CASE REPORT

Diagnosis of Pharyngeal Fistula by Video Laryngoscopy and its Nonsurgical Treatment: a Case Report

Dong Wang, MD*, Jun Dong, MD*, Meng Lu, MD, Bao-hui Yang, MD, Hao-peng Li, MD, Xi-jing He, MD

Department of Orthopaedics, Second Affiliated Hospital of Xi'an Jiaotong University, Xi'an, Shaanxi, China

Introduction

Anterior cervical discectomy and fusion (ACDF) is a widely used and effective procedure for diseases of the cervical vertebrae^{1,2}. However, several postoperative complications can readily occur, for example, damage to adjacent organs such as the esophagus and trachea. Pharyngeal fistula, a rare and serious complication which can occur after cervical surgery can lead to wound, vertebral and/or mediastinal infection, resulting in a high mortality. The reported morbidity of this disease following anterior cervical surgery is 0.2% to 1.49%^{3,4}. Either operative or conservative intervention is reported effective in the management of pharyngeal fistula. Surgical treatment such as debridement and exploratory surgery, primary suturing of the perforation, sternocleidomastoid myoplasty have been reported³. However, as spontaneous recovery of this disease is possible, reoperation is not always necessary. The conservative treatment generally includes clinical observation, extra oral feeding, and systemic antibiotics. The diagnosis of pharyngeal fistula can be achieved by imaging or endoscopic studies⁵. Here, we report a case of pharyngeal fistula after ACDF and discuss the possible pathogenesis and treatment.

Case Report

A 36-year-old man with a history of encephalitis resulting in intermittent head spasm presented to us complaining of neck pain and numbness on the right side of his body. Magnetic resonance imaging (MRI) examination revealed disc herniation at the C₃₋₄ level (Fig. 1). Because there were clear indications for surgery, he underwent anterior cervical decompression at the C₃₋₄ level and insertion of an appropriately sized titanium cage packed with autogenous bone grafts into the

anterior defect. In view of his head spasm, the senior author decided to perform fusion with internal fixation and cervical pedicle screw fixation via a combined anterior and posterior approach. The plate and screws appeared satisfactory on a postoperative radiograph (Fig. 2). Three days postoperatively, he developed a sore throat, dysphagia and odynophagia. However, no abnormalities were found on physical examination of the lungs and chest. Various investigations, including chest X-ray, white blood cell count, erythrocyte sedimentation rate, and C-reactive protein concentration, were negative. Eventually, a pharyngeal fistula was detected by video laryngoscopy (Fig. 3).

A nasogastric tube was immediately inserted and intravenous rehydration and cephalosporin were administered. A sinus emerged through the apparently-healed wound 15 days after surgery, accompanied by oozing of mucus and partial anterior subcutaneous emphysema. After removal of the pseudomembrane inside the sinus, the wound was thoroughly flushed with gentamicin and metronidazole and packed with povidone-iodine gauze. The patient also received a daily metronidazole mouthwash and intravenous nutrition and his condition improved considerably. Although the exudate from the wound had dramatically decreased by the 20th day of daily replacement of the wound dressing, the diameter of sinus had increased. Forty-five days postoperatively, during which time daily dressing replacement and medication had been continued; iodoform was substituted for povidone-iodine gauze in the sinus to decrease the size of the wound. Subsequently, laryngoscopic reexamination revealed that the diameter of the fistula had decreased remarkably (Fig. 4). By 60 days after surgery, the external wound had completely healed over. On

Address for correspondence Xi-jing He, MD, Department of Orthopaedics, Second Affiliated Hospital of Xi'an Jiaotong University, 157 West Five Road, Xincheng District, Xi'an, Shaanxi Province, China 710004 Tel: 0086-29-87678002; Fax: 0086-29-87678634; Email: xijing_h@vip.tom.com

Disclosure: The authors of this manuscript have no conflicts of interest. The manuscript submitted does not contain information about medical device(s)/drug(s). No funds were received in support of this work. No benefits in any form have been, or will be, received from a commercial party related directly or indirectly to the subject of this manuscript.

*These two authors contributed equally to this work and should be considered co-first authors.

Received 24 August 2013; accepted 21 February 2014

Fig. 1 Preoperative T₂ sagittal image from cervical spinal MRI showing severe cervical spondylitis with swan-neck deformity and severe compression of the spinal cord at the C₃₋₄ level (white arrow).

laryngoscopy, the original fistula was found to have closed and only pseudomembrane was visible on the surface (Fig. 5). The patient was eventually discharged without any clinical sequelae.

Discussion

Pharyngeal fistulas, a rare and potentially lethal complication of cervical surgery⁶, tends to occur in the postoperative period. However, they can develop weeks to months or even longer after such procedures⁷. For example, Gazzeri *et al.* reported a patient in whom esophageal perforation developed 11 years after ACDF⁸. This complication is so rare that, up to now, it has only been documented by anecdotal case reports⁷⁻¹¹. The reported mortality of pharyngoesophageal fistula is 20% to 65%⁸.

Typically, esophageal perforation occurs after screw fixation of the lower cervical spine anteriorly, whereas pharyngeal fistulas may form after surgery on higher cervical vertebral segments. There are three main causes of pharyngeal fistula formation⁹: errors in surgical techniques/judgments, biological factors and postoperative trauma. They are easily caused by injuring the triangular space, which is a weak area immediately above the cricopharyngeal threshold. In our case, we performed decompression at the C₃₋₄ level, corpectomy of the C₃ vertebra and insertion anteriorly of an appropriately sized

Fig. 2 Postoperative cervical lateral view radiograph showing that the instrumentation is satisfactorily placed.

Fig. 3 First electronic laryngoscopy: a pharyngeal fistula almost 3 mm × 5 mm with a pseudomembrane covering its surface (in the red circle) is visible.

Fig. 4 Second electronic laryngoscopy: the pharyngeal fistula is 2 mm × 3 mm (in the red circle).

titanium cage packed with autogenous bone grafts. Thus, over-resection of post-pharyngeal flap led to a pharyngeal muscle defect.

Various therapies have been used to manage pharyngeal fistulas. Surgical revision is necessary if the fistula has been caused by complications of surgery such as migration of loose screws or plate fracture. During revision operation, it suggested that internal cervical screws or other fixation be left in place if they are all stable to minimize the risk of developing a new fistula⁸. The surgeon should focus on suturing the incision in layers, from the external to the internal mucosa⁶. However, because spontaneous resolution of fistulas can occur, reoperation is not always necessary^{6,10,11}. In some cases, the fistula is too small to require a second surgery². Vogel and Strong described a case in which a gallbladder T-tube was used to close the defect¹². In our case, the pharyngeal fistula was caused by the over-resection of the post-pharyngeal flap during the procedure. Thus, a revision procedure was unnecessary. Use of a nasogastric tube and/or intravenous line to provide nourishment obviates the need for swallowing, thus contributing to closing of the fistula. In our case, infection was prevented by packing the fistula with iodoform gauze; this also contracts the interior walls of the sinus. Thus, our patient was managed non-surgically by insertion of a nasogastric tube, iodoform gauze packing of the fistula and intravenous nutrition.

Fig. 5 Third electronic laryngoscopy: the pharyngeal fistula has almost healed (in the red circle).

Early identification and immediate treatment of pharyngeal fistula reduces adverse effects. However, in the early stages some patients are asymptomatic⁶. In our experience, the possibility of fistula should be considered when symptoms such as throat pain, dysphagia, odynophagia or hoarseness, develop after cervical surgery. Various means of diagnosing pharyngeal fistulas and esophageal perforation have been reported; these include barium meal, direct visualization, plain radiography and CT (with esophageal contrast)^{1,8,13}. However, none of these is sufficiently sensitive. Taylor and colleagues compared three techniques for detecting esophageal perforation using intra-esophageal dye injection and concluded that full reliance should not be placed on intra-esophageal dye injection via nasogastric tube alone when attempting to diagnose esophageal perforation¹⁴. In the patient described in this article, video laryngoscopy revealed a fistula from the posterior wall of the pharyngoesophageal junction to the trachea. Eventually, video laryngoscopic examination demonstrated that the pharyngeal fistula had completely healed. To our knowledge, this is the first reported case of pharyngeal fistula after ACDF diagnosed definitively by video laryngoscopy and managed non-surgically without any significant clinical complications.

References

1. Newhouse KE, Lindsey RW, Clark CR, Lieponis J, Murphy MJ. Esophageal perforation following anterior cervical spine surgery. *Spine (Phila Pa 1976)*, 1989, 14: 1051–1053.
2. Patel NP, Wolcott WP, Johnson JP, *et al.* Esophageal injury associated with anterior cervical spine surgery. *Surg Neurol*, 2008, 69: 20–24.
3. Sun L, Song YM, Liu LM, *et al.* Causes, treatment and prevention of esophageal fistulas in anterior cervical spine surgery. *Orthop Surg*, 2012, 4: 241–246.
4. Gaudinez RF, English GM, Gebhard JS, Brugman JL, Donaldson DH, Brown CW. Esophageal perforations after anterior cervical surgery. *J Spinal Disord*, 2000, 13: 77–84.
5. Ardon H, Van Calenbergh F, Van Raemdonck D, *et al.* Oesophageal perforation after anterior cervical surgery: management in four patients. *Acta Neurochir (Wien)*, 2009, 151: 297–302.
6. Pompili A, Canitano S, Caroli F, *et al.* Asymptomatic esophageal perforation caused by late screw migration after anterior cervical plating: report of a case and review of relevant literature. *Spine (Phila Pa 1976)*, 2002, 27: E499–E502.
7. Smith TJ, Burrage KJ, Ganguly P, Kirby S, Drover C. Prevention of postlaryngectomy pharyngocutaneous fistula: the Memorial University experience. *J Otolaryngol*, 2003, 32: 222–225.
8. Gazzeri R, Tamorri M, Faiola A, Gazzeri G. Delayed migration of a screw into the gastrointestinal tract after anterior cervical spine plating. *Spine (Phila Pa 1976)*, 2008, 33: E268–E271.
9. Sahjpaul RL. Esophageal perforation from anterior cervical screw migration. *Surg Neurol*, 2007, 68: 205–209.
10. Boscolo-Rizzo P, De Cillis G, Marchiori C, Carpenè S, Da Mosto MC. Multivariate analysis of risk factors for pharyngocutaneous fistula after total laryngectomy. *Eur Arch Otorhinolaryngol*, 2008, 265: 929–936.
11. Joo YH, Sun DI, Park JO, Cho KJ, Kim MS. Factors predicting fistula following radial forearm free flap reconstruction for head and neck cancer. *Oral Oncol*, 2010, 46: 684–687.
12. Vogel DH, Strong MS. Use of a T-tube in management of a pharyngeal fistula after laryngectomy. *Plast Reconstr Surg*, 1978, 62: 563–565.
13. Leonard R, Belafsky P. Dysphagia following cervical spine surgery with anterior instrumentation: evidence from fluoroscopic swallow studies. *Spine(Phila Pa 1976)*, 2011, 36: 2217–2223.
14. Taylor B, Patel AA, Okubadejo GO, Albert T, Riew KD. Detection of esophageal perforation using intraesophageal dye injection. *J Spinal Disord Tech*, 2006, 19: 191–193.