

Esophageal perforation after anterior cervical spine surgery

Epidemiology

Esophageal [perforation](#) is a rare but well-known complication of [anterior cervical spine surgery](#).

Data is imprecise due to reporting [bias](#). It is also likely that minor injuries that heal spontaneously and go unrecognized may occur. Reported range: 0.02% to 1.52%. Incidence is higher when the surgery is performed for trauma ¹⁾.

Incidence may be higher with use of [anterior cervical plate](#).

Etiology

Intraoperative injury (direct injury or from retractor), [hardware failure](#) & hardware erosion, [graft extrusion](#).

Complications

Dysphagia, local infection, deep infection (including osteomyelitis), pseudarthrosis, pharyngoesophageal diverticulum, sepsis, mediastinitis, death in 4% ²⁾.

Species reported with infection include: [Staphylococcus](#) (including [MRSA](#)), [Candida](#), [Pseudomonas](#), and [Streptococcus](#).

Delay to diagnosis

Mean = 717 days. Median = 44.5 days.

intraoperative recognized: zero delay to diagnosis

- early post-op: < 30 days post-op. Most are probably unrecognized intraoperative injuries
- delayed: as late as 18 years. Mostly hardware failure/erosion.

Clinical features

Dysphagia (the most common), odynophagia, fever, neck swelling, and wound leakage

Signs include: Fever, subcutaneous emphysema, sepsis $\pm$ shock ³⁾.

Systematic Review

Halani et al., performed a systematic review of the literature to evaluate symptomatology, direct causes, repair methods, and associated complications of esophageal injury.

A PubMed search that adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines included relevant clinical studies and case reports (articles written in the English language that included humans as subjects) that reported patients who underwent anterior spinal surgery and sustained some form of esophageal perforation. Available data on clinical presentation, the surgical procedure performed, outcome measures, and other individual variables were abstracted from 1980 through 2015.

The PubMed search yielded 65 articles with 153 patients (mean age 44.7 years; range 14-85 years) who underwent anterior spinal surgery and sustained esophageal perforation, either during surgery or in a delayed fashion. The most common indications for initial anterior cervical spine surgery in these cases were vertebral fracture/dislocation (n = 77), spondylotic myelopathy (n = 15), and nucleus pulposus herniation (n = 10). The most commonly involved spinal levels were C5-6 (n = 51) and C6-7 (n = 39). The most common presenting symptoms included dysphagia (n = 63), fever (n = 24), neck swelling (n = 23), and wound leakage (n = 18). The etiology of esophageal perforation included hardware failure (n = 31), hardware erosion (n = 23), and intraoperative injury (n = 14). The imaging modalities used to identify the esophageal perforations included modified contrast dye swallow studies, CT, endoscopy, plain radiography, and MRI. Esophageal repair was most commonly achieved using a modified muscle flap, as well as with primary closure. Outcomes measured in the literature were often defined by the time to oral intake following esophageal repair. Complications included pneumonia (n = 6), mediastinitis (n = 4), osteomyelitis (n = 3), sepsis (n = 3), acute respiratory distress syndrome (n = 2), and recurrent laryngeal nerve damage (n = 1). The mortality rate of esophageal perforation in the analysis was 3.92% (6 of 153 reported patients).

Esophageal perforation after anterior cervical spine surgery is a rare complication. This systematic review demonstrates that these perforations can be stratified into 3 categories based on the timing of symptomatic onset: intraoperative, early postoperative (within 30 days of anterior spinal surgery), and delayed. The most common source of esophageal injury is hardware erosion or migration, each of which may vary in their time to symptomatic manifestation ⁴⁾.

Following anterior cervical surgery, patients should be closely followed up in the postoperative period for risk of esophageal perforation. Development of symptoms like dysphagia, pneumonia, fever, odynophagia, hoarseness, weight loss, and breathing difficulty in patients with a history of previous anterior cervical surgery should alert us for a possible esophageal injury. Review of the literature revealed that conservative treatment is advocated for early and small esophageal perforations. Surgical treatment may be considered for large esophageal defects ⁵⁾.

Aslier et al. reviewed the records of four patients with Pharyngoesophageal perforation (PEP) after anterior cervical spine intervention (ACSI). Symptoms, physical examination findings, imaging results, treatment, and follow-up characteristics were evaluated.

All four patients had undergone ACSI for either cervical trauma or cervical disc herniation with cervical cage reconstruction. Symptoms developed within the first 10 days of the postoperative period in three

patients, and in the eighth month in one patient. Mucosal defects were detected during neck exploration in three patients. Reconstruction with primary suture and a local muscle flap was utilized in two patients. Three patients were discharged 3-8 weeks after surgical treatment.

In cases of PEP after ACSI, a good prognosis can be achieved when symptoms are detected in the early period and reconstruction with local muscle flap is applied ⁶⁾.

Case report

Piątek and Maciejczak presented the case of an [elderly patient](#) with a history of [odontoid fracture](#). Ten weeks after primary AOSF, the patient came to the Neurosurgery Department due to expectorating [screws](#). This implied the need for further examination and even oesophageal reconstructive surgery or another [spinal surgery](#). In laryngological examination and in gastroscopy there were no signs of fistula. In this case conservative treatment was proceeded. Due to odontoid fracture, non-union cervical posterior stabilisation was necessary ⁷⁾.

A 58-year-old woman who achieved complete resolution when treated only with debridement and drainage.

Shah et al. find that a supportive approach, surgical management without direct repair, may play a vital role in select patient populations in order to avoid potentially long-term consequences or radical treatments, like esophageal diversion. Decisions regarding direct repair versus debridement and inspection only should be made on a case-by-case basis through a multidisciplinary approach ⁸⁾.

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