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Cervical Spine Osteomyelitis after Esophageal Dilation in Patients with a History of Laryngectomy or Pharyngectomy and Pharyngeal Irradiation

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Introduction

Dysphagia is a common sequela of the treatment of head and neck cancer and is frequently managed with esophageal dilation in patients with dysphagia secondary to hypopharyngeal stenosis. Reported complications of esophageal dilation include bleeding, esophageal perforation, and mediastinitis. We examine four cases of cervical spine osteomyelitis presenting as a delayed complication of esophageal dilation for hypopharyngeal stenosis in patients with a history of laryngectomy or pharyngectomy and radiation with or without chemotherapy. The history of head and neck surgery and radiation in these patients further complicates the management of the cervical spine osteomyelitis.

Case 1

A 72 year old male with a history of laryngeal cancer was initially treated with radiation therapy twenty years prior to presentation. Ten years prior to presentation he experienced a second occurrence of laryngeal cancer treated with total laryngectomy and adjuvant chemoradiotherapy. One year prior to presentation he began to experience progressive dysphagia which was treated with serial esophageal dilations every 3-5 weeks at another institution. The details of those procedures are unavailable. Following completion of oncologic treatment he began to have neck pain and fevers; imaging revealed a retropharyngeal collection with concern for cervical osteomyelitis. He was considered a high operative risk and managed medically with antibiotics when he presented to our institution for a second opinion. Follow-up imaging revealed progressive destruction of the cervical spine and identified an epidural abscess (Fig. 1). After multidisciplinary review the patient was taken to the operating room with the head and neck service and neurosurgery for debridement and reconstruction. The details of operative management and outcome are listed in Table 1. Initially he was kept NPO due to a pharyngocutaneous fistula which was managed conservatively. He remained PEG-tube dependent for nutrition but eventually was able to take a limited diet by mouth. He expired of unrelated causes one year later.

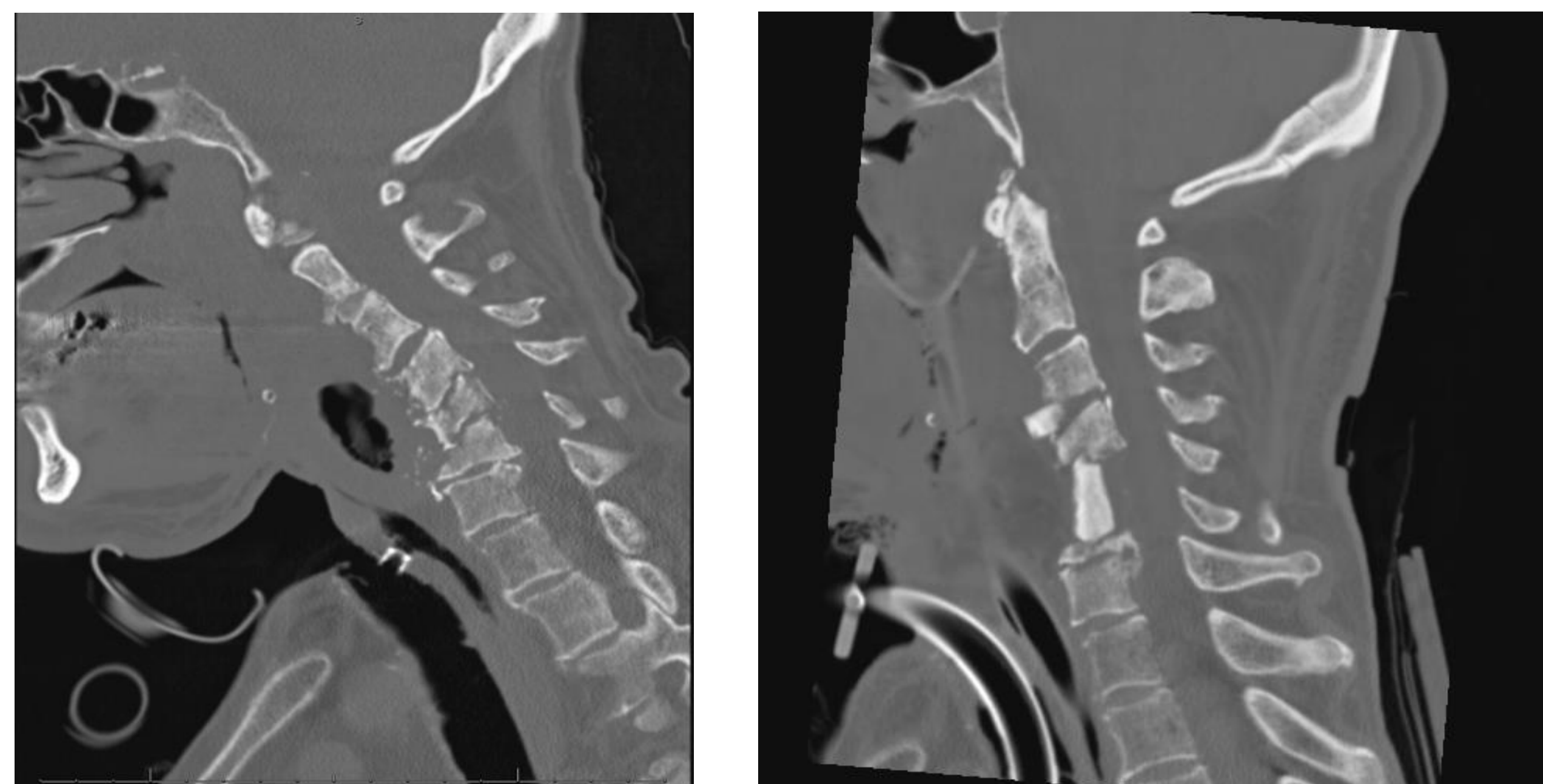


Fig. 1. A Preoperative CTC-spine Sagittal View, demonstrating destructive bony lesions. B Postoperative CT C-spine Sagittal View showing iliac crest autograft reconstruction.

Case 2

A 74 year old man with a history of laryngeal cancer treated with total laryngectomy and radiation therapy developed progressive dysphagia 24 years after treatment. He underwent esophageal dilation uneventfully. He did not receive preoperative antibiotics; no perforation or laceration was seen on post-dilation esophagoscopy. Ten days later he presented to the Emergency Department of another institution complaining of fevers and neck pain. He was transferred for further management and CT and MRI imaging of the spine revealed retropharyngeal air, C6-7 discitis and osteomyelitis as well as a communicating epidural abscess. His surgical management is detailed in Table 1. He recovered well from surgery and returned to an oral diet. He is doing well at time of this report 10 months after surgery.

Case 3

A 62 year old man with a history of T2N2bM0 squamous cell carcinoma of the pyriform sinus treated with transoral robotic resection, neck dissection and adjuvant chemoradiotherapy developed a hypopharyngeal stricture and dysphagia 3 months after treatment completion. He underwent dilation at our institution. He received preoperative antibiotics (Cefazolin 1g); no perforation or mucosal laceration was seen upon post-dilation esophagoscopy. Of note, he did have a persistent hypopharyngeal ulcer since adjuvant treatment. Seven weeks later he presented to another facility with upper extremity weakness and imaging revealed an epidural abscess, bone destruction, discitis, and retropharyngeal air (Fig 2. A). He underwent urgent drainage along with decompression and an anterior cervical decompression and fusion (ACDF) at the outside facility (Fig 2. B). Postoperatively he developed a pharyngocutaneous fistula through his neck wound and was transferred to our facility for further management. Additional imaging revealed a pharyngeal defect and retropharyngeal collection, C3-4 discitis and osteomyelitis, and enlargement of the epidural abscess. After multidisciplinary review, the patient was surgically stabilized (Fig 2. C). He experienced a full neurologic recovery and was able to resume an oral diet (Table 1). He remains living without long term sequelae at the time of this report 2.5 years after surgery.

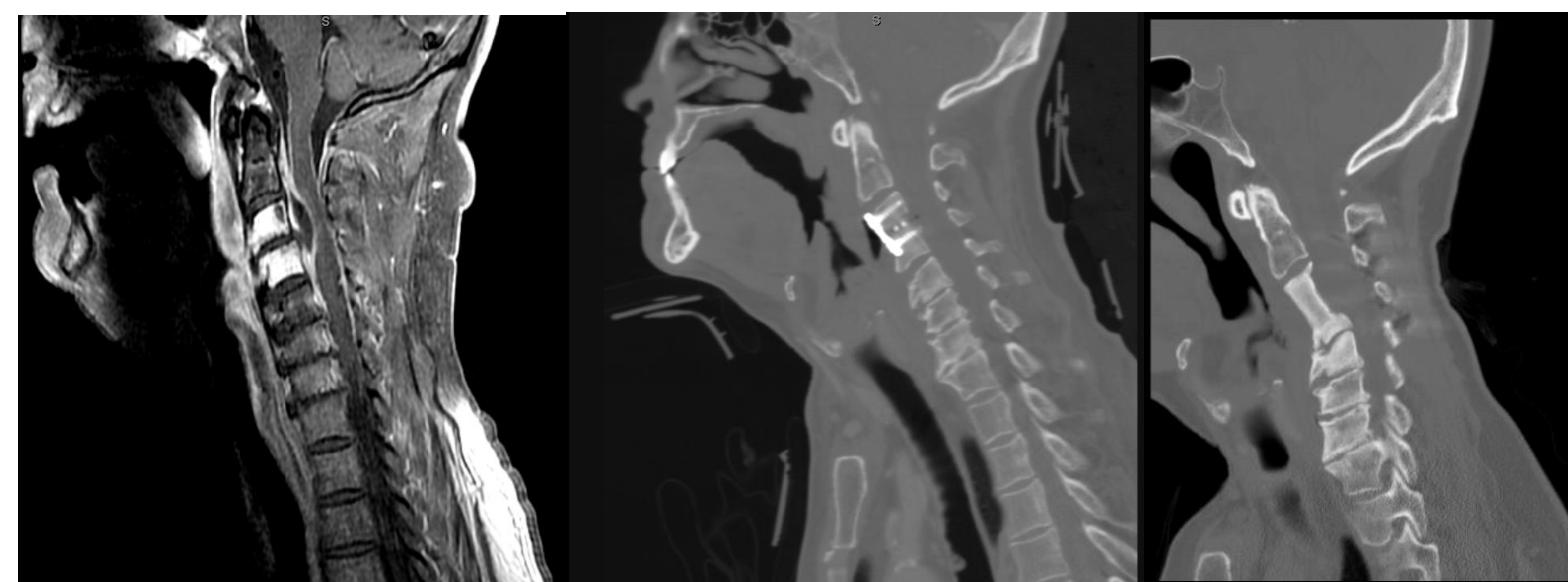


Fig 2. A. MRI Cspine Sagittal View, showing osteomyelitis of C3-C4 with epidural abscess. B. CT Cspine Sagittal View following unsuccessful ACDF with communication noted between spinal hardware and pharynx. C. Iliac Bone Autograft replacing the diseased vertebrae

Case 4

A 78 year old man was initially treated with radiation therapy for a tongue base cancer. Five years later he underwent total laryngectomy and further irradiation for a separate laryngeal cancer. He developed significant dysphagia approximately 5 months after treatment completion and underwent esophageal dilation uneventfully with improvement in swallowing function. He did receive preoperative antibiotics (Cefazolin 1g); no laceration or perforation was seen on post-dilation esophagoscopy. Approximately 10 weeks following dilation a surveillance PET/CT revealed intense activity in the lower cervical spine. At that time the patient was experiencing neck pain but had no neurological deficits. A follow-up MRI of the spine revealed C5-6 discitis and osteomyelitis. He was managed similarly to previous cases (Table 1). The pharynx remained intact and no soft tissue reconstruction was required. He recovered well and returned to an oral diet. He is living without long term sequelae at the time of this report 16 months after surgery.

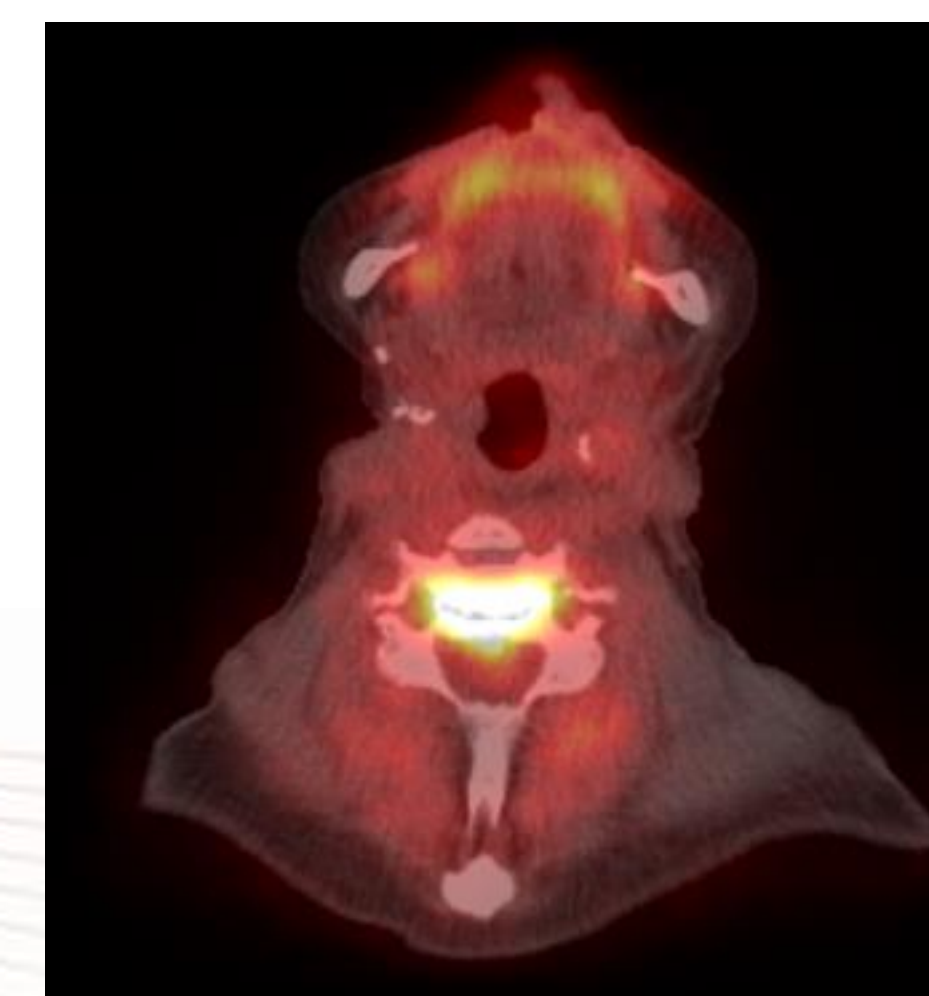


Fig 3. PET/CT Axial View showing hypermetabolic uptake at C5-6

| | Case 1 | Case 2 | Case 3 | Case 4 |
|---|---|---|---|---|
| Time from dilation to presentation | Unknown | 10 days | 8 weeks | 10 weeks |
| Presentation | Neck pain, fevers | Neck pain, fevers | Fevers, Upper extremity weakness | Incidental on post-treatment PET |
| Spine management | C4-6 Debridement, Discectomy Iliac crest autograft Halo stabilization | C6-7 Debridement, Discectomy Iliac crest autograft Posterior fusion | C3-4 Debridement, Discectomy Removal of hardware Iliac crest autograft Posterior Fusion | C5-6 Debridement, Discectomy Iliac crest autograft Posterior fusion |
| Pharyngeal reconstruction | Pectoralis major flap | Sternocleidomastoid Muscle Flap | Deltopectoral Flap | None |
| Cultures | Polymicrobial | Polymicrobial | <i>Eikenella corrodens</i> | <i>Pseudomonas aeruginosa</i> |
| Length of stay | 8 days | 12 days | 6 days | 7 days |
| Outcome | Pain resolution Neuro intact Limited po diet | Neuro intact Return to PO diet | Neurologic recovery Return to PO diet | Neuro intact Return to PO diet |

Table 1. Case Details of C-spine Osteomyelitis Cohort

Discussion

Osteomyelitis is a rare complication of esophageal dilation that has not been well described in the literature. Mullen et al. reviewed seven reported cases associated with esophageal dilation with or without stent placement; all patients had a history of esophageal or laryngeal cancer¹. Prior cancer treatment not only contributes to the stenosis requiring dilation but likely puts these patients at increased risk for this uncommon complication. The likelihood of prior radiation being a significant risk factor is reinforced by our experience, in that 2 of our 4 patients had been re-irradiated for a second squamous cell carcinoma. Transient bacteremia occurs in many endoscopic procedures and has been shown to occur in up to 100% of esophageal dilations². We suspect that by a similar mechanism of microtrauma, bacterial translocation and seeding of adjacent tissues occurs. Compromised vascularity in radiated tissues may allow persistent infection to develop at these vulnerable sites including the cervical spine. While an undiagnosed perforation may have contributed in these cases, one of our patients never developed any pharyngeal defect. Current guidelines of the American Society of Gastrointestinal Endoscopy regarding antibiotic prophylaxis do not recommend peri-procedural antibiotics for routine procedures including dilations and do not comment on prior radiation as a risk factor for infectious complications³. The tissue damage and fibrosis that makes these patients vulnerable to osteomyelitis also makes their surgical management difficult. A structural autograft was used and anterior cervical instrumentation was avoided in all cases. In the 3 cases where a pharyngeal defect existed, soft tissue reconstructions using well vascularized flaps were employed. Under the direction of Infectious Diseases, patients were treated initially with IV antibiotics and eventually transitioned to long term oral therapy. All patients maintained or recovered full neurologic function and returned to a limited or full oral diet.

Cervical spine osteomyelitis is a rare and serious complication that should be considered in patients with a history of pharyngeal surgery and radiation who undergo esophageal dilation. We would consider the use of preoperative antibiotic prophylaxis covering oropharyngeal flora in this special population. In our experience a multidisciplinary surgical approach to the cervical spine and pharynx along with extended antibiotics allowed for successful management of this challenging complication.

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