SHORT REPORT

Pharyngo-cutaneous fistula following anterior cervical fusion

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Abstract

A 26-year-old man who underwent anterior cervical fusion for a compressed fracture of the C5 vertebra developed postoperatively partial extrusion of the bone graft, followed by progressive dysphagia and retropharyngeal emphysema. Although no definite perforation of the oesophagus or pharynx was detected at reoperation, an extensive pharyngo-cutaneous fistula formed subsequently through the operative wound. Open drainage in association with broad spectrum antibiotics, continuous nasopharyngeal suctioning, stopping of oral intake and gastrostomy feeding resulted in closure of the fistula. However, the fistula recurred twice soon after resumption of the oral feeding. The diagnostic difficulties in determining when the healing of a pharyngo-cutaneous fistula is complete are underlined. In addition, the importance of continued treatment for 4-6 weeks after first radiological evidence of closure of the fistula is emphasized.

Key words: Anterior fusion, cervical spine, complications, pharyngo-cutaneous fistula.

Introduction

A pharyngo-cutaneous fistula is a serious and life threatening complication of an anterior cervical fusion. However, because of its rarity, neurosurgeons are often not aware of it and of the appropriate management. As a result, diagnosis and treatment may be unnecessarily delayed, often with deleterious consequences, including death from septicaemia, mediastinitis or meningitis.1

In this report the author describes his experience with a case of a delayed pharyngo-cutaneous fistula following anterior cervical fusion. The aim is to draw attention to this complication and discuss its treatment alternatives.

Case report

A 26-year-old man presented with an acute tetraplegia of 10 days duration following a road traffic accident. On admission, he was fully conscious and his cranial nerves were intact. There was complete motor loss below C5 level. Sensation was lost for all modalities below the level of the dermatome C7. There was complete loss of sphincter control.

Plain radiographs of the cervical spine revealed a compressed fracture with anterior wedging of the vertebral body C5 (Fig. 1A). Computed tomography (CT) myelography showed the spinal canal to be narrowed by a retropulsed bone fragment, with some flattening of the cord (Fig. 1B-C).

The patient was started on gradual cervical traction on a Stryker bed and 2 days later he underwent anterior corporectomy C5 followed by an interbody fusion C4 to C6 using an iliac bone graft. Cervical traction was maintained postoperatively.

The early postoperative recovery was uneventful and a postoperative radiograph showed good alignment of the bone graft. On the seventh postoperative day, however, the patient complained of neck pain that started after being turned. A repeat cervical radiograph revealed partial (5 mm) extrusion of the bone graft. One week later, the patient started to complain of dysphagia. His companion and nurses attested that he had choked with a fish bone one day prior to the start of his new symptoms. Cervical radiograph showed that while the degree of graft extrusion was unchanged, there was a gas collection in a markedly widened retropharyngeal space.

The patient was started immediately on intravenous antibiotic therapy consisting of cloxacillin 500 mg 6-hourly, gentamicin 80 mg 8-hourly and cefotriaxone 2 g 12-hourly, followed by emergency exploration of the neck wound. There were adhesions and much purulent material in the
parapharyngeal spaces. A meticulous search for a possible pharyngo-oesophageal perforation was unsuccessful despite the insertion of a nasogastric tube. The operative field was cleaned thoroughly with 1.5% hydrogen peroxide solution and a fresh bone graft was implanted. The wound walls were subsequently lined with gentamicin-collagen fleece (Sulmycin<sup>®</sup> implant, Schering-Plough Int., Germany) which is thought to give a high local antimicrobial concentration, and the skin was closed loosely in a single layer.

Two days later the patient's neck was markedly swollen with mucopurulent discharge from the wound, and mild elevation of the body temperature. An Omnipaque<sup>®</sup> (Nycemed AS, Oslo, Norway) oesophagogram disclosed extensive leakage of the contrast medium from the hypopharynx into the parapharyngeal spaces (Fig. 2A). The wound was immediately reopened, cleaned, and two Penrose drains were inserted, leaving the skin without closure. Postoperatively, oral intake was stopped and continuous nasopharyngeal suctioning was carried out. In addition, the antimicrobial therapy was adjusted to cloxacillin, gentamicin, azactam (2 g 12-hourly) and flagyl (500 mg 8-hourly), based on recent results of the bacterial cultures which showed a mixed infection with Staphylococcus aureus, Pseudomonas aerugenosa, various Streptococci and Bacteroides species. Feeding via gastrostomy tube was started 6 days later and after two more weeks the cervical traction was replaced by a halo external cervical fixation device.

Treatment was carried out for 1 month when external healing of the fistula was complete and an oesophagogram showed apart from irregularity of the pharyngeal wall no extravasation of the dye (Fig. 2B). Subsequently, the patient was allowed to take oral fluids, but upon progression to a soft diet 2 weeks later, he developed a local neck swelling with purulent discharges from the wound. A new oesophagogram revealed a recurrence of the pharyngocutaneous fistula. Consequently, open wound drainage was carried out and all other therapeutic measures were resumed until a control oesophagogram suggested 5 weeks later that the fistula had healed completely. Nevertheless, 10 days after starting oral fluid intake, the neck abscess recurred. Simple incision was repeated and it was found that the abscess cavity formed a fistulous tract extending 6 cm deep into the soft tissues of the neck. A repeat oesophagogram showed also finger-like extravasation of the contrast medium at the level of the

FIG. 1. Plain lateral radiograph of cervical spine (A) showing a compressed fracture of the vertebral body C5. The axial (B) and mid-sagittal (C) postmyelography CT scan confirms the presence of narrowing of the cervical canal with obliteration of the anterior and posterior subarachnoid spaces and flattening of the cord.
FIG. 2. (A) Lateral oesophagogram showing extensive extravasation of the contrast media into the prevertebral space. (B) A control oesophagogram one month later revealed no further leakage of the dye. There is a retrograde contrast filling of the nasopharyngeal tube.

FIG. 3. (A) Oesophagogram showing a second recurrence of the pharyngo-cutaneous fistula. (B) Final oesophagogram confirming the complete healing of the fistula.
FIG. 4. Lateral radiograph of the cervical spine showing good fusion of the bone graft at C5–6 with a mild swan neck deformity.

hypopharynx (Fig. 3A). All previous therapeutic measures were restarted and the fistula tract was treated, in addition, with local application of Leukase-Kegel® (SmithKline Beecham GmbH, Munchen, Germany; 1 wound pellet contains 10 mg framycetin sulphate; 250 NF-units trypsin; 2 mg lidocaine hydrochloride) (4–6 pellets/day).

The fistula healed gradually and 2 months later an oesophagogram confirmed the complete closure of the pharyngo-cutaneous fistula (Fig. 3). On fibre-hypopharyngoscopy, the fossa piriformis and esophageal inlet were unremarkable except for a dark spot in the right piriform fossa measuring about 3 mm in diameter, and probably caused by a small, mucosa covered hole or tract that was not possible to enter with the scope. There were neither granulations nor other signs of infection.

Thereafter, oral feeding was resumed gradually. The patient was transferred later to a spinal rehabilitation unit, but his neurological status remained unchanged. During the follow-up period of 20 months, there was no recurrence of the pharyngo-cutaneous fistula. The last radiographs of the cervical spine showed good fusion of the bone graft with a mild swan neck deformity (Fig. 4).

Discussion

Since its first description by Robinson & Smith in 1955, anterior cervical fusion has gained wide acceptance as a surgical method for the treatment of a range of cervical problems. Nevertheless, the procedure has been associated with a wide range of operative complications that fall into four different categories:

1. Soft tissue injuries during the exposure of the spine.
2. Neural tissue damage during manipulation of the vertebra and intervertebral discs.
3. Problems related to bone graft and internal fixation material.
4. Problems at the bone donor site.

Injuries to the pharynx and oesophagus are rare complications of anterior cervical fusion, but their exact incidence remains unknown. Barber compiled the surgical complications in 700 anterior cervical fusions from different series in the literature and found that dysphagia, hoarseness, and haematoma were reported most frequently, but there were no reports of pharyngo-oesophageal injuries. Tew and Mayfield encountered only one case of oesophageal perforation in 500 cases of anterior spinal surgery. Van Berge Henegouwen et al. reported three cases of oesophageal perforation in 441 anterior cervical fusions for degenerative disease of the spine (i.e. incidence 0.7%). To date, fewer than 20 cases of pharyngo-oesophageal injury following anterior cervical fusion have been reported in the literature, but as there are unreported cases, the incidence of this complication is probably underestimated.

It seems appropriate to distinguish between two types of pharyngo-oesophageal injuries, based on the time of their development in relation to the anterior cervical fusion:

1. Acute injuries which include all injuries detected intraoperatively or in the immediate postoperative period.
2. Delayed injuries which develop after a postoperative period of variable duration.

These two types differ with regard to the pathogenesis of the injury as well as some aspects of their treatment.

Acute pharyngo-oesophageal injuries are most likely caused by a sharp retractor blade that is not adequately protected under the longitudinal colli muscles. Rarely, however, pharyngo-oesophageal rupture may be inflicted shortly prior to surgery as a result of hyperextension injury of the cervical spine, or traumatic endotracheal or nasogastric intubation.

In contrast, the mechanism of delayed pharyngo-oesophageal perforation after anterior cervical fusion is more complex. Partial extrusion of the bone graft or other internal fixation material, and prevertebral abscess have been common findings in the cases reported so far. It has been therefore postulated that chronic compression of the oesophagus by projecting bone or metal may lead to focal ischaemia and necrosis of the oesophageal wall followed by...
prevertebral abscess formation. Nevertheless, the possibility of oesophageal necrosis being in some cases a result rather than a cause of the infection cannot be excluded entirely. It is interesting to note that our patient was initially asymptomatic despite partial extrusion of the bone graft. Dysphagia and retropharyngeal emphysema developed only after he choked with a fish bone, raising the possibility of transluminal perforation of pharynx wall as a cause of the infection.

The recognition of intraoperative pharyngo-oesophageal injuries depends on a high degree of suspicion and careful inspection of the operative field prior to wound closure. Pharyngo-oesophageal lacerations not detected intraoperatively usually present with cervical pain which is aggravated by swallowing and associated with neck swelling and crepitations. Later, patients develop, in addition, fever and other symptoms and signs of acute infection. The diagnosis is confirmed by lateral radiographs of the neck soft tissues showing cervical emphysema. A chest radiograph is needed to detect any associated mediastinal emphysema. The site and size of the perforation is best demonstrated by oesophagography with water-soluble contrast media which shows extravasation through the defect. While pharyngo-oesophagoscopy is considered a definitive test in the detection of pharyngo-oesophageal perforations, the diagnostic yield of the rigid endoscopy has been quite modest, lying in the range of 30%. However, the diagnostic accuracy of this procedure may improve by using a flexible fiberoptic endoscope.

Pharyngo-oesophageal perforations discovered during or within the first hours after the operation should be treated by immediate broad spectrum antimicrobial coverage and primary surgical repair of the defect. Intraoperative insertion of a nasogastric tube may be helpful in delineating the site of injury, but small and posteriorly located perforations may still escape detection, as demonstrated by our case. Patients recovering smoothly after primary repair should undergo control-oesophagography with water-soluble contrast medium 7–10 days later to confirm the integrity of pharynx and oesophagus prior to starting oral feeding.

Treatment of patients with a delayed type of pharyngo-oesophageal perforation should focus initially on the control of the associated and potentially life-threatening infection. Wide incision and drainage of the neck abscess, and broad-spectrum antimicrobial therapy in association with continuous suctioning of the saliva from pharynx and oesophagus usually lead to rapid improvement in the patient's condition. Enteral feeding through a gastrostomy can be resumed once the acute infection has subsided.

The early development of the two recurrences in our patient raises some doubt regarding the diagnostic efficacy of oesophagography in determining when the healing of a pharyngocutaneous fistula is complete. Cellular debris and thickened secretions may occlude the fistula temporarily giving rise to the false negative oesophagrams. Moreover, these multiple recurrences emphasize the importance of continued treatment for 4–6 weeks after the external healing of the fistula.

The role of direct repair of the pharyngo-oesophageal wall after resolution of the infection signs had subsided, is still a matter of controversy. Severe adhesions, increased tissue friability and poor vascular supply often set limitations to the success of direct reconstruction. In contrast, surgical repair by interposition of vital tissue, such as the pedicled sternocleidomastoid muscle flap, seems to be more promising. This is, however, a specialized procedure that may be considered for cases in which the fistula fails to close despite adequate conservative treatment.

In conclusion, pharyngo-oesophageal perforation following anterior cervical fusion represents a serious and difficult condition to treat. Its prevention rather than treatment should be the prime concern of all surgeons. The importance of gentle tissue handling, clean dissection along physiological cleavage planes, and careful placement of retractor blades under the longitudinal colli muscles cannot be overemphasized. Persistent dysphagia after anterior cervical fusion should prompt suspicion of pharyngo-oesophageal injury. The presence of prevertebral air on lateral cervical spine radiograph should be considered diagnostic of pharyngo-oesophageal perforation unless proven otherwise. Graft extrusion by more than 50% should be corrected promptly. Although graft extrusion of a lesser extent may be well tolerated because of resorption of the extruded portion in due course, close clinical and radiological follow-up examinations are mandatory for early recognition of any evolving complications.

Acknowledgements

The authors thank Ms Hilda A. Sumandar for secretarial assistance and Mr Abdullah Palma for the photographs.

References

4. Cloward RB. Complications of anteriorcervical disc reconstruction.