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Severe Isolated Chest Pain as the Sole Manifestation of Duodenal Ulcer: A Case Report with 19-Month Follow-up

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Case Report

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Abstract

Background Chest pain is a common clinical presentation with a wide range of differential diagnoses. Visceral disorders can mimic chest pain through the mechanism of visceral-cutaneous referred pain; this is particularly likely to lead to misdiagnosis across medical specialties when typical gastrointestinal symptoms are absent.

Case presentation A 24-year-old male patient presented with isolated right-sided chest pain that had persisted for over one month and had worsened over the past 20 days (NRS score of 8/10), with no gastrointestinal symptoms. He had previously been evaluated by the departments of thoracic surgery, dermatology, and pain medicine; chest CT, thoracic spine MRI, and CTA of the lungs and thoracic aorta were all negative. The pain medicine department led a multidisciplinary evaluation, which included abdominal CT and gastroscopy.Gastroscopy revealed a deep, large ulcer in the duodenal bulb (Stage A1), and Helicobacter pylori was detected. Two days after initiating treatment for the ulcer and to eradicate Helicobacter pylori, the pain subsided significantly, and tramadol was discontinued. The patient was discharged on the fifth day after showing improvement. At the 19-month follow-up, the patient remained pain-free.

Conclusion This case demonstrates how visceral pain can "cross-system" and manifest as somatic chest pain. The 19-month period of complete remission strongly supports the diagnosis that duodenal ulcer is the cause of the patient's chest pain. Clinicians should recognize that the anatomical location of symptoms does not necessarily indicate the site of the lesion. Long-term follow-up is a crucial step in verifying the diagnostic hypotheses of difficult cases.

Background

Chest pain is one of the most common reasons for seeking medical care in outpatient clinics and emergency departments, and its differential diagnosis encompasses diseases involving multiple systems, including cardiovascular, respiratory, gastrointestinal, musculoskeletal, neurogenic, and psychogenic conditions. In recent years, international guidelines have moved away from the traditional dichotomy of “typical” versus “atypical” chest pain, reclassifying chest pain into three categories: cardiac, possibly cardiac, and possibly non-cardiac [1, 2]. This change aims to emphasize a systematic evaluation of non-cardiac causes and to prevent delays in diagnosing extracardiac conditions resulting from the “atypical” label.Under this new framework, although cardiovascular disease remains a critical condition that must be ruled out as a priority, a large number of patients with chest pain are ultimately diagnosed with non-cardiac chest pain. Studies have found that among patients undergoing coronary angiography for chest pain, approximately 20%–39% have normal coronary arteries [3], a significant proportion of which can be attributed to esophageal or gastroduodenal diseases. Gastrointestinal diseases are one of the common causes of non-cardiac chest pain. Gastroesophageal reflux disease (GERD) is the most common cause of non-cardiac chest pain in Western countries, accounting for 60% of cases; in South Korea, GERD accounts for 41% of cases of non-cardiac chest pain [4]. Hsia et al.

performed esophagogastroduodenoscopy, esophageal manometry, and the Bernstein test on 100 consecutive patients with noncardiac chest pain and found evidence of esophagitis, gastritis, duodenitis, or peptic ulcer disease in 48 cases [5]. Park et al. conducted a large-scale, multicenter study involving 904 patients with noncardiac chest pain. The results showed that gastritis had the highest prevalence (72.9%) on upper gastrointestinal endoscopy, followed by GERD (48.2%) and peptic ulcers (17.0%) [6]. Among patients undergoing upper gastrointestinal endoscopy for chest pain as the chief complaint, as many as 36.2% were found to have upper gastrointestinal mucosal lesions [3].

Visceral-somatic referred pain is the key neural mechanism for understanding such cases. The sensory afferents from internal organs enter the spinal cord through the visceral nerves and converge with the somatic afferents from the body surface at the same neuron in the spinal dorsal horn. The brain cannot accurately distinguish the source of the signals, thus "mislocalizing" visceral pain to the body surface. The afferent fibers from the stomach and duodenum enter the spinal cord segments T5-T12 [7], so their pain can involve the chest, back, and even the shoulders. However, when patients lack typical gastrointestinal symptoms (such as upper abdominal pain, heartburn, acid reflux, nausea, vomiting), clinicians rarely associate chest pain with gastric-duodenal diseases.

A few studies have reported cases of peptic ulcers in which chest pain was the sole or primary symptom. In 1959, Shedrow reported three cases of gastric ulcers presenting with chest pain, noting that ulcers of the upper lesser curvature of the stomach often present as chest pain without gastric symptoms [8]. Shikino et al. reported a case of a 51-year-old woman in whom left-sided chest pain was the sole symptom of a gastric ulcer [9]. Namba et al. reported a case of a 48-year-old man with a duodenal ulcer presenting as intractable chest pain in the right T6–T7 dermatomal region [7]. A study by Albaqawi et al. showed that the incidence of chest pain among patients with peptic ulcers was as high as 42.4% [10]. In cases of perforated ulcers, chest pain and dyspnea may even be the initial manifestations of perforation [11], further highlighting the importance of gastrointestinal diseases in the differential diagnosis of chest pain.

Although the aforementioned studies have indicated the association between chest pain and gastric-duodenal diseases, cases of duodenal ulcers presenting only with isolated severe chest pain are still relatively rare. We report a case of a 24-year-old male with severe right-sided chest pain (NRS 8/10) as the sole clinical manifestation, without any digestive tract symptoms. After visiting departments such as thoracic surgery, dermatology, and pain management, and undergoing multiple examinations, he was finally diagnosed with duodenal bulb ulcer through gastroscopy. Through this case, our aim is: (1) to demonstrate the clinical manifestations of visceral-somatic referred pain with a specific case; (2) to propose the clinical principle that "the anatomical location of symptoms does not fully equal the anatomical location of the lesion"; (3) to emphasize the crucial value of long-term follow-up in verifying the correctness of the diagnosis.

Case presentation

The patient is a 24-year-old male. He was admitted to the hospital due to "right chest pain for over one month, which has worsened for 20 days". The pain is needle-like, with a NRS score of 8/10. The pain is more severe during the afternoon and at night, and slightly improves when lying down. It is not related to eating. Occasionally, it radiates to the right back, accompanied by mild chest tightness, without digestive tract symptoms such as nausea, vomiting, heartburn, or acid reflux.

Within one month prior to admission, the patient visited the thoracic surgery, dermatology, and pain management outpatient clinics, where he underwent a chest CT scan, thoracic spine MRI, abdominal ultrasound, electrocardiogram, and blood tests (including complete blood count and liver and kidney function tests); none of these revealed any definite abnormalities. Symptomatic treatment with pregabalin, methylcobalamin, and tramadol was administered, but the response was poor. Medical History: Chronic hepatitis B (e-antigen positive) for 8 years, currently receiving oral antiviral therapy with tenofovir alafenamide. History of smoking for 3 years at a rate of 10 cigarettes per day; denies a history of chronic alcohol consumption. Physical Examination on Admission: Vital signs were stable; physical examination of the chest, abdomen, and spine revealed no abnormal findings.

After admission, immediate tests were conducted for D-dimer, myocardial enzyme spectrum, and CTA of the pulmonary artery and thoracic aorta, all of which were negative. Acute coronary syndrome, pulmonary embolism, and aortic dissection were ruled out. Pregabalin, methylcobalamin, and tramadol were used for symptomatic treatment. Right thoracic paravertebral block was performed, but the pain was not completely controlled. Due to the poor effect of conventional treatment, a multidisciplinary discussion was requested, and it was suggested to conduct abdominal CT and gastroscopy. Gastroscopy showed a 1.2cm × 0.8cm deep ulcer in the duodenal bulb (stage A1), and Helicobacter pylori was positive (Fig. 1). Anti-ulcer and Helicobacter pylori eradication quadruple therapy was initiated, and pregabalin was discontinued(specific scheme see Table 1). The pain significantly improved on the second day of anti-ulcer and Helicobacter pylori eradication treatment, tramadol was stopped, and the patient was discharged on the fifth day, with a follow-up appointment at the gastroenterology outpatient department.

One month after discharge, the patient was followed up at the gastroenterology outpatient department. The pain was completely relieved (NRS 0). The medication was adjusted to aplivastatin, rabeprazole, combined with oral suspension of sucralfate. The treatment was continued for half a month. Since then, the patient did not take any additional medication and did not undergo a follow-up gastroscopy. Five months after discharge, a phone follow-up was conducted. The patient reported that there was no chest pain after discontinuing the medications for peptic ulcers. At the 12th and 19th months after discharge, phone follow-ups were conducted. The pain remained completely relieved.

Table 1
Interventions during each stage of treatment and pain responses

Phase	Intervention	Pain Outcome
Outpatient Care	Oral pregabalin, methylcobalamin, and tramadol	Invalid (NRS remains between 7 and 8)
Day 1 of Hospitalization	Tramadol injection (during flare-ups)	Valid for a limited time
Days 2–4 of Hospitalization	Thoracic paravertebral block + increased pregabalin dose (150 mg bid)	Partially effective; still requires medication for daily flare-ups
Day 9 of Hospitalization	Initiate anti-ulcer and anti-Helicobacter pylori therapy (amoxicillin capsules 1 g bid; colloidal bismuth subcitrate capsules 200 mg bid; esomeprazole magnesium enteric-coated capsules 20 mg bid; levofloxacin tablets 0.5 g qd; sucralfate oral suspension 10 mL tid), and discontinue pregabalin.	Once the underlying cause was addressed, the pain began to subside
Day 11 of Hospitalization	Continue treatment for the ulcer; discontinue tramadol.	Significant relief from pain
Day 14 of Hospitalization	Discharged after recovery	The pain has almost completely disappeared
1 Month After Discharge	The regimen was adjusted to 5 mg of esomeprazole enteric-coated tablets once daily, 100 mg of ribavirin three times daily, and 10 mL of sucralfate oral suspension three times daily; the patient continued this treatment for half a month before discontinuing it on their own.	The pain has completely subsided (NRS 0)
5 months after discharge	After discontinuing the medication on his own, he did not receive any further treatment for his ulcer.	Complete and sustained relief from pain
12 months after discharge	After discontinuing the medication on his own, he did not receive any further treatment for his ulcer.	Complete and sustained relief from pain
19 months after discharge	After discontinuing the medication on his own, he did not receive any further treatment for his ulcer.	Complete and sustained relief from pain

Discussion

The core teaching significance of this case lies in the fact that a severe pain in the chest (rated 8/10 on the NRS scale) has an underlying cause located in the duodenum of the digestive system. The pain "crosses" the boundaries of different anatomical systems, and the patient shows no digestive tract

symptoms at all, further enhancing this "disguise". This case is not a rare "weird disease", but rather a typical clinical presentation of a common neural mechanism - visceral-cutaneous referred pain.

Sensory input from the stomach and duodenum provides the neurological foundation for understanding this case. Nociceptive signals from the stomach and duodenum enter the spinal cord at segments T5–T12 via visceral afferent fibers (through the celiac plexus and the vagus nerve) [7]. These visceral afferent fibers converge with somatic afferent fibers from the right chest wall on the same neurons in the dorsal horn of the spinal cord [9]. Based on prior experience and the “familiarity” of the sensory input, the brain “attributes” pain signals that cannot be precisely localized to a more familiar somatic location—this is the neurological explanation for why the pain in this case was “localized” to the right chest.

Shikino et al. reported a similar case in which a 51-year-old woman’s left chest pain (T5–T8 dermatomes) was ultimately diagnosed as a gastric ulcer; the authors similarly attributed this to the mechanism of referred pain [9]. As early as 1959, Shedrow noted that high-location ulcers of the lesser curvature of the stomach often present as chest pain and frequently lack gastric symptoms [8]. Our case further expands on this understanding: a duodenal bulb ulcer can also present as isolated chest pain, with the pain clearly localized to the right side of the chest, similar to the report by Namba et al. [7].

The visceral-surface convergence mechanism holds significant clinical importance in non-cardiogenic chest pain. A study by Nam et al. revealed that among 121 patients with typical chest pain but normal coronary angiography, 84.9% exhibited at least one abnormality in the digestive tract after undergoing three examinations: upper gastrointestinal endoscopy, Bernstein test, and esophageal manometry [3]. A large-scale study by Park et al. further confirmed the high detection rate of upper gastrointestinal diseases in patients with non-cardiogenic chest pain [6]. These data indicate that visceral-origin chest pain is not rare but is often underestimated. However, in clinical practice, when patients lack typical digestive tract symptoms such as abdominal pain, heartburn, and acid reflux, the digestive system is still easily excluded from the differential diagnosis spectrum of chest pain. This gap between cognition and practice is worthy of vigilance.

Another key teaching point from this case: the typical symptoms of a duodenal ulcer (upper abdominal pain, heartburn, acid reflux, and symptoms related to eating) were completely absent. The literature indicates that the incidence of chest pain among patients with peptic ulcers can reach 42.4% [10], though it is relatively rare as the sole symptom. Shikino et al. also noted that approximately 58% of nonsteroidal anti-inflammatory drug (NSAID)-associated ulcers are asymptomatic; analgesic medications may mask the symptoms of peptic ulcers, causing them to be more severe at the time of diagnosis [9].

This case suggests that one should not rely solely on the presence of “typical symptoms of the system” to determine whether to consider diseases of that system. In the differential diagnosis of chest pain, even when a patient has no gastrointestinal symptoms whatsoever, clinical reasoning should proactively consider other sites when routine examinations and treatments for the “chest system” have failed.

Based on this case, we need to pay attention to a clinical point: the anatomical location of the symptoms does not always correspond exactly to the anatomical location of the lesion. This point is relatively easy to understand theoretically, but in actual clinical decision-making, it is often overshadowed by the overestimated "site-specificity".

In the diagnosis and treatment of chest pain, clinicians typically follow a prioritization sequence of “most dangerous → most common → others” [4]. While this process is efficient, it also has systemic blind spots: when the pathology is located in a system “outside the thoracic cavity,” it may be completely excluded from the initial differential diagnosis. In this case, the patient sought care successively at the thoracic surgery, dermatology, and pain management outpatient clinics. With both chest CT and thoracic spine MRI results coming back negative, the diagnosis reached an impasse—until the inpatient pain management unit broke down disciplinary barriers and expanded its scope to include the digestive system.

Case reports in the literature where perforative ulcers presented with chest pain and dyspnea as the initial symptoms [11], as well as cases of gastric ulcer perforation leading to mediastinal emphysema [12], further emphasize the significance of digestive system diseases in the differential diagnosis of chest pain. The consensus on chest pain management also clearly states that the causes of non-cardiac chest pain can originate from referred pain in abdominal and pelvic organs such as the stomach, gallbladder, and pancreas, and stresses the need for a multidisciplinary collaboration for differential diagnosis [13].A study by Albaqawi et al. also showed that the incidence of chest pain among patients with peptic ulcers is as high as 42.4% [10], a rate far higher than what is generally recognized by clinicians.

Therefore, we suggest the following: When the pain does not respond well to the conventional treatment for the "affected area", one should actively adopt a "cross-system" thinking approach - ask: Could this pain possibly originate from other systems? Visceral-somatic referred pain should be included in the routine differential diagnosis framework, rather than being considered as the "last option" after ruling out all other possible causes.

In this case, the role of the pain department is not merely "pain relief" - pregabalin and paravertebral block do indeed have some effect - but more importantly, when the pain cannot be completely controlled by conventional treatments at the "affected area", it actively crosses boundaries and initiates multidisciplinary collaboration.

It is worth noting that in the same study, Park et al. also found that as many as 82.1% of patients with noncardiac chest pain received treatment with gastrointestinal medications [6]; this figure indirectly reflects that clinicians have, in practice, included upper gastrointestinal diseases in the differential diagnosis of chest pain. However, the diagnostic and treatment process in this case demonstrates that empirical treatment alone is insufficient—when there is a high index of suspicion but a lack of typical symptoms, clinicians should proactively transcend specialty boundaries, promptly initiate objective tests

such as gastroscopy, or request collaboration from the gastroenterology department to confirm the diagnosis.

The 19-month long-term follow-up of this case provided crucial prognostic information: After the patient was diagnosed and received anti-ulcer and anti-Helicobacter pylori treatment, the pain was significantly relieved on the second day and tramadol was discontinued. The patient improved and was discharged on the fifth day, and remained pain-free for 19 months even after discontinuing the digestive ulcer medications on their own. This rapid and persistent therapeutic response further supports the judgment that duodenal ulcer is the sole and sufficient cause of the patient's chest pain.

Long-term follow-up is an important indicator of the quality of case reports. It enhances the credibility of diagnostic conclusions and also reminds clinicians that appropriate etiology-based treatment can lead to lasting therapeutic effects. In the cases reported by Shedrow, some patients developed perforations or malignant tumors because their chest pain was overlooked [8]. Bruner and Gustafson reported a 54-year-old patient whose initial symptoms of a perforated duodenal ulcer were dyspnea and chest pain [11], while Mahdi et al. reported a 29-year-old patient who developed pneumothorax as a complication of a perforated duodenal ulcer [14]. Dai et al. reported a case of a 75-year-old patient with a perforated gastric ulcer in which gas entered the mediastinum through the esophageal hiatus, leading to mediastinal emphysema [12]. Furthermore, case reports have shown that spinal cord compression can present initially with chest pain alone, leading to delayed diagnosis [15]. These cautionary cases from various medical disciplines collectively suggest that the causes of chest pain are complex and diverse; clinicians must maintain a broad perspective on differential diagnosis and avoid rigid thinking. Through 19 months of pain-free follow-up, this case positively demonstrates the value of a timely and accurate diagnosis.

This case report has the following limitations: (1) As a single-case report, it cannot establish a causal relationship but can only provide clinical warnings and generate hypotheses; (2) No quantitative assessment using psychosomatic evaluation scales was conducted, making it impossible to quantify the patient’s psychological comorbidity; (3) The patient did not adhere to medical advice regarding standardized follow-up and repeat gastroscopy; however, the outcome of persistent pain without recurrence partially compensates for this limitation; (4) No 24-hour esophageal pH monitoring or esophageal manometry was performed, so the concurrent presence of gastroesophageal reflux disease or esophageal motility disorders cannot be completely ruled out.

Conclusion

This case report describes a case of duodenal bulb ulcer presenting with isolated severe chest pain, which "crossed" the systemic boundary from the chest to the digestive tract. After initiating anti-ulcer treatment, the pain was rapidly relieved, and 19-month follow-up confirmed the long-lasting efficacy. This case suggests that visceral-somatic referred pain can cause a "dislocation" of pain across systems.

When the pain does not respond well to conventional treatment, clinical thinking must cross system boundaries. As Shedrow warned, chest pain may be the only alarm for peptic ulcers [8].

Declarations

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Author contributions

Sun G,Dai Y,Jiang P,Li C and Lin T conceived of case report idea.The manuscript was written by Sun G. Dai Y and Lin T revised the manuscript critically for important intellectual content.

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Data availability

No datasets were generated or analysed during the current study.

Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Sichuan Provincial People's Hospital. Due to the non-interventional nature of the study and the use of anonymized data, the Ethics Committee waived the requirement for signed informed consent. Nevertheless, the patients were fully informed about the study.

Consent for publication

Written informed consent for publication of the data was obtained from the patient.

Competing interests

The authors declare no competing interests.

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Figures

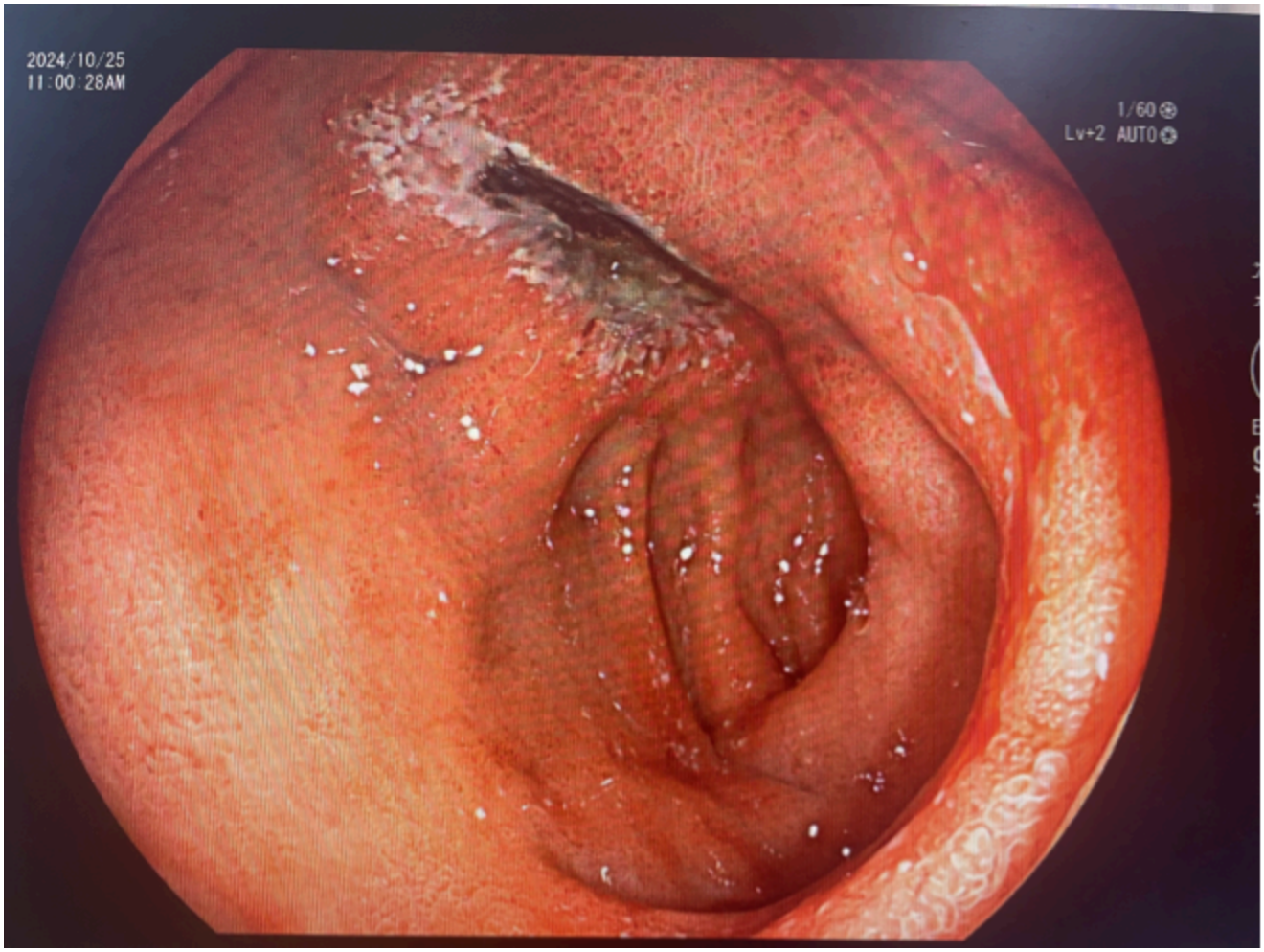


Figure 1

A deep, large ulcer measuring 1.2 cm × 0.8 cm in the duodenal bulb (Stage A1)