7,8</sup> In our case, the patient presented with respiratory and abdominal complaints and strangulated hernia.

The CT scan is the gold standard and established the diagnosis of DH in 89% of cases.<sup>5,11</sup> However, the diagnosis could be made clinically, using chest radiographs, barium studies, and magnetic resonance imaging (MRI).<sup>2,5</sup> Chest radiograph might show herniated abdominal viscera.<sup>2,10</sup> A gastric air bubble in the chest cavity for herniated stomach or air-fluid level for pleural effusion.<sup>2,11</sup> In our case, the chest radiograph indicated a large bowel in the left chest cavity while the CT scan confirmed the diagnosis of left diaphragmatic hernia, the herniated colon, and left pleural effusion.<sup>2,5</sup> Several cases document that herniated abdominal viscera include the stomach, omentum, small and large bowel, appendix, mesentery, liver, gall bladder, kidney, spleen, and pancreas with the colon being the most common (52%).<sup>5,6,8-10,12</sup>

Surgery is the treatment of choice although a conservative approach has been documented.<sup>5</sup> Surgery via the abdominal approach is the most common approach for surgical repair, including thoracic or thoracoabdominal approaches.<sup>2,5,6</sup> Surgery either via laparotomy (commonest), laparoscopic, or combined laparoscopic-thoracoscopic approach, thoracotomy.<sup>6,7</sup> Also, a robotic-assisted approach has been documented.<sup>5</sup> Laparoscopic surgery benefits low complication rates and short hospital stay.<sup>7</sup> Operative approach is influenced by the patient's hemodynamic stability, associated conditions, and the surgeon's expertise.<sup>6</sup> Patients who present with features of incarceration, gangrene, or perforation of hernia content warrant emergency surgery.<sup>5,9</sup> A laparotomy allows the surgeon to assess the viability of herniated contents, and manage abdominal visceral complications (gangrene, perforation, and contamination).<sup>5,9,10</sup> On the contrary, it offers limited access to the chest cavity. Arguably the thoracoabdominal approach enables evaluation and adequate surgical treatment of both cavities.<sup>5</sup>

The principles of surgery in DH are to identify the hernia defect, reduce the contents, and repair the diaphragm.<sup>6</sup> In this case, we repaired the diaphragm with absorbable suture vicryl and did not place a mesh due to the significant contamination. Depending on the size of the defect, it can be primarily repaired with sutures (absorbable or non-absorbable 65%) or tension-free mesh absorbable or nonabsorbable mesh (68%).<sup>5,6,9,10</sup>

DH risks abdominal and thoracic complications including hydronephrosis, abscess formation, lung empyema, broncho-pleuro-colonic fistula, pleural effusion, fecothorax, and pneumonia.<sup>5</sup> Complications could be hernia-related or surgery-related bowel ischemia, gangrene, bowel perforation, sepsis, and wound infection.<sup>2,5</sup> In a systematic review of 193 patients with adult CDH, the 30-day mortality was 4.4% while the postoperative complication rate was 21.5%.<sup>8</sup>

Being a single retrospective case report limits its generalizability. In addition, limited documentation on gangrenous congenital diaphragmatic hernia in adults underscores the need for more clinical studies.

## Conclusion

Adult congenital diaphragmatic hernia is rare. A rapid and accurate diagnosis is vital and surgical repair is mandatory

for strangulated diaphragmatic hernia. Laparotomy (abdominal approach) is preferred for emergency cases.

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