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IfJJO covers topics concerning arthroscopy, evidence-based medicine, epidemiology, nursing, sports medicine, therapy of bone and spinal diseases, bone trauma, osteoarthropathy, bone tumors and osteoporosis, minimally invasive therapy, diagnostic imaging. Priority publication will be given to articles concerning diagnosis and treatment of orthopedic diseases. The following aspects are covered: Clinical diagnosis, laboratory diagnosis, differential diagnosis, imaging tests, pathological diagnosis, molecular biological diagnosis, immunological diagnosis, genetic diagnosis, functional diagnostics, and physical diagnosis; and comprehensive therapy, drug therapy, surgical therapy, interventional treatment, minimally invasive therapy, and robot-assisted therapy.

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Open wound management of esophagocutaneous fistula in unstable cervical spine after corpectomy and multilevel laminectomy: A case report and review of the literature

Hossein Elgafy, Mustafa Khan, Jacob Azurdia, Nicholas Peters

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Abstract

A 67-year-old female patient developed an esophagocutaneous fistula 4 mo after C4 and C5 partial corpectomy. Plain radiograph and computed tomography (CT) scan of cervical spine showed inferior screws pullout with plate migration that caused the esophageal perforation. Management included removal of anterior hardware, revision C4-5 corpectomy, iliac crest strut autograft and halo orthosis immobilization. The fistula was treated using antibiotics and a 10-french gauge rubber tube for daily irrigation and Penrose drain. At 3 mo, the esophagocutaneous fistula healed and the patient resumed oral feeding. Six months follow-up CT scan showed sound fusion with graft incorporation. At two-year follow-up, patient denied any neck pain or dysphagia. This case report presents a successful outcome of a conservative open wound management without attempted repair. The importance of this case report is to highlight this treatment method that may be considered in such a rare complication particularly if surgical repair failed.

Key words: Wound management; Esophagocutaneous fistula

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Core tip: Esophageal perforation and subsequent fistulization is a known complication following anterior cervical spine surgery. As part of the treatment of this complication, hardware removal is commonly required. The majority of the literature advises against conservative treatment of esophageal injury due to the associated morbidity and mortality.
INTRODUCTION
Anterior cervical spine discectomy and corpectomy are reliable with good outcomes for the treatment of neck pain with radiculopathy or myelopathy. The incidence of esophageal perforation in anterior cervical spine surgery is 0.2% to 0.4%. High mortality rates up to 20% have been reported with injury even when the patient is treated within the first 24 h. This increases to 50% when treatment is further delayed. In rare circumstances with delayed diagnosis, esophagocutaneous fistulous tract may form and presents with discharge of food particles from the surgical wound. As with most infections involving orthopedic implants, management involves hardware removal, debridement of soft tissues and culture specific antibiotic[1-4]. The objective of this case report is to present a successful open wound management without attempted repair of a patient with an esophagocutaneous fistula.

CASE REPORT
A 67-year-old female patient was hospitalized at the authors’ institution for left distal femur fracture that was treated with open reduction and internal fixation. During her postoperative stay, it was noted that food particles were draining from an anterior cervical wound. Patient had a history of two previous cervical spine surgeries, both performed at other institutions. The first was a C4-6 posterior laminectomy without fusion, performed eight years prior to this hospitalization. The second surgery was performed 4 mo prior to her admission to the authors’ institution. It consisted of C4 and C5 partial corpectomy with insertion of a polyetheretherketone (PEEK) cage and C3-6 anterior cervical instrumentation.

The spine service was consulted and plain radiograph demonstrated inferior screws pullout with plate migration (Figure 1). Computed tomography (CT) scan showed subcutaneous air tracking along the neck soft tissues. General surgery and otolaryngology were consulted and an esophagram (Figure 2) revealed ingested oral contrast tracking along the right subcutaneous tissues of the neck confirming perforation of the esophagus at the level of the inferior screws with fistulization through the anterior surgical wound. Blood work showed normal white cell count 8000 (normal 4500-10000), decreased prealbumin 6.1 mg/dL (normal 17-34) and serum iron level 15 mg/dL (normal 50-212) that confirmed malnutrition.

The patient’s oral intake was suspended and a nasogastric tube placed to facilitate feeding. The patient was taken to the operating room and underwent removal of the anterior hardware, drainage of cervical abscess, revision C4-5 corpectomy, C3-C6 fusion using tricortical iliac crest strut autograft and halo vest immobilization. The wound was left open and managed by the general surgery and otolaryngology services. One week after the revision cervical fusion, the patient was taken to the operating room by general surgery for irrigation and debridement, insertion of a 10 French gauge rubber tube for irrigation and Penrose drain. The wound was irrigated via the rubber tube two times daily with a dilute hydrogen peroxide solution. The patient was placed on ceftriaxone and flagyl for 6 wk as cultures grew polymicrobial mouth flora.

The halo vest removed at 3 mo. The fistulous tract healed at 3 mo and patient resumed oral feeding. Six months follow-up CT scan showed graft incorporation (Figure 3). At two years follow up, patient denied any neck pain or dysphagia and plain radiograph showed maintenance of the cervical spine alignment (Figure 4).

DISCUSSION
The incidence of esophageal perforation after anterior cervical spine surgery is 0.2% to 0.4% and may present...
intraoperatively or in the postoperative period\textsuperscript{(1-5)}. Graft dislodgment, prominent hardware or migration can result in chronic pressure on the esophagus, which leads to ischemic tissue breakdown\textsuperscript{(4,6,7)}. It has been reported that 50% of esophageal fistulas occur at C5-6 level instrumentation. At this anatomic landmark, known as Lannier’s triangle, the pharynx transitions to the esophagus and the posterior esophageal mucosa is extremely thin and covered only by fascia\textsuperscript{(8-11)}.

Patients with delayed esophageal injury commonly present with surgical wound infection, odynophagia (pain on swallowing) and dysphagia\textsuperscript{(1,4,12,13)}. When esophageal injury is suspected, contrast swallow studies may reveal extravasation of the contrast material and CT scan may demonstrate subcutaneous air. The patient in the current report had loose hardware, prior corpectomy and presented with food particles draining from an anterior cervical wound, which is pathognomonic for esophageal fistula.

Treatment strategies for esophageal perforation and fistula are debated (Table 1). The majority of

### Table 1  Cases reported in the literature

<table>
<thead>
<tr>
<th>Ref.</th>
<th>No of patients with perforation</th>
<th>Time of diagnosis</th>
<th>Management</th>
<th>Outcome</th>
</tr>
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<tr>
<td>Zhong et al\textsuperscript{(1)}</td>
<td>6</td>
<td>Early postoperative</td>
<td>Wound debrided in 3 patients, implant removed and primary suture of perforation in 2 patients</td>
<td>5 healed 1 died due to pneumonia 3 healed 1 patient died due to systemic complication, indirectly related to the perforation Healed</td>
</tr>
<tr>
<td>Ardon et al\textsuperscript{(3)}</td>
<td>4</td>
<td>Early postoperative in 3 patients</td>
<td>Hardware removed with primary suture of the perforation in 2 patients and in one of these an additional sternocleidomastoid myoplasty was done</td>
<td>3 healed</td>
</tr>
<tr>
<td>Yin et al\textsuperscript{(4)}</td>
<td>1</td>
<td>3 yr after surgery</td>
<td>Emergency tracheostomy, hardware removal, abscess drainage and infected tissue debridement</td>
<td>Fistula recurred twice soon after resumption of oral feeding</td>
</tr>
<tr>
<td>Jamjoom et al\textsuperscript{(7)}</td>
<td>1</td>
<td>Early postoperative</td>
<td>No definite perforation detected at reoperation, pharyngocutaneous fistula formed subsequently No attempted repair</td>
<td>Open drainage in association with broad spectrum antibiotics, continuous nasopharyngeal suctioning, stopping of oral intake and gastrostomy feeding</td>
</tr>
<tr>
<td>Orlando et al\textsuperscript{(9)}</td>
<td>5</td>
<td>2 during surgery 2 early postoperative 6 mo postoperative in 1</td>
<td>Hardware removal in 2 Hardware retained in 1 No hardware inserted in 2 Esophagus repaired in 4</td>
<td>All healed</td>
</tr>
<tr>
<td>Sun et al\textsuperscript{(10)}</td>
<td>5</td>
<td>1 during surgery 4 early postoperative</td>
<td>Hardware removal in 2 Esophagus repaired in 4 reinforcement with a sternocleidomastoid muscle flap in 1 patient Hardware retained No repair</td>
<td>All healed</td>
</tr>
<tr>
<td>Balmaseda et al\textsuperscript{(20)}</td>
<td>1</td>
<td>Early postoperative</td>
<td>Hardware retained repaired and reinforced with sternocleidomastoid flap</td>
<td>Healed</td>
</tr>
<tr>
<td>Ji et al\textsuperscript{(21)}</td>
<td>1</td>
<td>Early postoperative</td>
<td>Hardware retained</td>
<td>Recurrent esophageal leakage 2 d after the repair Wound reopened and a continuous irrigation and drainage system used</td>
</tr>
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Figure 3  Computed tomography scan sagittal reformat showed incorporation of the iliac crest strut graft.

Figure 4  Lateral cervical spine plain radiograph at 2-year follow-up showed incorporation of the iliac crest strut graft with maintenance of the cervical spine alignment.
A 67-year-old female patient presented with food particles draining from an anterior cervical wound. Patient had a history of two previous cervical spine surgeries; the first was a C4-6 posterior laminectomy without fusion, performed eight years prior current presentation. The second surgery was performed 4 mo prior to her admission to the authors’ institution. It consisted of C4 and C5 partial corpectomy with insertion of a PEEK cage and C3-6 anterior cervical instrumentation.

In conclusion, the current report shows that this complication can be successfully treated with open wound management. This highlights the value of wound management for such a rare complication that could be considered after failed surgical repair of esophageal injury.

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