

14. Yıldırım G, Öztürk EA, Acar YB. Influence of Vertical Facial Patterns on Dental Arch Parameters in Class III Malocclusions: A Cross-Sectional Study. Turkish Journal of Orthodontics. 2026 Mar 31;39(1):26. doi: 10.4274/TurkJOrthod.2026.2025.100
15. Zahari AZ, Chew KH, Ruslan AH. Prevalence of Malocclusion in Prehistoric, Iron Age, Medieval, and Bronze Age Populations: A Systematic Review. Annals Of Abbasi Shaheed Hospital And Karachi Medical & Dental College. 2026 Mar 2;31(1):106-18. doi: 10.58397/b5t9hm74

Conflict of interest. The authors have no conflicts of interest to declare.

ORCID: Orlovskiy I.V. <https://orcid.org/0009-0000-2057-7542>, Beliaev E.V. <https://orcid.org/0000-0003-2168-5558>, Vakhovskiy V.V. <https://orcid.org/0000-0002-1078-3753>, Kovalchuk L.O. <https://orcid.org/0000-0002-1757-6212>, Cherkasova L.A. <https://orcid.org/0000-0001-9972-2721>, Likhitskiy O.O. <https://orcid.org/0000-0002-6132-2869>, Plaviuk L.Yu. <https://orcid.org/0000-0002-5117-8226>.

Article received: 17.07.2025

DOI 10.26724/2079-8334-2026-3-97-139-145

UDC 616.329-001-089:616.25-002-036.11

Rustamzade U.Ch., Jafarov Ch.M., Hasanov A.B., Gasimov E.M., Guliyeva S.V.
Azerbaijan Medical University, Baku, Azerbaijan

DIAGNOSIS AND TREATMENT OUTCOMES OF ACUTE MEDIASTINITIS FOLLOWING THORACIC ESOPHAGEAL INJURY

e-mail: statya2021@mail.ru

Retrospective study included 47 consecutive patients (20 men and 27 women) aged 32–59 years who were treated for acute mediastinitis secondary to open and closed injuries of the thoracic esophagus at the Department of General Surgery in Azerbaijan Medical University (Baku, Azerbaijan), between January 2000 and December 2025. The causes included foreign body perforation (n=19), iatrogenic injury (n=15), spontaneous esophageal rupture (n=8), penetrating stab or gunshot injuries (n=3), and combined tracheal and esophageal injury following blunt chest trauma (n=2). Diagnosis was based on clinical examination, contrast esophagography, computed tomography, and esophagoscopy. Surgical management included mediastinal and pleural drainage, thoracotomy, primary repair of the esophageal defect whenever feasible, and intensive postoperative care. Computed tomography and contrast esophagography were the most informative diagnostic modalities for identifying esophageal perforation and assessing mediastinal involvement. The findings of this study support the importance of early diagnosis, prompt surgical management, and comprehensive postoperative care as the principal components of successful treatment of acute mediastinitis secondary to thoracic esophageal injury.

Key words: acute mediastinitis, esophageal perforation, thoracic esophagus, esophageal injury, thoracotomy, computed tomography.

Рустамзаде У.Ч., Джафаров Ч.М., Гасанов А.Б., Гасимов Е.М., Гулієва С.В.

ДІАГНОСТИКА ТА РЕЗУЛЬТАТИ ЛІКУВАННЯ ГОСТРОГО МЕДІАСТИНІТУ ПРИ ТРАВМАХ ГРУДНОГО ВІДДІЛУ СТРАВХОДУ

До ретроспективного дослідження було включено 47 послідовних пацієнтів (20 чоловіків і 27 жінок) віком від 32 до 59 років, які проходили лікування з приводу гострого медіастиніту, вторинного щодо відкритих і закритих ушкоджень грудного відділу стравоходу, на кафедрі загальної хірургії Азербайджанського медичного університету (Баку, Азербайджан) у період з січня 2000 року по грудень 2025 року. Причинами ушкодження стравоходу були перфорація чужорідними тілами (n = 19), ятрогенні ушкодження (n = 15), спонтанний розрив стравоходу (n=8), колото-різани та вогнепальні поранення (n=3), а також поєднане ушкодження трахеї та стравоходу при тупій травмі грудної клітки (n=2). Діагностика ґрунтувалася на клінічному обстеженні, рентгеноконтрастному дослідженні стравоходу, комп'ютерній томографії та езофагоскопії. Хірургічне лікування включало дренування середостіння та плевральних порожнин, торакотомію, ушивання дефекту стравоходу за наявності технічних можливостей та комплексну інтенсивну післяопераційну терапію. Найбільш інформативними методами діагностики для виявлення перфорації стравоходу та оцінки поширеності запального процесу в середостінні виявилися комп'ютерна томографія та контрастне дослідження стравоходу. Отримані результати підтверджують важливість ранньої діагностики, своєчасного хірургічного втручання та комплексного післяопераційного лікування як основних складових успішного лікування гострого медіастиніту, що розвинувся внаслідок ушкодження грудного відділу стравоходу.

Ключові слова: медіастиніт, ураження стравоходу, грудний відділ стравоходу, перфорація стравоходу, хірургічне лікування, комп'ютерна томографія.

Esophageal perforation is one of the most severe emergencies in thoracic surgery because it is associated with the rapid development of mediastinal infection, sepsis, multiple organ failure, and high mortality. Despite advances in diagnostic imaging, antimicrobial therapy, and surgical techniques, delayed diagnosis remains the principal factor

adversely affecting treatment outcomes [2, 5, 6, 8]. Acute mediastinitis is the most serious complication of thoracic esophageal injury and develops as a consequence of contamination of the mediastinum by saliva, gastric contents, digestive enzymes, and microorganisms. The inflammatory process rapidly spreads through the loose mediastinal connective

tissue and frequently extends into the pleural cavities, resulting in empyema, severe intoxication, and systemic inflammatory response syndrome [1, 2, 10].

The most common causes of thoracic esophageal perforation include iatrogenic injuries during endoscopic procedures, perforation by ingested foreign bodies, spontaneous rupture (Boerhaave syndrome), and penetrating or blunt thoracic trauma [3, 5, 8]. According to recent studies, iatrogenic perforations currently account for more than half of all esophageal injuries owing to the increasing use of diagnostic and therapeutic endoscopic procedures [1, 5].

Early diagnosis remains challenging because the initial clinical manifestations are often nonspecific. Chest pain, dysphagia, dyspnea, fever, and subcutaneous emphysema are the most common symptoms; however, their severity depends on the location of perforation, the time elapsed since injury, and the extent of mediastinal contamination [3, 13]. Contrast-enhanced computed tomography has become the imaging modality of choice because it accurately identifies the site of perforation, mediastinal air and fluid collections, pleural involvement, and the extent of inflammatory changes. Contrast esophagography and esophagoscopy provide valuable complementary information and facilitate treatment planning [4, 12].

The management of esophageal perforation should be individualized according to the cause, location, size of the defect, time from perforation, and the patient's clinical condition. Although minimally invasive and endoscopic techniques have expanded therapeutic options during the last decade, prompt surgical intervention remains the cornerstone of treatment in patients with extensive mediastinal contamination or generalized sepsis [2, 5, 6, 11].

However, comprehensive clinical studies evaluating acute mediastinitis caused by different mechanisms of thoracic esophageal injury within a single patient cohort remain limited. The present study integrates patients with diverse etiologies and illustrates key diagnostic and surgical principles through representative clinical cases, providing practical evidence for optimizing the management of this life-threatening condition.

The purpose of the study was to evaluate the clinical presentation, diagnostic approaches, surgical management, and treatment outcomes in patients with acute mediastinitis secondary to thoracic esophageal injuries.

Materials and methods. This study included 47 consecutive patients (20 men and 27 women) aged 32–59 years who were treated for acute mediastinitis secondary to open and closed injuries of the thoracic esophagus at the Department of General Surgery in Azerbaijan Medical University (Baku, Azerbaijan), between January 2000 and December 2025. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki (2013

revision). Patient confidentiality was strictly maintained, and all personal data were anonymized before analysis.

A detailed medical history was obtained from all patients to determine the mechanism and possible cause of esophageal injury, including accidental ingestion of foreign bodies, previous endoscopic or other instrumental procedures involving the esophagus, spontaneous rupture, and chest trauma.

Clinical evaluation included assessment of chest pain, dysphagia, dyspnea, fever, signs of shock, respiratory distress, subcutaneous emphysema involving the neck, supra- and infraclavicular regions and chest wall, as well as crepitus on palpation.

All patients underwent a comprehensive diagnostic evaluation consisting of chest radiography, contrast esophagography, computed tomography (CT), and esophagoscopy. These investigations were performed to determine the site and extent of esophageal perforation, identify mediastinal and pleural involvement, detect retained foreign bodies when present, and guide the choice of surgical treatment. After confirmation of the diagnosis, all patients underwent surgical treatment. The surgical approach was selected individually according to the anatomical location of the esophageal perforation, the extent of mediastinal involvement, and the presence of pleural complications. Surgical treatment included elimination of the source of esophageal perforation, drainage of the mediastinum and pleural cavity, repair of the esophageal defect when technically feasible, and establishment of enteral nutritional support when indicated.

Statistical analysis was descriptive. Categorical data are presented as frequencies and percentages, whereas continuous variables are presented as ranges where appropriate. No inferential statistical tests were performed because of the retrospective descriptive design and the absence of comparison groups, consistent with recommendations for reporting surgical case series [7].

Results of the study. A total of 47 patients with acute mediastinitis secondary to thoracic esophageal injury were included in the study. There were 20 (42.6 %) men and 27 (57.4 %) women aged 32–70 years.

The most common cause of thoracic esophageal injury was perforation by foreign bodies, which was identified in 19 (40.4 %) patients. Iatrogenic injuries accounted for 15 (31.9 %) cases, including injuries following esophagoscopy (n=10), esophageal bougienage (n=3), tracheal intubation (n=1), and pneumatic cardiodilatation (n = 1). Spontaneous esophageal rupture (Boerhaave syndrome) was diagnosed in 8 (17.0 %) patients. Penetrating injuries caused by stab or gunshot wounds were observed in 3 (6.4 %) patients, whereas 2 (4.3 %) patients sustained simultaneous rupture of the posterior tracheal wall and anterior esophageal wall with subsequent tracheoesophageal fistula following blunt chest trauma (Table 1).

Table 1

Etiology of thoracic esophageal injury in patients with acute mediastinitis

Cause of injury	n	%
Foreign body perforation	19	40.4
Iatrogenic injury	15	31.9
– Esophagoscopy	10	21.3
– Esophageal bougienage	3	6.4
– Tracheal intubation	1	2.1
– Pneumatic cardiodilatation	1	2.1
Boerhaave syndrome	8	17.0
Stab/gunshot injury	3	6.4
Blunt trauma with tracheoesophageal fistula	2	4.3

The clinical manifestations depended on the mechanism of esophageal injury and the interval between perforation and hospital admission. Presenting symptoms included severe chest pain, predominantly localized in the interscapular region, dysphagia, dyspnea, and fever. As the disease progressed, patients developed signs of systemic intoxication, including weakness, tachycardia, hypotension, pallor, profuse sweating, and varying

degrees of respiratory distress. Physical examination revealed subcutaneous emphysema involving the neck, supraclavicular regions, chest wall, and upper extremities, accompanied by palpable crepitus. Percussion demonstrated areas of dullness or hyperresonance corresponding to pleural involvement, whereas auscultation revealed markedly diminished or absent breath sounds over the affected hemithorax (Table 2).

Table 2

Clinical manifestations of acute mediastinitis secondary to thoracic esophageal injury

Parameter	Findings
Main symptoms	Chest pain, dysphagia, dyspnea, fever
Early clinical signs	Hypotension, pallor, sweating, respiratory distress
Physical examination	Subcutaneous emphysema, crepitus
Progressive manifestations	Tachycardia, intoxication, fever 38–39°C
Chest radiography	Mediastinal widening, pneumomediastinum, pneumothorax, hydropneumothorax, pleural effusion, pulmonary collapse, subcutaneous emphysema
Contrast esophagography	Contrast leakage outside the esophagus
Computed tomography	Mediastinal emphysema, mediastinal fluid collections, pleural effusion, pyopneumothorax, pulmonary collapse, mediastinal shift, subcutaneous emphysema
Esophagoscopy	Localization and assessment of the esophageal perforation

Chest radiography demonstrated characteristic signs of thoracic esophageal perforation, including mediastinal widening, pneumomediastinum, subcutaneous emphysema, pleural effusion, hydropneumothorax, pneumothorax, and pulmonary collapse. Contrast esophagography identified the site of perforation by demonstrating leakage of contrast material beyond the esophageal lumen into the mediastinum or pleural cavity.

Computed tomography provided detailed assessment of the extent of mediastinal infection and pleural involvement. CT findings included mediastinal emphysema, mediastinal fluid collections, pleural effusion, pyopneumothorax, pulmonary collapse, displacement of mediastinal structures, and subcutaneous emphysema. In patients with retained foreign bodies, CT also facilitated precise localization of the perforating object.

Esophagoscopy enabled direct visualization of the perforation site, determination of the size of the esophageal defect, assessment of mucosal injury, and identification or removal of retained foreign bodies when present.

Forty-six of the 47 patients underwent emergency surgical intervention after confirmation of

the diagnosis. One patient declined surgical treatment. The operative approach was selected according to the location of the esophageal perforation and the extent of mediastinal infection. Surgical treatment consisted of elimination of the cause of perforation, extensive mediastinal drainage, pleural drainage when indicated, repair of the esophageal defect whenever technically feasible, and establishment of enteral nutritional support. Patients with severe respiratory failure and septic intoxication required postoperative mechanical ventilation and intensive care until clinical stabilization was achieved.

Overall, 40 patients survived, whereas 7 died, resulting in an overall in-hospital mortality rate of 14.9 % (7/47). The principal causes of death were respiratory failure associated with severe septic intoxication (n = 4) and massive aortic hemorrhage (n = 2). One 70-year-old patient who declined surgical intervention died 20 days after diagnosis due to progressive mediastinal infection and its complications.

Case 1. A 58-year-old man was admitted in critical condition with severe dyspnea, profuse sweating, dysphagia, and right-sided chest pain

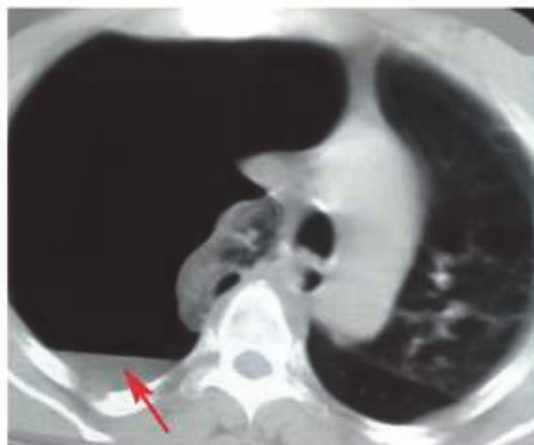
four days after accidental ingestion of a sharp chicken bone. Initial endoscopic attempts to remove the foreign body at another hospital were unsuccessful, and the patient's condition worsened during the procedure, which required transfer to an AMU surgery clinic (08.07.2011). On admission, physical examination revealed pallor, extensive subcutaneous emphysema involving the neck, chest wall, and upper extremities, absent

breath sounds over the right lung, tachycardia (120 beats/min), and arterial blood pressure of 100/70 mmHg.

Computed tomography demonstrated extensive pneumomediastinum, right-sided tension hydropneumothorax with collapse of the right lung, mediastinal shift to the left, and widespread subcutaneous emphysema resulting from thoracic esophageal perforation (Figs. 1a, b).



A



B

Fig.1. Chest computed tomography findings. A – Thoracic esophageal perforation caused by a sharp bone fragment, associated with pneumomediastinum and right-sided pneumothorax. B – Right-sided tension hydropneumothorax with collapse of the right lung, pleural fluid level, and leftward mediastinal shift.

Because of the patient's critical condition, emergency right anterolateral thoracotomy was performed. Intraoperatively, purulent pleural fluid, lung collapse, and extensive fibrinopurulent mediastinal inflammation were identified. Following esophagotomy, the sharp bone fragment was removed (Fig. 2), the esophageal defect was closed with interrupted sutures, pulmonary decortication was performed, and mediastinal and pleural drainage was established. Enteral nutritional support was provided through a nasogastric tube.



Fig. 2. Sharp bone fragment.

The patient received prolonged postoperative intensive care, broad-spectrum antimicrobial therapy, and conservative supportive treatment. His clinical condition gradually improved, and he was discharged in satisfactory condition. This case illustrates the importance of prompt recognition of thoracic esophageal perforation following unsuccessful endoscopic foreign-body extraction and demonstrates that timely surgical intervention can successfully

control mediastinal infection even in critically ill patients.

Case 2. A 54-year-old man was admitted with severe right-sided chest pain, dyspnea, weakness, and fever (39°C) seven days after accidental ingestion of a chicken bone. According to the patient, the foreign body had been removed by esophagoscopy at another hospital one day after ingestion. However, no repeat endoscopic examination was performed to exclude esophageal injury, no enteral tube was inserted, and the patient was discharged with oral feeding resumed. During the following days, progressive chest pain, dysphagia, dyspnea, and fever developed, prompting referral to our center.

On admission, the patient's condition was severe. Physical examination revealed pallor, subcutaneous emphysema involving the neck and supraclavicular regions, absent breath sounds over the right lung, tachycardia (120 beats/min), arterial blood pressure of 100/70 mmHg, and signs of respiratory compromise. Computed tomography demonstrated extensive cervical and mediastinal emphysema, right-sided pyopneumothorax with fluid and air extending to the fourth rib, collapse of the lower lobe of the right lung, left pleural effusion, and displacement of the mediastinum (Figure 3 a, b).

Because of the patient's critical condition, emergency bilateral pleural drainage was performed immediately after admission. Approximately 1 L of foul-smelling purulent fluid mixed with food particles was evacuated from the right pleural cavity, resulting in partial clinical improvement. After stabilization, the patient underwent right anterolateral thoracotomy

under general anesthesia. Surgical exploration revealed diffuse purulent mediastinitis, empyema, extensive fibrinopurulent inflammation of the mediastinal pleura, and approximately 300 mL of foul-smelling pus. The mediastinum contained food debris, including fragments of chicken skin and herbs. A 2-cm esophageal perforation with necrotic margins was identified below the tracheal bifurcation and confirmed by intraoperative esophagoscopy. Extensive mediastinal debridement and irrigation were performed, followed by placement of large-bore drains adjacent to the esophageal defect, pleural drainage, and insertion of a nasogastric tube for enteral nutrition. Postoperatively, prolonged mechanical ventilation was required for 5 days

because of severe respiratory failure and septic intoxication. Intensive care and antimicrobial therapy resulted in gradual clinical improvement. Follow-up chest computed tomography demonstrated complete re-expansion of both lungs, resolution of pleural effusions, persistence of mild paraesophageal soft-tissue edema, and correctly positioned mediastinal and pleural drains (Figure 3). Three months after surgery, the patient's clinical condition had markedly improved, with complete resolution of mediastinal infection. Contrast esophagography demonstrated rapid passage of contrast into the stomach without leakage outside the esophageal lumen, confirming complete healing of the esophageal perforation. The patient recovered successfully.

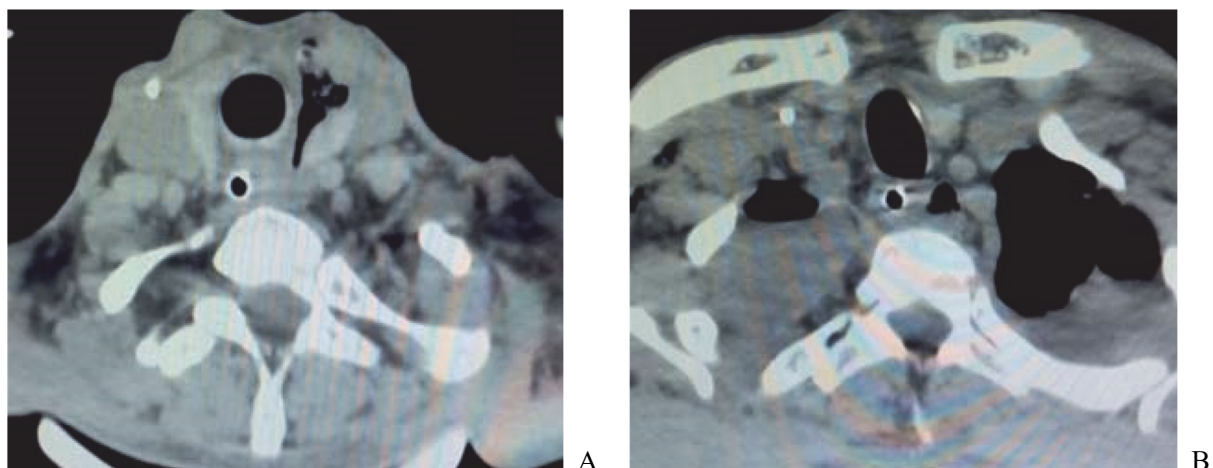


Fig.3. Chest computed tomography. A – Subcutaneous emphysema involving the left side of the neck. B – Bilateral pleural effusions involving the right and left pleural cavities.

Discussion. Acute mediastinitis secondary to thoracic esophageal perforation remains one of the most severe and life-threatening conditions in thoracic surgery because of the rapid dissemination of infection within the mediastinum and the subsequent development of pleural empyema, sepsis, respiratory failure, and multiple organ dysfunction. Despite substantial advances in diagnostic imaging, antimicrobial therapy, surgical techniques, and intensive care, mortality remains high, particularly when diagnosis and definitive treatment are delayed. According to recent international guidelines and large clinical series, the interval between esophageal perforation and initiation of treatment remains the single most important determinant of patient outcome [1–3, 5, 6, 8, 10].

In the present study, foreign-body ingestion was the leading cause of thoracic esophageal perforation, followed by iatrogenic injuries associated with endoscopic and instrumental procedures. These findings are consistent with contemporary reports demonstrating that accidental ingestion of sharp foreign bodies and iatrogenic perforations account for the majority of esophageal injuries in adults [5, 6, 8, 10]. Chirica et al. and Khaitan et al. emphasized that the widespread use of diagnostic and therapeutic endoscopy has increased the incidence of procedure-related perforations, whereas spontaneous esophageal

rupture (Boerhaave syndrome), although less common, is generally associated with more extensive mediastinal contamination and poorer prognosis because of delayed recognition and severe septic complications [2, 5, 13].

The clinical manifestations observed in our patients were comparable to those reported in previous studies. Severe chest pain, dysphagia, dyspnea, fever, tachycardia, and progressive systemic intoxication were the predominant presenting features, while subcutaneous emphysema, pleural involvement, respiratory insufficiency, and hemodynamic instability became more pronounced as mediastinal infection progressed. Similar observations have been described by Sdralis et al. and Axtell et al., who reported that the nonspecific nature of early symptoms frequently leads to misdiagnosis and delayed referral to specialized thoracic surgery centers [1, 10]. Consequently, a high index of clinical suspicion remains essential, particularly in patients presenting after foreign-body ingestion or recent endoscopic manipulation.

Our findings further confirm the importance of a multimodal diagnostic strategy. Although chest radiography remains a valuable first-line investigation capable of demonstrating pneumomediastinum, pleural effusion, hydropneumothorax, or mediastinal widening,

computed tomography has become the diagnostic modality of choice because of its superior sensitivity for detecting mediastinal inflammation, pleural collections, pneumomediastinum, and subcutaneous emphysema [1, 4, 12]. Nachira et al., Luttikhof et al., and Axtell et al. demonstrated that CT provides the most comprehensive assessment of both the extent of mediastinal contamination and associated pleuropulmonary complications, thereby facilitating appropriate surgical planning [1, 6, 8]. Similar observations were made in the present study, where CT proved to be the most informative imaging modality in patients with diffuse mediastinitis and significantly contributed to therapeutic decision-making. Contrast esophagography and flexible esophagoscopy provided complementary information by localizing the perforation and assessing the integrity of the esophageal wall, findings that are fully consistent with current diagnostic recommendations [2, 5, 10].

Early surgical intervention remains the cornerstone of treatment for patients with thoracic esophageal perforation complicated by diffuse mediastinitis. In our series, the surgical approach was individualized according to the location of the perforation, the extent of mediastinal and pleural contamination, and the patient's clinical condition. The principal therapeutic objectives included elimination of the septic focus, extensive mediastinal and pleural drainage, repair of the esophageal defect whenever technically feasible, and establishment of adequate enteral nutritional support. These principles closely correspond to the recommendations of the World Society of Emergency Surgery and the management strategies reported in recent multicenter studies [1, 2, 5, 6, 8, 10].

Although minimally invasive endoscopic techniques, including endoscopic vacuum therapy and self-expandable metallic stents, have considerably expanded therapeutic options during the past decade, their indications remain limited. Recent studies have demonstrated favorable outcomes primarily in patients with early diagnosis, contained perforations, minimal mediastinal contamination, and stable clinical condition, whereas extensive mediastinal infection, pleural empyema, and sepsis generally require surgical intervention [6, 9, 14, 15]. Conversely, diffuse mediastinitis, pleural empyema, extensive mediastinal contamination, and systemic sepsis remain clear indications for immediate surgical intervention [1, 2, 5, 12]. Our experience fully supports this concept, as all patients with advanced mediastinal infection required open surgical treatment combined with radical mediastinal debridement and adequate pleural drainage to achieve effective source control.

The representative clinical cases presented in this study further support the conclusions of previous investigations regarding the critical importance of early diagnosis. Chirica et al. and Khaitan et al. demonstrated that the probability of successful

treatment is significantly higher when definitive surgical management is initiated within the first 24 hours after esophageal perforation [2, 5]. In contrast, both representative patients in our series were admitted several days after injury and had already developed diffuse mediastinitis associated with pleural complications. One patient developed progressive mediastinal infection following unsuccessful endoscopic removal of an impacted foreign body, whereas the second experienced delayed recognition of esophageal perforation after foreign-body extraction because the integrity of the esophageal wall was not adequately evaluated and oral feeding was resumed prematurely. These clinical scenarios closely resemble diagnostic pitfalls described in previous reports and illustrate how delays in recognition may rapidly lead to severe septic complications [3, 5, 10]. Despite advanced mediastinal infection at presentation, both patients achieved favorable outcomes following prompt pleural decompression, extensive mediastinal drainage, elimination of the infectious source, intensive antimicrobial therapy, and multidisciplinary postoperative management. These observations are consistent with previous studies indicating that aggressive surgical source control combined with modern intensive care substantially improves survival even in patients with advanced mediastinitis, provided that definitive treatment is not further delayed [1, 6, 8]. Thus, our clinical experience reinforces the concept that timely referral to specialized thoracic surgery centers is crucial for improving prognosis in this highly lethal condition.

An important strength of the present study is the integration of a retrospective clinical series with representative case illustrations that demonstrate common diagnostic errors and therapeutic challenges encountered in routine practice. While the overall analysis characterizes the epidemiology, clinical manifestations, diagnostic approach, and surgical management of acute mediastinitis secondary to thoracic esophageal injury, the representative cases provide practical insight into the mechanisms leading to delayed diagnosis and emphasize the importance of multidisciplinary decision-making. This combination enhances the clinical applicability of our findings and may contribute to earlier recognition and more effective management of esophageal perforation in emergency settings. Patients with delayed diagnosis frequently presented with extensive mediastinal involvement, pleural complications, and severe clinical manifestations. Although timely diagnosis and surgical management appeared to contribute to favorable outcomes in the treated patients, the descriptive design of the present study does not permit causal inference. Nevertheless, our findings support current recommendations emphasizing early recognition, prompt referral to specialized thoracic surgery centers, and aggressive surgical source control in patients with diffuse mediastinitis.

Limitations. This study has several limitations. Its retrospective single-center design may have introduced selection bias and limits the generalizability of the findings. The relatively small sample size further reduces statistical power. In addition, the absence of a control group precluded

direct comparison of different diagnostic and therapeutic strategies. Nevertheless, the study reflects real-world clinical management of acute mediastinitis following thoracic esophageal injury and provides clinically relevant evidence supporting current diagnostic and surgical approaches.

Conclusions

1. Acute mediastinitis secondary to thoracic esophageal injury remains a life-threatening surgical emergency in which delayed diagnosis is the principal determinant of adverse clinical outcomes.
2. Early clinical suspicion, prompt multimodal diagnostic assessment using computed tomography and contrast esophagography, and timely surgical intervention are essential for successful management of this condition.
3. Individualized surgical treatment based on the mechanism of injury, anatomical location of the perforation, and extent of mediastinal contamination enables effective source control and contributes to improved clinical outcomes.
4. Adequate mediastinal and pleural drainage, repair of the esophageal defect whenever technically feasible, comprehensive intensive care, and appropriate nutritional support constitute the principal components of effective treatment.
5. The representative clinical cases presented in this study emphasize the importance of early recognition of esophageal perforation and rapid referral to specialized thoracic surgery centers in order to reduce severe septic complications and improve patient survival.

Prospects for further research. Future research should focus on prospective multicenter studies to further optimize prognostic factors related to clinical outcomes, as well as minimally invasive diagnostic and surgical algorithms in acute mediastinitis associated with thoracic esophageal injuries.

References

1. Axtell AL, Gaissert HA, Morse CR, Premkumar A, Schumacher L, Muniappan A, et al. Management and outcomes of esophageal perforation. *Dis Esophagus*. 2022;35(9):doac038. doi:10.1093/dote/doac038.
2. Chirica M, Kelly MD, Siboni S, Aiolfi A, Riva CG, Asti E, et al. Esophageal emergencies: WSES guidelines. *World J Emerg Surg*. 2019;14:26. doi:10.1186/s13017-019-0245-2.
3. DeVivo A, Sheng AY, Koyfman A, Long B. High risk and low prevalence diseases: esophageal perforation. *Am J Emerg Med*. 2022;58:208-215. doi:10.1016/j.ajem.2021.12.017.
4. Keogan AG, Rybachok A, Patel S, Latorre-Rodríguez AR, Vittori A, Mittal SK. Diagnostic utility of computed tomography in patients with spontaneous pneumomediastinum evaluated for suspected esophageal perforation. *World J Surg*. 2025;49(12):3362-3367. doi:10.1002/wjss.70158.
5. Khaitan PG, Famiglietti A, Watson TJ. The etiology, diagnosis, and management of esophageal perforation. *J Gastrointest Surg*. 2022;26(12):2444-2453. doi:10.1007/s11605-022-05370-5.
6. Luttikhof J, Pattynama LMD, Seewald S, Groth S, Morell BK, Gutschow CA, et al. Endoscopic vacuum therapy for esophageal perforation: a multicenter retrospective cohort study. *Endoscopy*. 2023;55(9):859-864. doi:10.1055/a-2042-6707.
7. Mathew G, Sohrabi C, Franchi T, Nicola M, Kerwan A, Agha R, et al.; PROCESS Group. Preferred Reporting of Case Series in Surgery (PROCESS) 2023 guidelines. *Int J Surg*. 2023;109(12):3760-3769. doi:10.1097/JS9.0000000000000940.
8. Nachira D, Sassorossi C, Petracca-Ciavarella L, Zanfrini E, Tabacco D, Pogliani L, et al. Management of esophageal perforations and postoperative leaks. *Ann Esophagus*. 2023;6:10. doi:10.21037/aoe-21-50.
9. Rausa E, Asti E, Aiolfi A, Bianco F, Bonitta G, Bonavina L. Comparison of endoscopic vacuum therapy versus endoscopic stenting for esophageal leaks: systematic review and meta-analysis. *Dis Esophagus*. 2018;31(11):doy060. doi:10.1093/dote/doy060.
10. Sdralis EIK, Petousis S, Rashid F, Lorenzi B, Charalabopoulos A. Epidemiology, diagnosis, and management of esophageal perforations: systematic review. *Dis Esophagus*. 2017;30(8):1-6. doi:10.1093/dote/dox003.
11. Shaqran TM, Engineer R, Abdalla EM, Alamoudi AA, Almahdi R, Aldahri A, et al. The management of esophageal perforation: a systematic review. *Cureus*. 2024;16:e68652. doi:10.7759/cureus.63651.
12. Shaheem S, Panikkaveetil H. Aetiology, clinical manifestations, diagnosis, and treatment of oesophageal perforation: a review. *Cureus*. 2024;16:e69494. doi:10.7759/cureus.69494.
13. Søreide JA, Viste A. Esophageal perforation: diagnostic work-up and clinical decision-making in the first 24 hours. *Scand J Trauma Resusc Emerg Med*. 2011;19:66. doi:10.1186/1757-7241-19-66.
14. Stathopoulos P, Zumblick M, Wächter S, Schiffmann L, Gress TM, Bartsch D, et al. Endoscopic vacuum therapy for acute esophageal perforation: could it replace surgery? *Endosc Int Open*. 2022;10(5):E686-E693. doi:10.1055/a-1781-0827.
15. Wilson MK, Carr SR. Clinical applications of esophageal stents. *Ann Esophagus*. 2023;6:20. doi:10.21037/aoe-21-29.

Conflict of interest. The authors have no conflicts of interest to declare.

ORCID: Rustamzade U.C. <https://orcid.org/0009-0001-0533-2122>, Jafarov Ch.M. <https://orcid.org/0009-0002-9977-8957>, Hasanov A.B. <https://orcid.org/0000-0003-0679-3008>, Gasimov E.M. <https://orcid.org/0000-0003-3195-5275>, Guliyeva S.V. <https://orcid.org/0000-0002-6064-4081>.

Article received: 1.08.2025