Pharyngoesophageal diverticulum following cervical corpectomy and plating

Case report

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This case of a pharyngoesophageal diverticulum was diagnosed 3 years after a corpectomy and fusion for a cervical fracture. The diverticulum was excised, the plate and screws were removed, and the patient was asymptomatic 3 years later. The dense scar tissue around the hardware probably caused traction on the posterior pharyngoesophageal region, followed by development of the diverticulum. The authors speculate that the malpositioning of the hardware was an irritative factor promoting such a scar. To the best of their knowledge, this is the first reported case of pharyngoesophageal diverticulum following cervical corpectomy and plating. (DOI: 10.3171/SPI/2008/9/9/258)

KEY WORDS • anterior cervical plate fixation • corpectomy • pharyngoesophageal diverticulum • surgical complication • traction-related diverticulum

Anterior cervical spine surgery might be associated with several pharyngoesophageal disorders. Dysphagia is the most common problem, but it is usually transient, with resolution occurring within a few weeks.1 Pharyngoesophageal perforation is a more serious complication, but fortunately it is less frequent: most of the reported cases occur during the early postoperative period,8,9 arising more rarely in a delayed manner7 (weeks and even months after surgery).

The development of a pharyngoesophageal diverticulum is an unusual complication of ACSS, with only 3 previously reported cases.5,11,12 To the best of our knowledge, these diverticula occurred following a cervical interbody fusion, whereas the case reported here occurred following a cervical corpectomy and plating procedure.

Case Report

History and Examination. This 31-year-old man sustained a C-7 burst fracture and a C5–6 unilateral dislocation due to a traffic accident in September 2001. He underwent a C-7 corpectomy and C5–6 discectomy, reconstruction of both defects with an iliac crest autograft, and C5–T1 anterior fusion with plating (Atlantis cervical plate). The postoperative course was excellent and he returned to his previous employment.

He returned for periodic follow-ups with radiographs (Fig. 1) and clinical examinations. During a routine 2-year follow-up visit, he complained of a mild and well-tolerated dysphagia. Radiographs showed that the hardware was well positioned although a little displaced to the right, and the dynamic radiographs showed no motion at the fused levels. A CT scan with 3D reconstruction showed complete fusion. Nevertheless, during a routine 3-year follow-up visit the dysphagia had increased, and the patient also referred to occasional regurgitations of food, a cough, and weight loss. A barium swallow showed a large posterior pharyngoesophageal diverticulum (Fig. 2).

Operation. The second surgery was performed 3 years after the cervical corpectomy and plating. The previous incision was opened and the diverticulum was identified. It was a big pouch, sessile (that is, without an evident neck), and it was very adherent by scar tissue to the plate. The pouch was released and the plate and screws were removed. Later the diverticulum was excised and the esophagus reconstructed by surgeons from the Ear, Nose, and Throat service. A nasogastric tube was placed and a tracheostomy was done. Feeding by nasogastric tube began 5 days after the operation, without any problems. The tube was taken out and the tracheostomy closed several days later, without complications. The patient returned to a normal diet and was discharged 15 days after the surgery, with swallowing nearly normal.

Postoperative Course. The patient was periodically evaluated, and from these assessments we found that the dysphagia had disappeared and normal weight had been recovered. A follow-up barium swallow performed at 1 year showed no problems. During the last follow-up, 3 years after the pharyngeal surgery, the patient was asymptomatic.

Discussion

Pharyngoesophageal diverticula are always uncommon lesions. The most commonly encountered one is the Zenker diverticulum.
Pharyngoesophageal diverticulum after cervical corpectomy

diverticulum, which arises from the posterior hypopharynx through the space between the inferior constrictor and the cricopharyngeus. This kind of diverticulum results from increased pressure in the pharynx during swallowing, secondary to a dysfunction of the cricopharyngeus muscle, so it is also known as a pulsion diverticulum.\(^2\) The traction-related diverticula are other types of lesions resulting from the pulling of the pharyngoesophageal wall, usually due to a scarring or inflammatory process in the surrounding area.\(^4,6\)

The present case is a pharyngoesophageal diverticulum secondary to an ACSS. This is an unusual complication, with only 3 previously reported cases.\(^5,11,12\) In 1991 Goffart et al.\(^5\) described the first case, which occurred in a 44-year-old man who had undergone an interbody fusion for a cervical fracture/dislocation 11 months previously. Salam and Cable\(^11\) reported another case in a 36-year-old woman who developed a diverticulum 1 year after expectoration of a bone graft that had been implanted 2 years previously during a revision surgery of an interbody fusion, which had been done 5 years before to treat a cervical spondylolisthesis. Another case was reported by Sood et al.,\(^12\) and it consisted of a 45-year-old man who had undergone an interbody fusion and plating for a cervical fracture 13 years previously. Our patient was a 31-year-old man who developed a pharyngoesophageal diverticulum 3 years after a corpectomy and fusion for a cervical fracture (Table 1).

The pathogenic mechanism of the development of this type of diverticulum is not well known. The most popular theory is that of a traction-related diverticulum resulting from the pulling of the pharyngeal wall due to scar tissue in the surrounding area. In the case of Goffart et al.,\(^5\) there was an adhesion between the hypopharynx and the bone graft, and a second operation would have contributed to more adherences at this level. In the Salam and Cable case,\(^11\) the authors postulated that the dense scar tissue at the site of extrusion of the bone graft probably caused traction on the posterior pharyngeal wall, with the development of a pharyngeal pouch. In the case of Sood et al.,\(^12\) the development of the diverticulum was attributed to adhesions between the posterior pharyngeal wall and the area around a screw used to hold the Senegas plate.

In our case there was severely fibrotic tissue between the plate and the diverticulum. No abnormality with the hardware was observed, except its malpositioning. Considering

![Fig. 1. Plain lateral (left) and anteroposterior (right) cervical radiographs obtained 6 months after corpectomy and plating. No abnormality associated with the hardware was observed, except that it was off the midline.](image1)

![Fig. 2. Lateral (left) and anteroposterior (right) barium swallow studies showing a large posterior pharyngoesophageal diverticulum. Note the close contact with the plate.](image2)
that any protrusion or irregularity of the anterior aspect of the cervical spine may occasionally cause esophageal irritation, even erosion, we speculate that the malpositioning of the hardware was a possible irritative factor on the esophageal wall, and therefore it was a probable factor in the formation of the diverticulum in our case, there being no other reasonable explanation.

The common symptoms of pharyngoesophageal diverticula are dysphagia, regurgitation of undigested food, and noisy swallowing. Chest infections caused by aspiration of the contents of the diverticular pouch during the night can occur. The diverticulum increases in size, and in the absence of treatment, esophageal occlusion can occur. The main presenting symptom in pharyngoesophageal diverticulum secondary to ACSS was a long-term dysphagia. Considering that dysphagia is a frequent symptom after ACSS, one understands the difficulty in diagnosis; a high level of suspicion is needed to prompt the diagnosis. The barium swallow x-ray study is the definitive investigation in cases of pharyngoesophageal diverticulum.

The recommended treatment of a pharyngoesophageal diverticulum is excision, which was done in previously reported cases except in the one reported by Salam and Cable, in which an endoscopy diathermy procedure was performed. In our case, besides the excision of the diverticulum, the hardware was removed due to the risk of its eventual malpositioning, which could be related to the development of the diverticulum. Since this experience, we have emphasized that the plate must be well centered and the anterior aspect of the cervical spine left smooth before concluding any cervical plating surgery.

Conclusions

Although dysphagia is a frequent problem after ACSS, when its duration is long-term, the patient should be adequately evaluated, especially with barium contrast radiological studies, with the aim to detect eventual pharyngoesophageal complications such as the development of a diverticulum.

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Disclaimer

The authors do not report any conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

References

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TABLE 1

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>Age (yrs), Sex</th>
<th>Spine Process</th>
<th>Prior Spine Ops</th>
<th>Symptoms (duration)</th>
<th>Treatment</th>
<th>Follow-Up Findings</th>
<th>Pathological Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goffart et al., 1991</td>
<td>44, M</td>
<td>fracture/dislocation spondylosis</td>
<td>IF &amp; RS 11 mos previously</td>
<td>dysphagia, regurgitation, &amp; weight loss (6 mos)</td>
<td>excision</td>
<td>occasional sticking of food at 18 mos significant improvement at 3 mos</td>
<td>adhesions b/wn PW &amp; BG adhesions at site of extrusion of internal fixation hardware &amp; a screw</td>
</tr>
<tr>
<td>Salam &amp; Cable, 1994</td>
<td>36, F</td>
<td>fracture</td>
<td>IF 5 yrs &amp; RS 2 yrs previously</td>
<td>dysphagia (1 yr)</td>
<td>DED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sood et al., 1998</td>
<td>45, M</td>
<td>fracture</td>
<td>IFP 13 yrs previously</td>
<td>dysphagia (1 yr)</td>
<td>excision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present study</td>
<td>31, M</td>
<td>fracture</td>
<td>CP 3 yrs previously</td>
<td>dysphagia (2 yrs), regurgitation &amp; weight loss (3 yrs)</td>
<td>excision &amp; removal of hardware</td>
<td>symptom free at 3 yrs</td>
<td>adhesions b/wn PW &amp; the plate</td>
</tr>
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* BG = bone graft; CP = corpectomy and plating; DED = Dohlman endoscopy diathermy; IF = interbody fusion; IFP = IF and plating; PW = pharyngeal wall; RS = revision surgery.