Intramedullary Spinal Cord Abscess due to Traumatic Esophageal Perforation Associated with Cervicothoracic Anterior Osteophytes: A Case Report

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Traumatic esophageal perforation is a disease with a high mortality rate; however, vertebral osteophyte is a rare cause[1)]. Furthermore, intramedullary spinal cord abscess (ISCA) is an uncommon infectious condition of the central nervous system[2)]. Here, we present the first reported case of ISCA after esophageal perforation attributed to massive anterior osteophytes.

An 83-year-old man was admitted to our hospital with neck pain and upper limb numbness following a fall. Computed tomography (CT) scan revealed extensive anterior vertebral osteophytes from C7 to T2 (Fig. 1A). Magnetic resonance imaging (MRI) identified fluid collection anterior to the vertebrae, which was suspected as a retropharyngeal hematoma; however, no vertebral or disc injuries were observed (Fig. 1B). The patient was diagnosed with cervical spinal cord injury without fractures and was managed conservatively with a cervical collar. Four days later, he developed a high fever and chest discomfort. CT revealed free air and fluid posterior to the upper esophagus, leading to descending necrotizing mediastinitis (Fig. 2A-B). Gastrointestinal endoscopy was performed on suspicion of esophageal perforation; however, no esophageal injury was initially detected. Prompt antibiotics administration significantly improved inflammatory markers. Follow-up endoscopy on day 10 revealed esophageal perforation (Fig. 2C), and esophagography confirmed the mediastinal leak (Fig. 2D-E). *Streptococcus parasanguinis*, an oral bacterium, was confirmed in the blood culture, providing a definitive diagnosis of mediastinitis with esophageal perforation. Conservative antibiotic treatment was maintained. However, on day 32, the patient experienced sudden motor paralysis. MRI revealed a cervical epidural abscess (Fig. 3A-C), and emergency posterior laminectomy and debridement from C5 to T2 were performed. Postoperatively, inflammatory markers gradually improved; nonetheless, the patient presented with consciousness disturbances and recurrent muscle weakness 5 days later. Gadolinium-enhanced MRI (Gd-MRI) demonstrated a large ring-enhanced region in the spinal cord on T1-weighted images (Fig. 3D-F), and cerebrospinal fluid (CSF) analysis strongly indicated ISCA with elevated neutrophils (96/μl) and protein levels (940 mg/dl) and decreased glucose levels (52 mg/dl, blood glucose level: 196 mg/dl). Conservative antibiotic treatment for 15 weeks resulted in complete recovery from unconsciousness, but mild muscle weakness persisted. Two months postoperatively, MRI revealed resolution of the abscess, although persistent high signal intensity was observed in the spinal cord (Fig. 3G-I).

The predominant etiology of esophageal perforation was emesis, accounting for 63.2% of cases, whereas trauma comprised only 2.7%[3)]. Esophageal perforation following spinal trauma was first documented in 1960[4)] and most subsequent reports have involved vertebral fracture or dislocation[5)]. However, this case represents a unique esophageal perforation caused by anterior vertebral osteophytes without fractures. Anterior vertebral osteophytes have a risk of injuring the esophageal wall with low-energy trauma[6)], and

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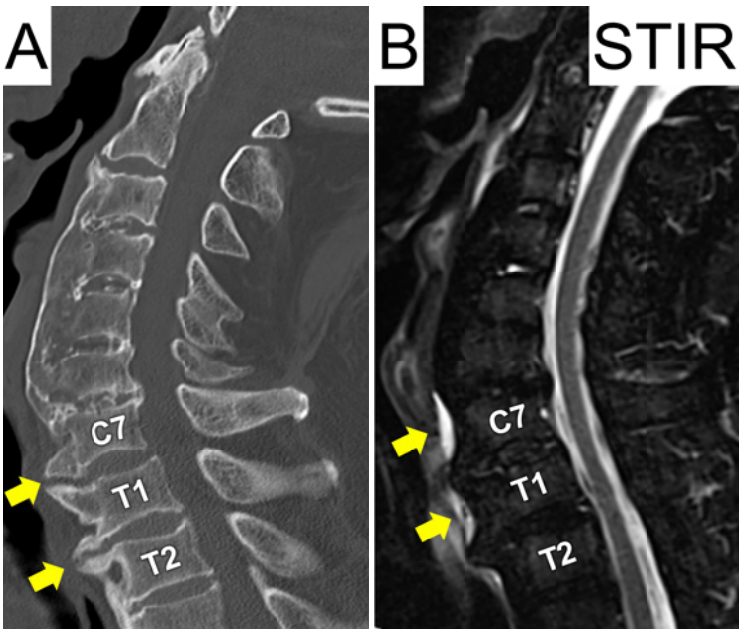

Figure 1. Computed tomography (CT) and magnetic resonance image (MRI) at initial visit.
A) CT showed large anterior vertebral osteophytes at C7-T2 without vertebrae injury (arrows).
B) MRI showing a small high-intensity collection anterior to the C7 and T1 vertebrae on STIR, which was suspected as retropharyngeal hematoma (arrows).

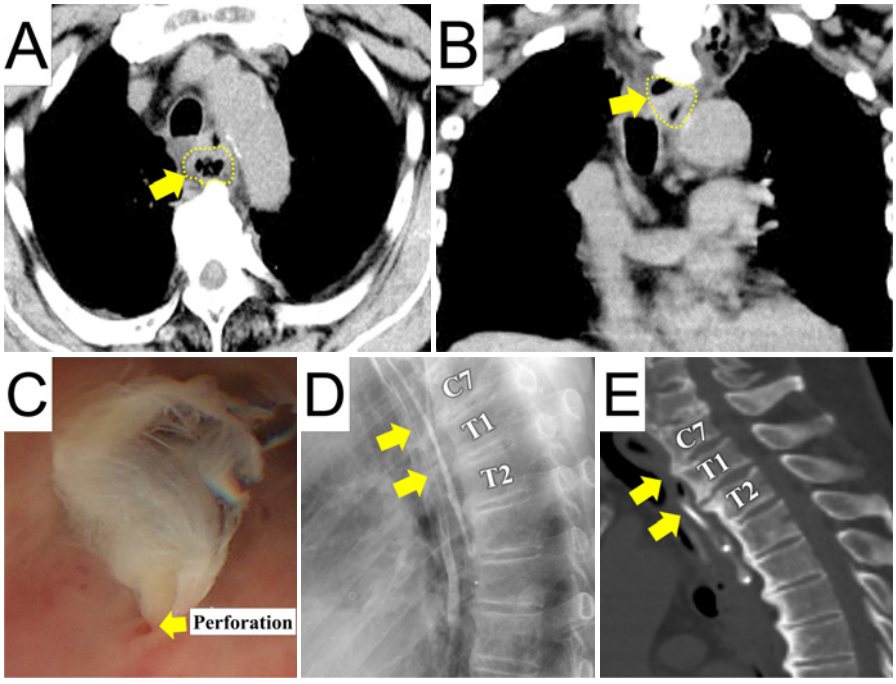

Figure 2. Chest computed tomography (CT), gastrointestinal endoscopy, and esophagography.
A, B) Chest CT showing a free air and fluid at the posterior part of the upper esophagus (arrows and circle).
C) Gastrointestinal endoscopy showing an esophageal perforation 10 cm antral to the esophageal inlet (arrow).
D) Esophagography showing the leakage of contrast medium into the mediastinum at C7-T2 (arrows).
E) Subsequent CT after esophagography showing the anterior leak at C7-T2 (arrows).

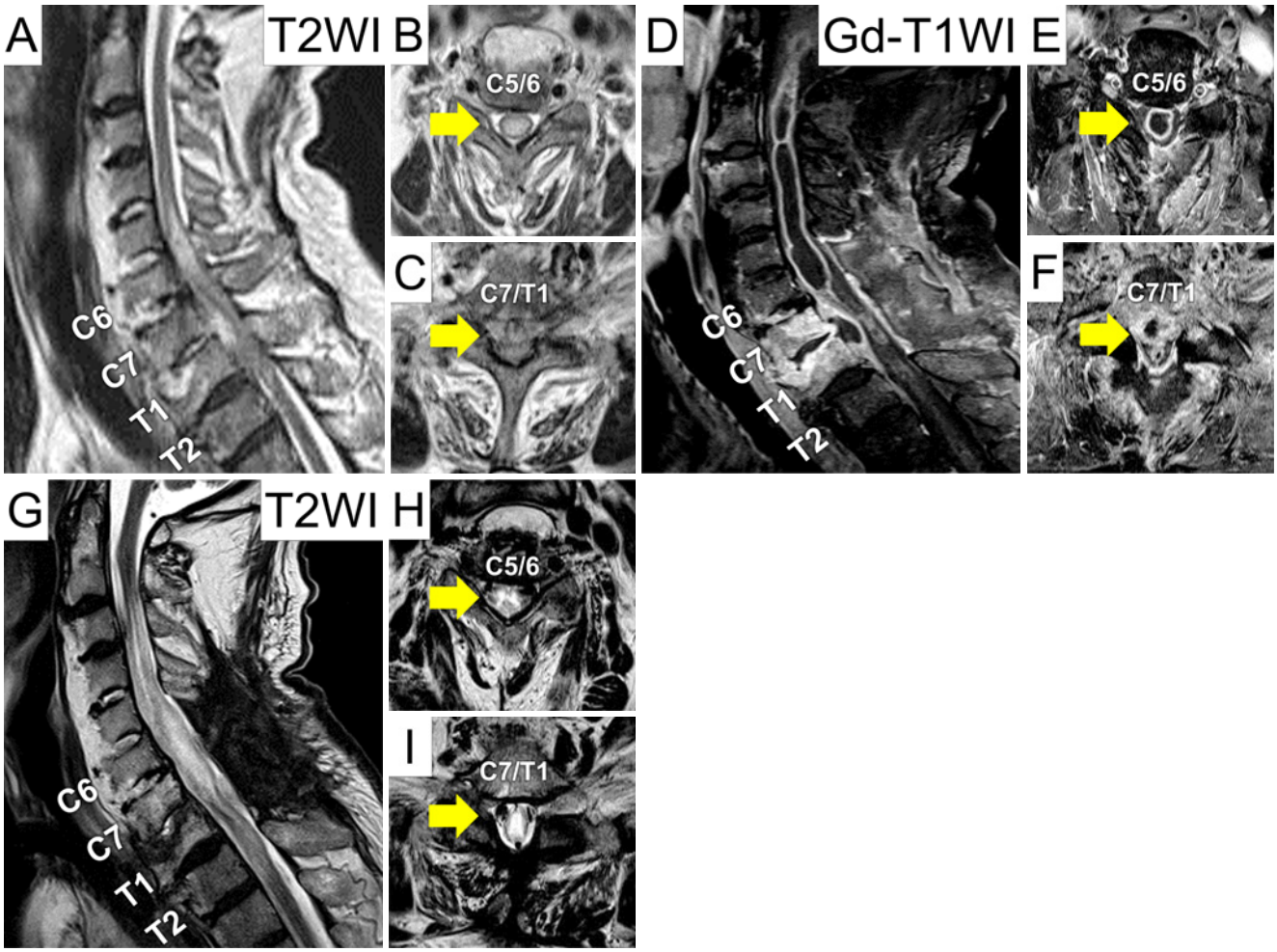

Figure 3. Preoperative, postoperative, and final follow-up magnetic resonance imaging (MRI).
A-C) Preoperative MRI showing an epidural abscess at C7/T1 and T2 high-intensity areas in the spinal cord at C5/C6 (arrows).
D-F) Postoperative Gadolinium-enhanced MRI showing a ring-enhanced intramedullary region from C1 to T1 (arrows).
G-I) Final follow-up MRI showing persistent T2 high signal intensity in the spinal cord (arrows).

esophageal perforation can lead to descending necrotizing mediastinitis, which has a high mortality rate of 17-33%[6]. Delayed diagnosis is associated with serious outcomes[7,8] and surgical interventions, such as primary repair or resection, should be considered promptly if early diagnosis is achieved[7,8].

ISCA is a rare central nerve infection predominantly associated with spinal epidural abscesses or anterior cervical surgery[2,9]. The ring-enhanced sign on T1-weighted images on Gd-MRI is a specific finding[9], and bacterial detection in CSF culture is crucial for a definitive diagnosis. *Streptococcus species* and some oral bacteria are common pathogenic organisms of ISCA[2,9,10]. The treatment of ISCA remains controversial. Although Kurita et al[2] reported no significant difference in outcomes between surgical treatment and antibiotic treatment alone, some studies indicated that early surgical drainage could improve neurological disorders[9,10]. In this case, surgery was considered; however, because the patient's general condition was unfavorable, conservative antibiotic treatment was opted.

This case is an extremely rare one: an esophageal injury with vertebral osteophytes progressed to a cervical ISCA that was successfully treated with conservative antibiotic treatment.

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