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CASE REPORT

Success in Esophageal Perforation Repair With Open-Wound Management After Revision Cervical Spine Surgery

A Case Report

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Study Design. Case report.

Objective. To share our successful experience in treating 1 case of esophageal perforation after anterior revision cervical spine surgery with open-wound management.

Summary of Background Data. Early diagnosis and surgical treatment is widely adopted in the management of esophageal complications after anterior cervical spine surgery, but the management of wound after surgical repair of esophageal perforation is rarely discussed.

Methods. One patient underwent revision anterior cervical spine surgery because of displaced hardware and poor alignment of cervical spine. Esophageal perforation was incurred intraoperatively and found on the first postoperative day. Repair surgery was carried out immediately afterward. During the surgery, esophageal perforation was closed with a suture, and reinforced with a sternocleidomastoid muscle flap. The wound was loosely closed with aspirating drainage. Two days after the surgery, the patient began to show signs of recurrent esophageal leakage and severe secondary wound infection. The wound was then reopened completely before a continuous irrigation and drainage system was positioned in place.

Result. In 12 weeks, the esophageal perforation healed without complications or loosening of instrumentation.

Conclusion. Open-wound management succeeded in this patient after surgical repair of esophageal perforation caused by revision anterior cervical spine surgery.

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Level of Evidence: 4

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Although many strategies have been described to manage esophageal perforation caused by anterior cervical spine surgery,[1–4] there has been no report of a similar encounter published in the literature. By sharing our experience of a special case, we are hoping to add new information to the literature.

Our case was a 24-year-old-male who experienced complete spinal cord injury (American Spinal Injury Association) due to fracture and dislocation at cervical spine (C5) and underwent anterior surgery. Tetraplegia was not recovered after surgery, but the patient could breathe normally as the function of the phrenic nerve remained undisturbed. Two years later he was admitted to our hospital again for the displacement of instrumentation (Figure 1). The preoperative screening test including contrast esophagography did not show abnormalities. He underwent revision cervical spine surgery. On the morning of first postoperative day, the patient complained of odynophagia with swelling around the right anterolateral incision. Saliva-like fluid and air was seen in the anterolateral incision drainage tube. Radiographical examination made after swallowing of soluble contrast showed an esophageal extravasation of the contrast medium in anterolateral incision at the level of C4 vertebra (Figure 2). Repair surgery was carried out urgently. Under general anesthesia, a nasogastric tube was positioned with the aids of fiber optic esophagoscopy. The anterolateral incision wound was opened and extended. A posterior esophageal wall laceration was found just anterior to cervical spine stabilization plate. Esophageal perforation was then sewed up interruptedly using absorbable sutures. Finally, an inferiorly based sternocleidomastoid muscle flap was separated and wrapped around the perforation site before it was sewed up to the wall of esophagus using absorbable sutures. At the end of the surgery, a suction drainage was positioned in the prevertebral space, and the skin was loosely closed. On

Figure 1. CT scan of neck after first anterior cervical spine surgery showing failed instrumentation and poor alignment of cervical spine. CT indicates computed tomography.

the second day after surgery, the patient began to have fever and swelling of neck followed by sign of infection with tachycardia. Despite parenteral administration of wide spectrum antibiotics, cardiac arrest occurred on the third postoperative day. After a successful resuscitation, the extracorporeal membrane oxygenation was used emergently. On suspicion of recurrent esophageal leakage, an emergent surgery was performed for inspection on the third postoperative day. After the anterolateral incision wound was completely reopened and a thorough debridement of the wound, a suction-irrigation draining system consisted of 2 plastic tubes was placed in the prevertebral space. The tube for irrigation was placed near the leak site of esophagus, and the one for drainage was positioned in the lower part of prevertebral space. Isotonic

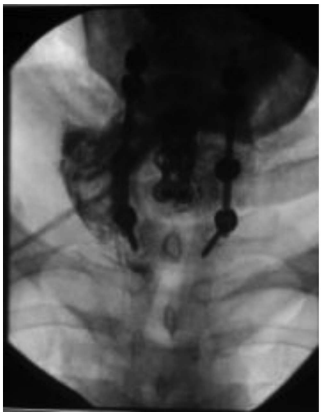

Figure 2. Contrast swallow image showing contrast medium extravasation and its collection in right operative field.

Figure 3. Contrast swallow image demonstrating complete healing of the esophageal perforation 12 weeks after surgical repair.

saline was used for continuous irrigation, and low dose of hydrogen peroxide was also used daily. The incision wound was kept open all along. Sensitive antibiotics selected on the basis of wound swab culture was administered intravenously with parenteral nutrition. The extracorporeal membrane oxygenation was used till heart function recovered. The wound was gradually closed whenever the wound bed became clean. In total, it was kept open for 6 weeks, and the irrigation-drainage system was left *in situ* for 4 more weeks. Leakage was monitored using leak test by asking the patient to drink water. The drainage tube was removed when the leak test became negative. When no esophageal leakage could

Figure 4. CT scan of neck at the 6-month follow-up showing normal density and structure of vertebra of cervical spine, no loosening sign of instrumentation. CT indicates computed tomography.

Figure 5. MRI of neck at 6-month follow-up showing normal signal of cervical spine and no abnormal signal in the prevertebral space. MRI indicates magnetic resonance image.

be found on the contrast swallow radiograph of the esophagus (Figure 3), the patient was allowed to resume soft oral diet, and soon discharged from the hospital. At the 6-month follow-up, the patient had a full recovery with normal diet. Neither computed tomographic scan nor magnetic resonance image showed sign of infection or loosening of instrumentation (Figure 4) (Figure 5).

DISCUSSION

In our case, esophagus perforation was treated in the similar manners as reported in the literature, that is, early surgical repairment of esophageal perforation with reinforcement using sternocleidomastoid muscle flap.[5,6] The wound was also closed over the vacuum drain. However, the method failed as the repaired esophagus was unable to prevent leakage of alimentary fluid after surgery. Subsequently, the vacuum drain failed when the leaked fluid began to accumulate in conjunction with inflammatory fluid in a closed wound.

Our experience suggests that an open drainage with irrigation can salvage the situation like this. Irrigation with isotonic saline around esophageal leakage area could act to dilute the leaked alimentary fluids and to purge the dead spaces deep in the neck. An open wound allows better control over infection caused by anaerobic organisms.

CONCLUSION

The open-wound management creates an environment that facilitates healing of esophageal perforation and reduces risks of infection. In comparison with what is commonly recommended in literature, this method is superior in that it also obviates the need for removal of the instrumentation.[7]

➢ Key Points

- ❑ Early surgical treatment is imperative in the majority of esophageal complications.
- ❑ After the repairing procedures, special attention should be paid to wound management.
- ❑ Open-wound management plays an essential role in the healing of esophageal perforation and the resolution of secondary infection as it acts to facilitate drainage.
- ❑ Open-wound management also obviates the need for removal of the instrumentation.

References

1. Gaudinez RF, English GM, Gebhard JS, et al. Esophageal perforation after anterior cervical surgery. *J Spinal Disord* 2000;13:77–84.
2. Marquez-Lara A, Nandyala SV, Hassanzadeh H, et al. Sentinel events in cervical spine surgery. *Spine* 2014;39:715–20.
3. Navarro R, Javahery R, Eismont F, et al. The role of the sternocleidomastoid muscle flap for esophageal fistula repair in anterior cervical spine surgery. *Spine* 2005;30:E617–22.
4. Orlando ER, Caroli E, Ferrante L. Management of the cervical esophagus and hypofarinx perforation complicating anterior cervical spine surgery. *Spine* 2003;28:E290–5.
5. Nourbakhsh A, Garges KJ. Esophageal perforation with a locking screw. *Spine* 2007;32:E428–35.
6. Benazzo M, Spasiano R, Bertino G, et al. Sternocleidomastoid muscle flap in esophageal perforation repair after cervical spine surgery concepts, techniques, and personal experience. *J Spinal Disord Tech* 2008;21:597–605.
7. Rueth N, Shaw D, Groth S, et al. Management of cervical esophageal injury after spinal surgery. *Ann Thorac Surg* 2010;90:1128–33.