

Esophageal, pharyngeal and hemorrhagic complications occurring in anterior cervical surgery: Three illustrative cases

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Abstract

Background: The number of esophageal and pharyngeal perforations occurring in anterior cervical surgeries ranges from 0.25% to 1% and 0.2% to 1.2%, respectively. Symptoms usually appear postoperatively and are attributed to: Local infection, fistula, sepsis, or mediastinitis. Acute postoperative hematoma, although very rare (<1%), is the first complication to rule out due to its life-threatening complications (e.g. acute respiratory failure).

Case Description: Over a 36-year period, the author(s) described three severe esophageal/pharyngeal complications attributed to anterior cervical surgery. As these complications were appropriately recognized/treated, patients had favorable outcomes.

Conclusions: Anterior cervical spine surgery is a safe approach and is associated with few major esophageal/pharyngeal complications, which most commonly include transient dysphagia and dysphonia. If symptoms persist, patients should be assessed for esophageal/pharyngeal defects utilizing appropriate imaging studies. Notably, even if the major complications listed above are adequately treated, optimal results are in no way guaranteed.

Key Words: Anterior cervical approach, complications, esophageal fistula, postoperative hematoma, pharyngeal fistula, respiratory decompensation.

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INTRODUCTION

Although anterior cervical spine surgery is complex, it may be performed safely, and effectively. It has been performed since the 1950s^[2] and many different anterior cervical spine fixation techniques have evolved over the subsequent decades.^[3,4,16,24] Major complications for anterior cervical

discectomy/fusion (ACDF) include dysphagia/dysphonia, postoperative hematoma, and esophageal or pharyngeal perforation, all of which may lead to respiratory decompensation. Here the authors discussed the diagnosis, treatment and management of three cases of esophageal/pharyngeal and hemorrhagic complications attributed to ACDF utilizing a Smith-Robinson approach.

CASE REPORT

Case 1

A 45-year-old female presented with myelopathy/cord compression attributed to C3 to C7 disk herniations and ossified posterior longitudinal ligament (OPLL). She underwent anterior corpectomy/fusion (ACF) from C3-C5 utilizing cadaveric tricortical iliac crest bone graft, and ACDF at the C5-C6 and C6-C7 levels utilizing intersomatic tricalcium phosphate grafts [Table 1]. During bone milling, the external side of the lower pharyngeal wall was lacerated; the lesion was closed with a single suture. A few hours after the surgery, the patient developed dysphagia, which became increasingly severe over the next few days. When the ear/nose/throat (ENT) physician performed a fiber endoscopy, no abnormalities were found. However, an esophageal barium swallow documented a leak of iodinated contrast involving the lower peripharyngeal area [Figure 1]. The patient underwent antibiotic endovenous therapy and nasogastric tube placement for 3 weeks but she did not show improvement. The cervical spine computed tomography (CT) scan showed an abscess-like mass shifting the trachea in the posterior aspect of the piriform sinus [Figure 2].

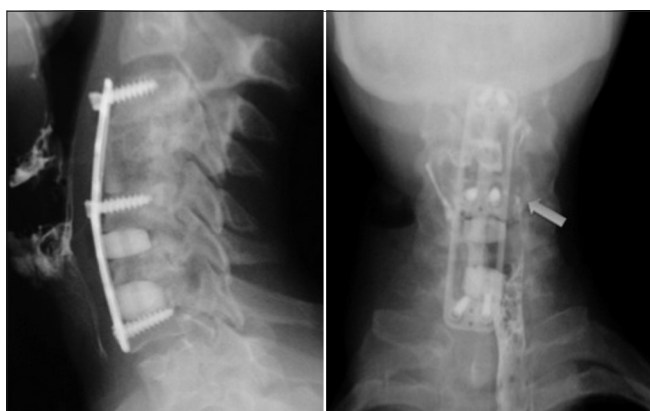


Figure 1: Esophageal barium exam. Leak of iodinated contrast few days after the surgery

Despite ENT draining the collection, the patient aspirated in the intensive care unit (ICU) after 5 days. A few hours later, this led to pneumonia and septic shock, with near-fatal outcome. Following treatment with intravenous antibiotics, parenteral nutrition, and nasogastric tube placement for 2 weeks, the patient improved and was then transferred. Fifteen days later, the patient was discharged home on intravenous antibiotics. Ultimately, she was asymptomatic.

Case 2

A 23-year-old male was injured in a motor vehicle accident that led to a cervical C2 fracture with traumatic grade II listhesis over C3 (CT-documented). Notably, there was no overt radiographic spinal cord and/or root injury, and the patient remained neurologically asymptomatic. The patient underwent a C2-C3 ACDF utilizing a titanium plate, screws, and tricalcium phosphate graft. He had multiple X-rays and a CT scan performed postoperatively that documented the known misalignment but the graft stability. He was discharged home neurologically intact.

Four years after the surgery, he was referred by ENT due to the recent onset of dysphagia and visualization of a



Figure 2: Cervical CT. Abscess-like mass on cervical CT shifting the trachea. Documented after 3 weeks under antibiotic endovenous therapy and nasogastric tube placement

Table 1: Cases summarized

Variables	Patient 1	Patient 2	Patient 3
Age/sex	45 female	23 male	49 male
MR/CT findings	C3C4/C4C5/C5C6/C6C7 DH*	Lysthesis G-II-fracture C2C3	C4C5/C5C6 DH*
Operative procedure	C3-C5 ACF** (Cadaveric bone graft) C5-C6, C6-C7 ACDF*** (Tricalcium phosphate grafts)	C2C3 ACDF*** (Tricalcium phosphate grafts)	C4C5, C5C6 ACDF*** (PEEK intersomatic Grafts)
Complications	Pharyngeal laceration Bronchoaspiration and Septic shock	Oropharyngeal fistula (4 years later)	Postoperative hematoma Respiratory decompensation
Treatment	Draining the abscess-like collection Endovenous antibiotics Nasogastric tube	Plate removal Endovenous antibiotics Nasogastric tube	1 st clot removal and drainage. 2 nd clot removal and drainage Tracheotomy Antifibrinolytic therapy

DH*: Disc Herniation, ACF**: Anterior cervical corpectomy/fusion, ACDF***: Anterior cervical discectomy/fusion, CT: Computed tomography, MR: Magnetic resonance

metallic foreign body in the oropharynx on the visual exam and fiberoptic laryngoscopy [Figures 3 and 4]. The plate had perforated the posterior wall of the pharynx and was removed utilizing a routine anterolateral cervical approach (e.g. a transoral approach was not chosen, as the lesion was too caudal) [Figure 5]. Following plate removal, the patient was admitted to the ICU, and placed on intravenous antibiotics; a nasogastric tube was also utilized for the ensuing month to allow the pharyngeal injury to heal. The patient was ultimately discharged without any neurological deficits or other sequelae, and returned to his former active life-style.

Case 3

A 49-year-old male had disc herniations and ACDF procedures performed at the C4-C5 and C5-C6 levels utilizing a titanium plate and Polyether ether ketone (PEEK) intersomatic grafts. No drain was placed during the procedure. Twenty-three hours postoperatively, the patient developed anterior cervical swelling accompanied by respiratory distress/dysphagia. The cervical CT showed an acute prevertebral hematoma

from C1 to C7, with left tracheal shift [Figure 6]. He was immediately taken to the OR, where, prior to surgery, an emergency tracheotomy was performed as orotracheal intubation was not feasible. Oozing and organized hematoma was found in the surgical bed; hemostasis was ultimately achieved, and a drain was placed. The patient remained in the ICU for 2 days and was then transferred to the medical ward. Six days later, several hours after removal of the tracheotomy, the patient again deteriorated from a recurrent hematoma CT-documented [Figure 7]. After emergent removal of the clot, the patient was again admitted to the ICU. A hematology consult was called due to the repeated hemorrhagic event; a platelet aggregation disorder was diagnosed. He was treated with Amchafibrib (tranexamic acid) during the following days of his ICU stay. The drain was removed 72 h later, and subsequently the tracheotomy was also discontinued 4 days later. The patient developed no further bleeding complications and currently does not have any residual neurological deficits.

DISCUSSION

Dysphagia and dysphonia are the most common postoperative complications (transient 5-30%; persistent 0.8-5%) following anterior cervical surgery.^[14,18,22] The incidence of esophageal perforation is between 0.25%

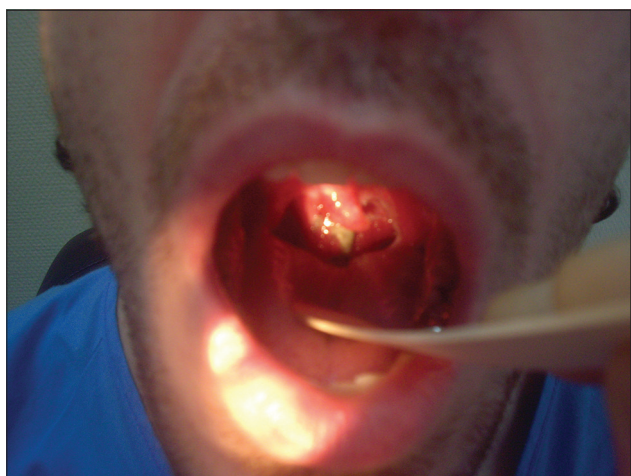


Figure 3: Visual exam. Metallic foreign body in the oropharynx 4 years after the surgery



Figure 4: Endoscopy exam. Metallic foreign body in the oropharynx

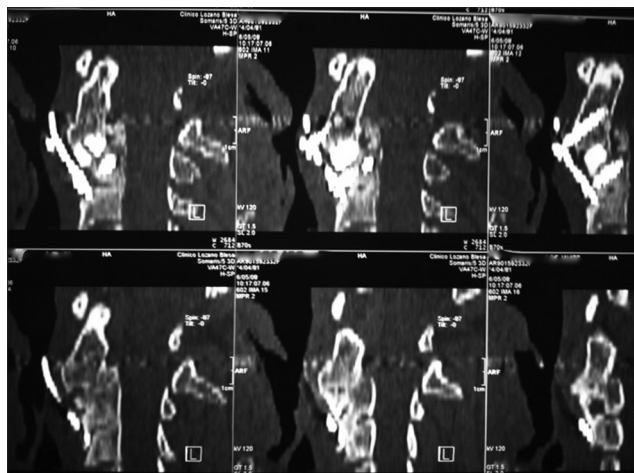


Figure 5: CT exam. Posterior wall of the pharynx perforation

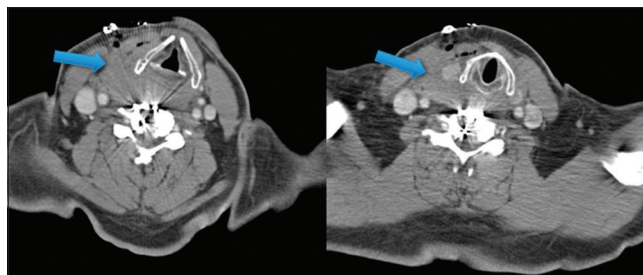


Figure 6: Postsurgical urgent cervical CT. Prevertebral hematoma with left tracheal shift

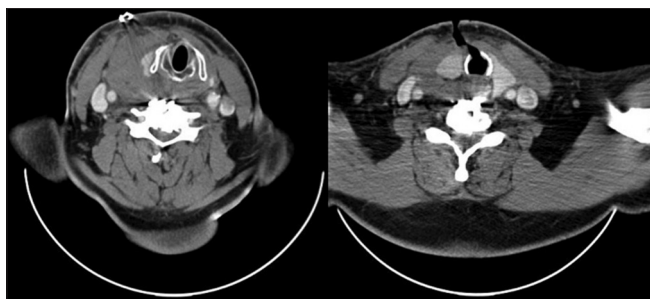


Figure 7: Second postsurgical urgent cervical CT. Recurring prevertebral hematoma

and 1%,^[1,12,20,24] and for pharyngeal perforation is between 0.2% and 1.2%.^[9,15,17,26] Most of these complications are attributed to esophageal traction or recurrent laryngeal nerve (3.5%) and/or injury leading to postoperative edema and neuroapraxia.^[12] Other symptoms of transient injuries esophageal/pharyngeal injuries include: Cough, fatigue while talking, aphonia, and bronchoaspiration. Symptoms usually appear postoperatively from a local infection, fistula, sepsis or mediastinitis, and may lead to septic shock, airway obstruction and even death. It is recommended to address these complications with a multidisciplinary approach that includes ENT and/or General Surgery.

If dysphagia and/or dysphonia persist, an organic defect should be ruled out utilizing fiberoptic endoscopy, barium swallow, or CT scans. Interestingly, Gaudinez *et al.*^[10] found that only 72% of patients with esophageal perforation had positive results on an imaging study, and endoscopy was required in 64% of cases to correctly establish the diagnosis. Laceration of the esophagus/pharynx typically occurs during surgery (e.g. during dissection/placement of instrumentation), or in the immediate postoperative period. Only rarely, does this complication appear years later (e.g. case 2) In case 2, the upper portion of the plate was not in close contact with the cortical vertebral body, thus leading to microtrauma to the posterior wall of the pharynx, and resulting in a delayed esophageal erosion.^[23,25]

Treatment options for esophageal/hypopharyngeal perforation repair

There are several treatment options to repair esophageal or hypopharyngeal perforations.^[21,27] For small defects, conservative treatment (e.g. enteral nutrition, antibiotics, and observation) may suffice. Others, however, may require direct repair of the surgical perforation utilizing a muscle flap (e.g. sternocleidomastoid or omohyoid muscles).^[5,28]

Respiratory decompensation

Another rare complication from this surgery is postoperative respiratory failure; such decompensation may be variously attributed to laryngospasm, vocal cord paralysis, allergic reaction, foreign bodies, and/or

hematoma (0.52%) (case 3).^[6,7,9,13,22] If a postoperative clot is suspected (5.6%), an emergent/urgent cervical spine CT should be performed to look for bleeding and tracheal compression/deviation. Surgical decompression should then be performed emergently;^[8] occasionally, this even warrants opening of the surgical wound at the patient's bedside followed by completion of clot removal in the operating room.

Postoperative hematoma/recurrent hematoma

Meticulous hemostasis is required during anterior cervical surgery to minimize postoperative hemorrhagic complications. However, when postoperative hemorrhages recur, a hematology consult is warranted to rule out an underlying bleeding disorder/coagulopathy. Another remaining question is about the role of postoperative drainage. Some surgeons, including vascular, general, or ENT surgeons, routinely place drains following neck surgeries. However, postoperative hemorrhages are not clearly avoidable even if a drain is placed.^[11,19]

CONCLUSIONS

Anterior approach cervical spine surgery is a safe surgical procedure with few complications, if it is properly indicated and performed. We should emphasize on presenting this kind of disorder in order to disclose its treatment, apart from its medical-legal consequences, so that it is reflected not only in the general literature but also in medical publications and neurosurgery history.

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