

Transdiaphragmatic Intercostal Hernia Masquerading as Pleural Effusion and Chest Wall Lipoma

Win Myint TUN¹, Htet Zaw LIN², Yair OO², Mo Mo AUNG², Jackson Tan²

Abstract

Transdiaphragmatic intercostal hernia (TDIH) is a rare condition involving simultaneous disruption of the diaphragm and intercostal muscles, allowing abdominal organs to herniate into the chest wall. It is usually traumatic and spontaneous cases are uncommon and can be easily overlooked. We report the case of a man in his late 60s with six years of progressive right chest wall swelling and recent vomiting and breathlessness. Initial imaging was misinterpreted as pleural effusion, but a computed tomography confirmed a five cm diaphragmatic defect with bowel herniation through the 7th–8th intercostal space. Prompt recognition is vital, as delayed diagnosis may lead to bowel obstruction, strangulation, and life-threatening complications.

Keywords: Transdiaphragmatic intercostal hernia; Diaphragmatic rupture; Chest wall hernia; Pleural effusion; Computed tomography; Lipoma

Author Details:

1 Department of Radiology, Raja Isteri Pengiran Anak Hospital, Brunei Darussalam
2 Department of Nephrology, Raja Isteri Pengiran Anak Hospital, Brunei Darussalam

*Correspondence:

Htet Zaw Lin
htetzawlin1987@gmail.com

INTRODUCTION

Transdiaphragmatic intercostal hernia (TDIH) is a rare condition in which abdominal organs protrude through a torn diaphragm and a defect in the intercostal muscles into the subcutaneous tissues of the chest wall.¹ This condition requires simultaneous disruption of the

diaphragm and the intercostal musculature and is frequently associated with rib fractures, making it essentially a combination of a diaphragmatic hernia and an intercostal hernia.² Since Croce and Mehta coined the term ‘intercostal pleuroperitoneal hernia’ in 1979, fewer

The Brunei International Medical Journal (BIMJ) is a peer-reviewed official publication of the Ministry of Health and Universiti Brunei Darussalam, under the auspices of the Clinical Research Unit, Ministry of Health, Brunei Darussalam. The BIMJ publishes articles ranging from original research papers, review articles, medical practice papers, special reports, audits, case reports, images of interest, education and technical/innovation papers, editorials, commentaries, and letters to the Editor. Topics of interest include all subjects related to clinical practice and research in all branches of medicine, both basic and clinical, including topics related to allied health care fields. The BIMJ welcomes manuscripts from contributors but usually solicits review articles and special reports. Proposals for review papers can be sent directly to the Managing Editor. Please refer to the contact information of the Editorial Office.

DISCLAIMER: All articles published, including editorials and letters, represent the opinions of the contributors and do not reflect the official views or policies of the Clinical Research Unit, the Ministry of Health, or the institutions with which the contributors are affiliated, unless clearly stated. The appearance of advertisements does not constitute an endorsement by the Clinical Research Unit or the Ministry of Health, Brunei Darussalam. Furthermore, the publisher cannot accept responsibility for the correctness or accuracy of the advertisers' text, claims, or any opinions expressed.

than 40 cases of TDIH have been reported in the literature.³ Traumatic causes predominate and post-traumatic diaphragmatic ruptures account for only 0.8–5% of blunt trauma admissions, whereas spontaneous cases triggered by violent coughing, sneezing, vomiting or vigorous exertion are exceptionally rare.⁴ Reported risk factors that may predispose patients to spontaneous TDIH include chronic obstructive pulmonary disease, long-term corticosteroid therapy and obesity.⁵ Clinically, patients typically present with sudden thoracoabdominal pain, dyspnoea and a palpable chest-wall bulge that enlarges with inspiration or coughing.⁶ A high index of suspicion is essential because the diagnosis can be missed; imaging with chest radiography and especially computed tomography (CT) confirms TDIH by demonstrating herniated abdominal viscera through the chest wall.⁷ Once recognised, urgent surgical repair is recommended to prevent complications such as strangulation or incarceration.⁸

CASE REPORT

A late 60-year-old gentleman presented to the emergency department with a 3-day history of vomiting containing undigested food. He did not report any fever, abdominal pain, jaundice, altered bowel habit or reduction in urine amount. He noticed that there was a large swelling at right side of the chest for the past six years which was progressively increasing in size and made him difficult to breath. He denied any injury to his chest.

His background history was relevant for bulbar myasthenia gravis, hypertension, and chronic kidney disease since 2015. His myasthenia gravis was diagnosed in 2019, treated medically and remained was

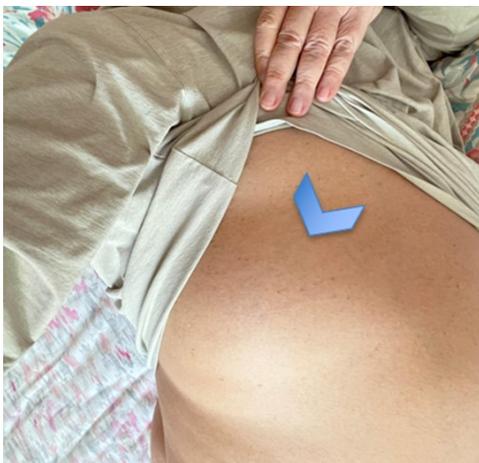


Figure 1: A well-differentiate non-mobile 7cm x 5cm mass (blue arrowhead) at the right lateral aspect of his chest.

controlled since 2021 and continued to be under follow-up of the neurology service. His kidney function is progressively deteriorated and approaching to pre-end-stage kidney disease with a creatinine of 595.5 (umol/L) and eGFR of 7.6 ml/min/1.73 m².

Examination revealed a well-differentiate non-mobile oblong-shaped 7cm x 5cm swelling at the right postero-lateral aspect 7th-8th Intercostal space of his chest which is soft in consistency (**Figure 1**). There was reduced air entry in the right lung lower zone with dullness. The abdomen was soft and not distended. However, the bowel sounds were increased.

As the patient had previous had several visits in the past, past imaging was reviewed. The initial chest X-ray that was done two months earlier (**Figure 2a**), demonstrated a homogeneous opacity in the right lower chest. It was first interpreted as a right pleural effusion. A subtle bowel gas shadow in the right lower lateral chest wall was overlooked. A follow-up chest X-ray (**Figure 2b**) done two months later, showed increased bowel gas within the right hemithorax above the diaphragmatic level and extending into the right lower

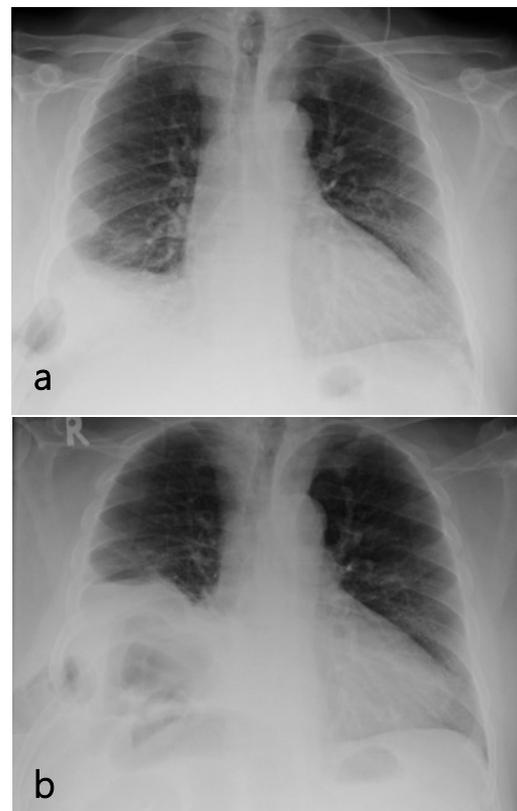


Figure 2: Chest X-rays PA views; a) Initial CXR showed a homogeneous opacity at the right lower chest suggesting right pleural effusion with bowel gas shadow at the right lower lateral chest wall being overlooked (long arrow), and b) Subsequent CXR showed more bowel gas in the right lower chest above the diaphragm (arrow-head) and extending into the right lateral chest wall, beyond the right lateral rib cage (short arrow).

lateral chest wall, beyond the rib cage. An ultrasound of the right hemithorax showed no evidence of pleural effusion. Abdominal X-ray (**Figure 3**) demonstrated dilated small bowel loops with a maximum diameter of up to 5cm, consistent with small bowel obstruction.

A non-contrast CT chest (**Figure 4**) confirmed the X-ray findings of right diaphragmatic and chest wall hernia. A 5cm defect was seen in the right hemidiaphragm near the lateral costophrenic angle, along with marked widening of the right 7th-8th intercostal space (14.6cm in width). There is herniation of the ascending colon, transverse colon, mesentery, and peritoneal fat through the diaphragmatic defect into the right thoracic cavity, and further extension into the lateral chest wall via the widened intercostal space.

After diagnosis, a surgical review was sought and conservative management was advised, with arrangements made for outpatient follow-up. The patient remained clinically stable and did not exhibit symptoms of intestinal obstruction. Both general and cardiothoracic surgical teams were consulted, and detailed discussions were held with the patient regarding the nature of the major surgical procedure, its potential risks, benefits, and perioperative considerations. Given his high anaesthetic risk and advanced chronic kidney disease-Stage V, with likely need for renal replacement therapy in foreseeable future, the patient elected for conserva-



Figure 3: Abdominal X-ray showed dilated small bowel loops.

tive management rather than operative repair. He remained minimally or asymptomatic on follow up. He was informed that should he develop any complications that fail to respond to conservative management, he will require surgery.

DISCUSSION

TDIH can present with a wide spectrum of symptoms and this includes epigastric pain,¹ intestinal obstruc-

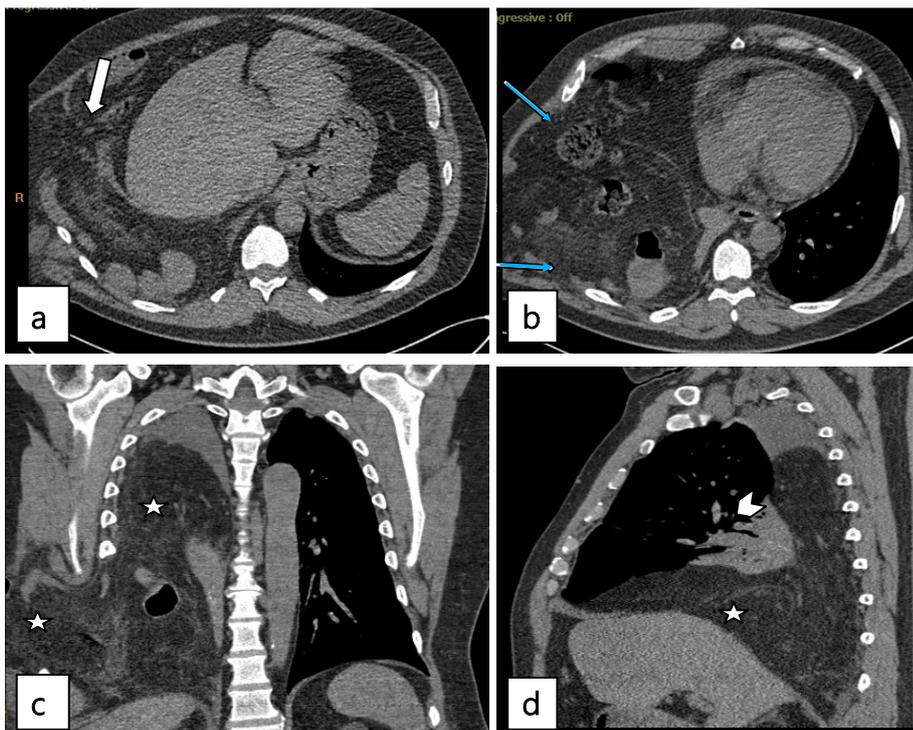


Figure 4: A non contrast CT scan of the chest in axial (a & b), coronal (c) and sagittal (d) views. a) A defect was noted at the right hemidiaphragm near the lateral costophrenic angle (*thick arrow*). b) The right 7th-8th lateral intercostal space is markedly widened (*thin blue arrows*). c) There is herniation of ascending colon, transverse colon, mesentery and peritoneal fat into the right thoracic cavity via the diaphragmatic defect and into the right lateral chest wall through the widened intercostal space (*star*). d) Associated atelectasis of the right lung lower lobe was also noted

tion,¹ acute left thoraco-abdominal pain following the sudden appearance of a bulge at the left posterolateral chest wall.^{1,3,6,10} Others have reported a single episode of dark-coloured vomiting,⁹ gradual swelling on left side of the chest that becomes prominent on straining and reduces in the lateral decubitus position,^{4,5,11} and progressive exertional breathlessness.^{5,7}

Most reported cases of TDIH present acutely and were associated with underlying risk factors such as falls, road traffic accidents, or blunt trauma.^{3,4,11} Other precipitating factors include prolonged daily use of a tight abdominal belt traditionally worn by Cretan villagers of Crete while milking sheep,¹⁰ violent or intractable coughing episodes,^{2,7} forceful sneezing,¹ chronic obstructive pulmonary disease,² and chronic steroid use.⁶ In rare instances, no precipitating cause has been identified.^{1,5}

Spontaneous TDIH is rare, with only three reported cases linked to blunt trauma or accidental injury.^{3,4,11} TDIH is frequently associated with fractures of the ninth and tenth ribs,^{1-3,5} and has been reported more commonly on the left side.^{1-3,5,6,10} In our case, however, the defect was located in the lateral aspect of the right hemidiaphragm, with widening of the right 7th-8th intercostal space and herniation of the ascending colon, transverse colon, mesentery, and peritoneal fat into the right thoracic cavity.

On examination, findings have included a reducible soft-tissue mass at the 7th intercostal space,^{1,2,4-6,10,11} extensive chest wall ecchymosis,^{2,6,7,10} and diminished lung sounds involving ipsilateral lower chest.² In some cases, the condition has initially been misdiagnosed as a lipoma¹¹ or myalgia.¹

Diagnosis of TDIH is often with radiological imaging. The imaging diagnosis of TDIH can be challenging, as its radiographic features may mimic other thoracic or abdominal pathologies if only plain radiography is performed. While non-diagnostic, CXR often provide clues and findings include mild elevation of the ipsilateral hemidiaphragm, blunting of the costophrenic angle¹⁰ and inferior displacement of the ribs.⁴ The presence of bowel gas within the thoracic cavity represents an important diagnostic clue. However, this may be subtle and easily overlooked, as occurred in our case. Thoracic ultrasound may help exclude pleural fluid but has limited sensitivity for detecting diaphragmatic hernia.^{1-5,7-8,10-11} As highlighted in our case, careful and thorough inspection of the imaging is important in order not to miss any subtle signs.

Generally, plain radiography and ultrasound have limited diagnostic value in TDIH. CT scan remains the

gold standard, as it enables precise localisation of the diaphragmatic defect, detailed characterisation of herniated abdominal contents, and assessment of associated complications such as bowel obstruction or strangulation. In addition, CT is useful in differentiating TDIH from other thoracic pathologies, including pleural effusion and chest wall tumors. Multiplanar reconstructions, particularly in the coronal and sagittal planes, are valuable for clearly delineating the diaphragmatic defect and facilitating preoperative planning.^{1-7,10,11} Characteristic features include ipsilateral hemidiaphragm with blunting of the costophrenic angle,^{5,10} radiological evidence of old ninth to tenth rib fractures,^{1,2,3,5} subcutaneous protrusion of abdominal fat,⁵ herniation of colon,^{10,11} liver and right colon, as well as omentum, splenic flexure, stomach, and the anterior aspect of the spleen into the thoracic cavity.^{2,6} Additional findings have included ipsilateral lower-lobe subsegmental atelectasis.¹⁰

Abdominal radiographs can demonstrate features of intestinal obstruction, yet they are nonspecific for diaphragmatic hernia unless bowel loops are visualised above the diaphragm.^{1-5,7,10}

Management of TDIH is surgical, especially if symptomatic. Even for non-symptomatic cases, surgery should be considered as the condition may progress. Surgical management of TDIH includes reduction of herniated contents, repair of both the diaphragmatic and intercostal defects, and frequently mesh reinforcement to prevent recurrence; the choice of approach (thoracic, abdominal, or thoracoabdominal) depends on the size, chronicity, and presence of complications.^{3-5,7,10} In our case, the patient responded to conversation and after discussion and taking into account his comorbidities, the patient decided against surgery and elected for a wait and see approach. To date, he remains asymptomatic or mildly symptomatic. However, he is aware that he may need to proceed with surgery if he develops complications that do not respond with conservative treatment.

CONCLUSION

TDIH is a rare and often under recognised condition that can sometime presents with diagnostic challenges. This case highlights a usual right sided presentation initially misdiagnosed as pleural effusion and chest wall lipoma, underscoring the importance of maintaining a high index of suspicion in atypical chest wall swellings. CT scan remains the gold standard for diagnosis.

Take Home Message

- TDIH is a rare entity resulting in defects of both the diaphragm and intercostal musculature, most frequently associated with rib fractures.
- Clinical presentation may mimic other thoracic or abdominal conditions such as pleural effusion and chest wall lipoma leading to misdiagnosis.
- Bowel gas within the thoracic cavity on imaging is a critical diagnostic clue but may be subtle and overlooked.
- CT imaging is the gold standard for diagnosis and preoperative planning, with multiplanar reconstructions particularly valuable.
- Definitive management requires surgical reduction of herniated contents and repair of both diaphragmatic and intercostal defects.

Abbreviations

TDIH	Transdiaphragmatic intercostal hernia
CT	Computed tomography
CXR	Chest X-ray

Declarations

Patient Consent

Patient consent has been obtained.

Disclosure and Conflict of Interest

The authors declare that they have no conflicts of interest and no financial disclosures relevant to this case report.

Acknowledgments

None

References

1. Samúdio MJ, Aparício DJ, Urbano ML, Barão A, Lopes AS, Miranda L. Transdiaphragmatic intercostal hernia induced by sternutation: A case report. *Int J Surg Case Rep*. 2024;120:109824.
2. Chapman AA, Duff SB. A Case of Spontaneous Transdiaphragmatic Intercostal Hernia with Contralateral Injury, and Review of the Literature. *Case Rep Surg*. 2017;2017:1–4.
3. Yodonawa S, Kobayashi K, Yoshida S, Ogawa I, Ito H, Kato A, et al. Transdiaphragmatic intercostal hernia following blunt trauma. *Gen Thorac Cardiovasc Surg*. 2012;60:459–61.
4. Benizri El, Delotte J, Severac M, Rahili A, Bereder JM, Benchimol D. Post-traumatic transdiaphragmatic intercostal hernia: report of two cases. *Surg Today*. 2013;43:96–9.
5. Aggarwal G, Khandelwal G, Shukla S, Maheshwari A, Mathur R, Acharya D. Spontaneous transdiaphragmatic intercostal hernia: a rare clinical entity. *Hernia*. 2012;16:113–5.
6. Lee J, Kim JS, Jeong JY. Non traumatic acquired acute transdiaphragmatic intercostal hernia induced by coughing. *J Cardiothorac Surg*. 2023;18:212.
7. Loumiotis I, Ceppa DP. Giant Transdiaphragmatic Intercostal Hernia. *Ann Thorac Surg*. 2017;104:e93.
8. Losanoff JE, Edelman DA, Salwen WA, Basson MD. Spontaneous rupture of the diaphragm: Case report and comprehensive review of the world literature. *J Thorac Cardiovasc Surg*. 2010;139:e127–8.
9. Croce E, Mehta V, Croce EJ, Mehta VA. Intercostal pleuroperitoneal hernia. *J Thorac Cardiovasc Surg*. 1979;77:856–7. PMID: 374885. *J Thorac Cardiovasc Surg*. 1979 Jun;6:856–7.
10. Lasithiotakis K, Venianaki M, Tsavalas N, Zacharioudakis G, Petrakis I, Daskalogiannaki M, et al. Incarcerated spontaneous transdiaphragmatic intercostal hernia. *Int J Surg Case Rep*. 2011;2:212–4.
11. Biswas S, Keddington J. Soft right chest wall swelling simulating lipoma following motor vehicle accident: transdiaphragmatic intercostal hernia. A case report and review of literature. *Hernia*. 2008;12:539–43.