Unexplained Abdominal Pain Caused by Fracture of the Thoracic Vertebra

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Patient: Male, 83-year-old
Final Diagnosis: Thoracolumbar compression fracture
Symptoms: Abdominal pain
Medication: —
Clinical Procedure: —
Specialty: Family Medicine

Objective: Unknown etiology
Background: It is important to identify the cause of chronic abdominal pain, especially in older adults. Thoracolumbar vertebral compression fractures are one potential cause, and can be difficult to identify. We report a case of an older man with severe unexplained abdominal pain and nausea due to an inadequately treated thoracolumbar vertebral compression fracture.

Case Report: A 93-year-old man fell 89 days prior to visiting the hospital and was diagnosed with a compression fracture in the Th12 vertebra. He started wearing a corset on the day of the injury. Two days later, he developed abdominal pain, mild nausea, and a decreased appetite. He attributed the symptoms to wearing the corset; therefore, he stopped wearing it. The cause of his abdominal symptoms could not be determined by blood tests and computed tomography of the abdomen. A 45° upper body elevation induced marked right lower abdominal pain (consistent with the dominant region of Th12-L1), and decreased temperature sensation was observed in the same region. We concluded that the abdominal pain was caused by neuropathy owing to a ruptured Th12 vertebral fracture. The patient was treated conservatively, the abdominal pain and nausea resolved 7 weeks after admission, and the patient was discharged.

Conclusions: When assessing patients with unexplained abdominal pain, vertebral compression fractures should be included in the differential diagnosis and the necessary diagnostic assessments should be made as early as possible. Early diagnosis provides a wider range of treatment options and can contribute to minimizing functional decline.

Keywords: Abdominal Pain • Diagnostic Errors

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**Background**

Chronic abdominal pain in the elderly is a relatively common condition; however, it is not easy to identify a thoracolumbar vertebral compression fracture as the cause. Therefore, thorough examination of medical history and physical examination are important for differentiation of the cause of chronic abdominal pain, especially in the elderly. In this article, we present a case of vertebral compression fracture as the cause of unexplained abdominal pain.

**Case Report**

A 93-year-old man fell 89 days prior to visiting the hospital, and a diagnosis of a compression fracture in the Th12 vertebra was made by an orthopedic surgeon. The patient started wearing a corset on the day of the injury; however, 2 days later, he developed prominent abdominal pain, mild nausea, and a decreased appetite. Therefore, he visited the Emergency Department of our hospital. His medical history included a myocardial infarction 18 years earlier, heart failure, and chronic obstructive pulmonary disease. He had been constipated in the past, but had not experienced any worsening of constipation after the fall. He had not taken opioid analgesics.

The physician performed blood tests and an electrocardiogram, echocardiogram, and computed tomography (CT) scan of the abdomen; however, no new cause of the symptoms other than the compression fracture was identified (Figure 1). The patient was advised to continue treatment with the orthopedic surgeon. However, he attributed his abdominal symptoms to wearing the corset; therefore, he stopped wearing it.

The patient's symptoms persisted and his food intake decreased; thus, he was referred to our department 89 days after the injury, owing to the unexplained abdominal pain and nausea. He had not resumed wearing a corset. Because he was taking several medications, we suspected theophylline poisoning as the cause of his nausea and abdominal pain, and, hence, discontinued the medications.

However, his symptoms did not improve, and so he was admitted for a thorough diagnostic evaluation.

**Investigations**

On admission, the patient's vital signs were as follows: body temperature, 36.6°C; blood pressure, 172/82 mmHg; pulse, 82 beats/min; respiratory rate, 16 breaths/min; and SpO₂, 99% on room air. A physical examination revealed no rigidity in the parietal region, no restriction of neck rotation, normal breath sounds, normal heart sounds, no murmur, a flat and soft abdomen, no tenderness, no costovertebral angle knocking pain, and no skin rash. No abnormalities were found in the nerves of the arms or legs. Blood tests, including complete blood count and biochemistry, showed no abnormal findings. Electrocardiogram, echocardiogram, head CT, head magnetic resonance imaging, and upper gastrointestinal endoscopy also showed no abnormalities. Contrast-enhanced CT of the chest and abdomen revealed no abnormal findings, except for progressive collapse of the Th12 vertebra (Figure 2). There were no signs of a recent myocardial infarction, worsening heart failure, intracranial lesions, intestinal obstruction, ileus, or electrolyte abnormalities.

Careful physical examination revealed that a 45° upper body elevation induced marked right lower abdominal pain, which was consistent with the dominant region of Th12-L1. Additionally, a decrease in temperature sensation was observed in the same region, with no decrease in pain or pressure sensation. Thus, we determined that the patient’s abdominal pain was caused by neuropathy owing to a ruptured fracture of the Th12 vertebra. Furthermore, the patient’s symptoms of chronic abdominal pain and nausea were reliably reproduced by raising the right arm, because of reproducible hyperalgesia in Th12-L1.

**Treatment**

Symptomatic therapy of acetaminophen and metoclopramide was prescribed and administered either orally or via intravenous
injection. Because of the delay in the diagnosis, surgery was not an option.

Outcome and Follow-Up

The patient’s abdominal pain and nausea resolved 7 weeks after admission. He continued to refuse to wear a corset. He was transferred to another hospital for further medical treatment, was discharged 5 weeks later, and received further rehabilitation for the compression fracture at a facility for older adults. The rehabilitation improved his activities of daily living and enabled him to return home.

Discussion

The differential diagnosis of unexplained chronic abdominal pain is more limited than that of acute abdominal pain (Table 1), and making a diagnosis based on examination and imaging is generally challenging [1]. A previous study found that 20% of patients with thoracolumbar compression fractures had abdominal pain, and 27% had nausea [2]. As the intercostal and subcostal nerves originate from the thoracic/upper lumbar nerve branches, this makes anatomical sense, and nerve damage resulting from thoracolumbar vertebral body injuries is associated with radiating pain, including abdominal pain [3]. As pain is reliably induced by trunk or abdominal wall movement, pain on elevation of the right arm is generally related to spinal extension, as in this case. There have been reports of similar diagnostic errors in which patients were initially diagnosed with lateral or anterior cutaneous nerve entrapment syndrome but were later found to have a compression fracture [4]. Abdominal pain caused by compression fractures is relatively common in clinical practice but is generally underreported [5].

Another notable differential diagnosis is iliocostal impingement syndrome, in which abdominal pain is associated with thoracolumbar compression fractures. In this syndrome, the space between the lower ribs and iliac bone is narrowed due to excessive kyphosis, and soft tissues, such as the intercostal nerves, are compressed, resulting in pain [6]. Another condition that can cause nausea associated with thoracolumbar compression fractures is esophageal hiatal hernia caused by scoliosis [7], which was not observed in this case. Additionally, wearing a corset to treat thoracolumbar compression fractures can cause superior mesenteric artery syndrome (cast syndrome), leading to nausea and abdominal pain [8]. As described above, abdominal pain was consistent with the diagnosis of a nerve root symptom because it occurred reproducibly with elevation of the arms. The painful area generally corresponded to the dominant area of the Th12-L1 nerve root and was accompanied by hypothermia.

In the present case, in addition to persistent lower back pain, unexplained abdominal pain persisted for 3 months, during which time the vertebral body crush and disuse syndrome progressed. The mild lower back pain and severe abdominal pain and nausea made the diagnosis difficult.

Table 1. Possible causes of unexplained chronic abdominal pain.

- Abdominal myofascial pain syndrome
- Hernia (Spigelian, umbilical, epigastric)
- Abdominal wall tumor (desmoid tumors)
- Abdominal wall endometriosis
- Abdominal wall tear
- Scar tissue (appendectomy, caesarean section, laparoscopy)
- Rib-tip syndrome
- Slipping rib syndrome
- Rib abnormalities
- Herpes zoster
- Radiculopathy (traumatic)
- Diabetic radiculopathy
- Neurofibroma/subarachnoid cysts, Schwannoma
- Iliinguinal or iliolypogastric nerve entrapment
- Athletic hernia or sports groin/pubalgia
- Herniated disk
- Abnormalities of vertebral column, including joints
- Exaggerated lumbar lordosis/leg length difference

Figure 2. OSagittal section of abdominal computed tomography (CT) performed after the patient was admitted for diagnostic evaluation, 93 days after his fall. The vertebral compression fracture has progressed since the previous abdominal CT scan 3 months previously.
There was a possibility of Kummell’s disease [9], which is also known as posttraumatic delayed vertebral collapse. This disease is caused by damage to the blood vessels supplying blood to the vertebral body. Although MRI is valuable in diagnosing Kummell’s disease, it was not performed in this case because the compression fracture had already progressed significantly. Gas images in the vertebral body on CT can reflect Kummell’s disease.

In vertebral body rupture fractures, early posterior fusion or percutaneous vertebroplasty may be indicated [10], and physicians should be aware of the possibility of abdominal symptoms after a compression fracture because early diagnosis and treatment can prevent a decline in activities of daily living. In the present case, due to the delay in the diagnosis, the vertebral compression had progressed and the opportunity for surgery had been missed.

Conclusions

In conclusion, thoracolumbar vertebral compression fractures are a common condition, especially in older adults, and nerve damage due to compression fractures can cause unexplained abdominal pain. In the present case, nerve damage due to a thoracolumbar vertebral compression fracture caused abdominal pain and nausea. When assessing patients with unexplained abdominal pain, vertebral compression fractures should be included in the differential diagnosis and the necessary diagnostic assessments should be made as early as possible. Early diagnosis can lead to a wider range of treatment options and may contribute to minimizing functional decline.

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Declaration of Figures’ Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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