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Nonoperative management of descending necrotizing mediastinitis: a unique approach

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Case Report

Keywords: Descending necrotizing mediastinitis (DNM), Mediastinal infection, Deep neck infection, Conservative management, Antimicrobial therapy

Posted Date: June 10th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9954160/v1

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Additional Declarations: The authors declare no competing interests.

Abstract

Background

Descending necrotizing mediastinitis is a rare, life-threatening complication of deep neck infections, traditionally managed with surgical drainage in combination with broad-spectrum antimicrobial therapy.

Case Presentation:

A 44-year-old man with poorly controlled diabetes mellitus and a history of parotitis complicated by a submandibular abscess presented with progressive dysphagia, chest pain, and fever. Imaging revealed a fluid collection extending from the cervical region into the upper mediastinum, consistent with descending mediastinitis. Laryngoscopy demonstrated no airway edema or mass, and esophagography showed no evidence of esophageal perforation. Following multidisciplinary discussion, the patient was managed conservatively with antibiotics alone and close monitoring. This decision was supported by the patient's clinical stability, limited extension of infection, and rapid clinical and radiographic improvement.

Conclusion

This case illustrates the successful nonoperative approach in a carefully selected patient with descending necrotizing mediastinitis. Although surgical management remains the standard of care, this report underscores the importance of individualized treatment decisions, multidisciplinary collaboration, and close monitoring when considering conservative management.

Introduction

Infectious mediastinitis is a serious, rapidly progressive infection of the mediastinum – the central compartment of the thoracic cavity that contains vital structures such as the heart, major vessels, trachea, esophagus, and nerves. It most commonly develops as a complication of open-heart surgery, but may also result from esophageal perforation, penetrating trauma, or contiguous spread from deep neck infections, in which case it is known as descending necrotizing mediastinitis (DNM) [1]. Untreated DNM can quickly progress to sepsis and is associated with significant morbidity and mortality. Consequently, the onset of thoracic symptoms in patients with deep neck infections should prompt urgent evaluation for possible mediastinal extension. While surgical drainage is considered the mainstay of treatment, with most authors recommending early and aggressive intervention [1–4], antibiotic therapy is also essential, and empiric regimens should provide coverage against both aerobic and anaerobic organisms [5]. This manuscript describes a unique case of DNM successfully managed with conservative treatment alone.

Case presentation

A 44-year-old man with poorly controlled diabetes mellitus and a history of right parotitis complicated by a submandibular abscess one year prior to admission presented with two days of fever, chest pain, and dysphagia. The pain was described as sharp, midsternal, and exacerbated by deep inspiration and swallowing. He had no history of tobacco, alcohol, or illicit drug use and denied any recent illnesses, including dental issues.

On presentation, he was febrile and tachycardic, but normotensive and breathing well on room air with normal oxygen saturation. Physical exam revealed poor dentition and left cervical lymphadenopathy but was otherwise unremarkable. Initial laboratory studies demonstrated white blood count (WBC) of 15.57 $x10^3$/μL and 87.6% neutrophilia, glucose of 334mg/dL, and hemoglobin A1c of 14.5%. Serologies for HIV and hepatitis B and C were negative; blood cultures were also negative. Chest radiography showed widening of the superior mediastinum (Fig. 1) and chest computed tomography (CT) revealed a 3.5 x 4.7 x 10.3 cm mediastinal mass, causing extrinsic rightward displacement of the trachea and marked narrowing of the esophagus (Fig. 2a). Neck CT demonstrated left-sided soft tissue inflammation along the lateral thyroid gland and carotid sheath with extension into the upper mediastinum.

A tentative diagnosis of mediastinitis was made, and the patient was started on intravenous ceftriaxone and metronidazole. Laryngoscopy showed a patent airway without edema or masses and a gastrografin esophagogram demonstrated no evidence of esophageal perforation. In light of these findings, the Cardiothoracic Surgery team recommended conservative management while further diagnostic evaluation was pursued. The Infectious Diseases team recommended broadening antibiotics to vancomycin and piperacillin-tazobactam and obtaining cultures from the mediastinal collection to further guide antimicrobial coverage.

Three days after presentation, the patient underwent ultrasound guided transesophageal fine-needle aspiration of 8ml of purulent fluid, which was sent for acid-fast bacilli, bacterial, and fungal cultures. Cultures subsequently grew pan-sensitive *Klebsiella pneumoniae*, and antibiotics were de-escalated to ceftriaxone and metronidazole.

The patient demonstrated considerable clinical improvement, with resolution of fever, chest pain, and dysphagia. Ten days after the antibiotics were started, repeat chest CT showed a decrease in the size of the mediastinal collection and resolution of the soft tissue changes surrounding the thyroid gland. By hospital day 13, the patient was completely asymptomatic with normal WBC (6.15 $x10^3$/μL) and negative inflammatory markers.

Given sustained clinical, laboratory, and radiologic improvement, no surgical drainage was attempted. A repeat CT scan on hospital day 18 demonstrated continued reduction of the mediastinal collection (Fig. 2b). The patient was discharged home on oral amoxicillin-clavulanate for two additional weeks to complete a total of five weeks of antibiotic therapy to ensure sustained resolution of infection. At one-week follow-up, he remained asymptomatic and reported full adherence to therapy.

Discussion

Descending necrotizing mediastinitis is a feared complication of deep neck infections given its rapid spread and high mortality, reported to be as high as 40% [3]. Although no active oropharyngeal infection was identified in this patient, several findings support an oropharyngeal source with extension into the mediastinum through the pretracheal space. These include a prior history of submandibular abscess caused by the same organism (*Klebsiella pneumoniae*), radiographic evidence of inflammatory changes involving the carotid sheath and thyroid region, and the absence of esophageal perforation. The patient's poorly controlled diabetes likely further contributed to the progression of the infection.

DNM can be classified according to the extent of mediastinal involvement into type I (localized to the superior mediastinum above the carina), type IIA (lower anterior mediastinum), type IIB (both anterior and posterior lower mediastinum), and type IIC (posterior mediastinum) [2, 5]. Disease localized to the superior mediastinum (type I), as observed in this case, is generally associated with more favorable outcomes, whereas mortality increases as infection spreads into deeper mediastinal compartments [2].

Even though *Klebsiella pneumoniae* was the only organism isolated in this patient, DNM is frequently polymicrobial. In a Japanese cohort of 208 patients with confirmed DNM, 51.1% had polymicrobial infection, commonly involving a combination of aerobic and anaerobic pathogens [5]. Organisms typically originate from the normal oral and upper respiratory flora and may include *Streptococcus* spp., *Staphylococcus* spp., *Prevotella, Bacteroides* spp., and *Peptostreptococcus* spp. [3, 5–7].

Clinical presentation may vary depending on the primary source of infection, but common initial symptoms include chest or neck pain, dyspnea, dysphagia, and fever [8, 9]. Imaging is the cornerstone of diagnosis and, while mediastinal widening on chest radiography is a classic finding, CT imaging is the modality of choice. CT findings may include soft-tissue masses or fluid collections, air–fluid levels, and esophageal wall thickening [4, 10]. When feasible, culture samples should be obtained to guide antimicrobial therapy, typically during open surgical drainage or via fine-needle aspiration.

Management of DNM traditionally relies on a combination of broad-spectrum antimicrobial therapy and surgical drainage, frequently requiring extensive operative intervention. The optimal duration of antibiotic therapy remains uncertain, but most authors recommend a prolonged course [9], with duration individualized according to disease severity, radiographic response, and adequacy of source control.

The rapid clinical and radiographic improvement shown by this patient allowed the medical team, in consultation with multiple specialists, to pursue a nonoperative strategy consisting of targeted antimicrobial therapy and close monitoring with serial imaging.

Conclusion

Descending necrotizing mediastinitis is a serious and potentially life-threatening condition that demands prompt identification and treatment. This case suggests that in carefully selected patients with early or

localized disease, such as type I, conservative management with targeted antimicrobial therapy and close clinical and radiologic monitoring may be a feasible alternative to immediate surgical drainage. Further studies are needed to better characterize the clinical factors associated with successful nonoperative management and to define the subset of patients who may safely benefit from a conservative approach. Surgical drainage, however, remains an indispensable intervention in most cases.

Declarations

Informed consent for publication was obtained from the patient.

Funding: no funding was received for conducting this study.

Competing Interests: the authors have no competing interests to declare.

References

1. Corsten MJ, Shamji FM, Odell PF et al (1997) Optimal treatment of descending necrotising mediastinitis. Thorax 52(8):702–708. 10.1136/thx.52.8.702
2. Endo S, Murayama F, Hasegawa T et al (1999) Guideline of surgical management based on diffusion of descending necrotizing mediastinitis. Jpn J Thorac Cardiovasc Surg 47(1):14–19. 10.1007/BF03217934
3. Gehrke T, Scherzad A, Hagen R, Hackenberg S (2022) Deep neck infections with and without mediastinal involvement: treatment and outcome in 218 patients. Eur Arch Otorhinolaryngol 279(3):1585–1592. 10.1007/s00405-021-06945-9
4. Abu-Omar Y, Kocher GJ, Bosco P et al (2017) European Association for Cardio-Thoracic Surgery expert consensus statement on the prevention and management of mediastinitis. Eur J Cardiothorac Surg 51(1):10–29. 10.1093/ejcts/ezw326
5. Sugio K, Okamoto T, Maniwa Y et al (2021) Descending necrotizing mediastinitis and the proposal of a new classification. JTCVS Open 8:633–647 Published 2021 Aug 19. 10.1016/j.xjon.2021.08.001
6. Brook I (2006) The role of anaerobic bacteria in mediastinitis. Drugs 66(3):315–320. 10.2165/00003495-200666030-00004
7. Huang TT, Tseng FY, Yeh TH, Hsu CJ, Chen YS (2006) Factors affecting the bacteriology of deep neck infection: a retrospective study of 128 patients. Acta Otolaryngol 126(4):396–401. 10.1080/00016480500395195
8. Zhao F, Lin L, Wang H, Wang L, Xu Y, Guo L (2024) Application of next-generation sequencing in acute tonsillitis complicated with descending necrotizing mediastinitis: A case report. Med (Baltim) 103(27):e38798. 10.1097/MD.0000000000038798
9. Pastene B, Cassir N, Tankel J et al (2020) Mediastinitis in the intensive care unit patient: a narrative review. Clin Microbiol Infect 26(1):26–34. 10.1016/j.cmi.2019.07.005

10. Akman C, Kantarci F, Cetinkaya S (2004) Imaging in mediastinitis: a systematic review based on aetiology. Clin Radiol 59(7):573–585. 10.1016/j.crad.2003.12.001

Figures



Figure 1

Initial chest radiography showing widening of the superior mediastinum and displacement of the trachea to the right

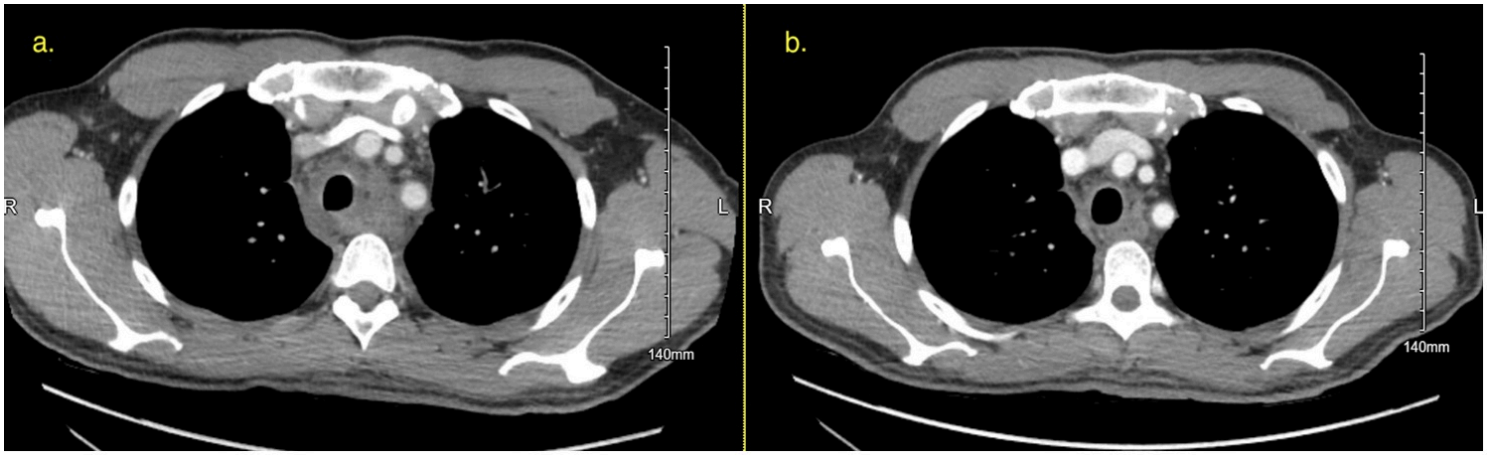


Figure 2

Interval comparison between chest CT on the day of presentation (a) and 18 days after the start of antibiotic therapy (b) showing significant improvement in the mediastinal fluid collection