Case Report

International Journal of Neurology and Neurosurgery
Volume 6 Number 1, January - June 2014

Multi-Corporal Abscess Formation due to Esophageal Perforation Post Anterior Cervical Discectomy and Fusion (ACDF)

Alturki A.*, Basamh M., Awwad W***, Jarzem P.******

Abstract

Anterior cervical discectomy and fusion (ACDF) is one of the most commonly performed spinal procedures in the United States. With an excellent outcome in most of them. The complications associated with this procedure are rare but can be troublesome and life threatening. We report the case of a patient that sustained a missed, late esophageal perforation after an anterior cervical discectomy and fusion, leading to multiple abscesses in the epiduaral, paraspinal, mediastinal, parapsoas, and pleural spaces, who survived after multiple procedures and was able to ambulate after a prolonged course of care. A proposed algorithm for treatment is included.

Keywords: ACDF; Multiple epidural abscess; Esophageal perforation.

Introduction

Anterior cervical discectomy and fusion (ACDF) is one of the most commonly performed spinal procedures in the United States.[1] More than 100,000 procedures are performed annually, with an excellent outcome in most of them.[1–8]

It is a well-established procedure for cervical myelopathy, cervical radiculopathy, neoplasms, cervical spondylitic diseases and cervical trauma.

The complications associated with this procedure are rare but can be troublesome.[10,11] These have been adequately described in the literature.[10-15]

Among them, one of the most serious is the extrusion of the implanted instrumentation, with various consequences each time.

We present a case of extrusion of implanted screws for anterior cervical plate insertion post ACDF procedure leading to esophageal perforation and extensive abscess formation. We also reviewed the literature on the incidence of this complication and its management.

Case report

A 62 years old male presented with septic shock one month after an ACDF of C5-C7, admitted to the intensive care unit in another hospital. He underwent resuscitation, Intubated and was eventually diagnosed with neck abscess, bilateral empyema and right psoas abscess. Underwent drainage for the neck and psoas abscesses and started on multi-Antibiotic treatment regimen. Due to the wide extent of his infections and the need for Tartiary care we accepted the patient in transfer and began a series of investigations and treatments.

62 days post op: Upon admission to our intensive care unite this Patient diagnosed with

Author's Affiliation: *Neurosurgery Resident,Department of Neurosurgery, National Neurosciences Institute, King Fahad Medical City, Riyadh, Saudi Arabia & Montreal Neurological Institute & Hospital, Montreal, Quebec, Canada, **Department of Neurosurgery, Montreal Neurological Institute and Hospital, Montreal, Quebec, Canada & King abdulaziz University, Jeddah, Saudi Arabia, ***Department of Orthopedics, King Saud University, Riyadh, Saudi Arabia & Montreal General Hospital, Montreal, Quebec, Canada, ****Department of Orthopedics, Montreal General Hospital, Montreal, Quebec, Canada.

Reprint Request: Dr. Abdulrahman Y. Al-Turki, MBBS, McGill University Health Centre, Montreal Neurological Institute and Hospital, 3801, rue University, Montreal, Quebec, Canada.

E-mail: Abdulrahman.Alturki@mail.mcgill.ca

(Received on 20.09.2013, Accepted on 26.09.2013)

Figure 1: Screw disengagement from the plate disally

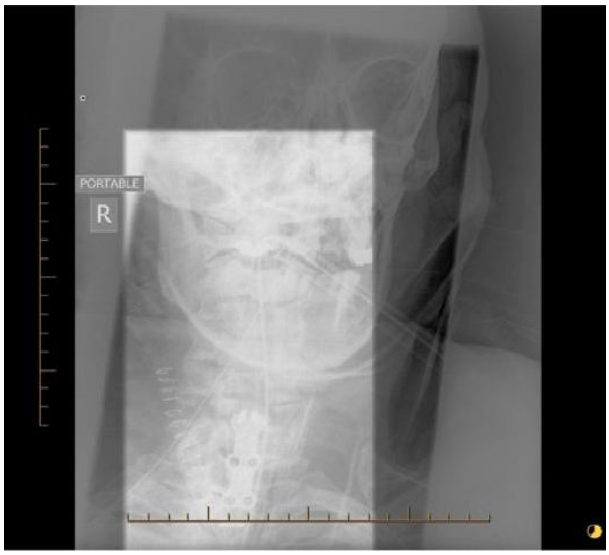


Figure 2: Sagital MRI STIR and T2 showing spondylodiscitis and epidural abcess

Figure 3: T2 thoracic and lumbar sagittal showing extensive epidural abcess

Figure 4: Axial CT stan showing T2 level decompression and bilateral chest tube

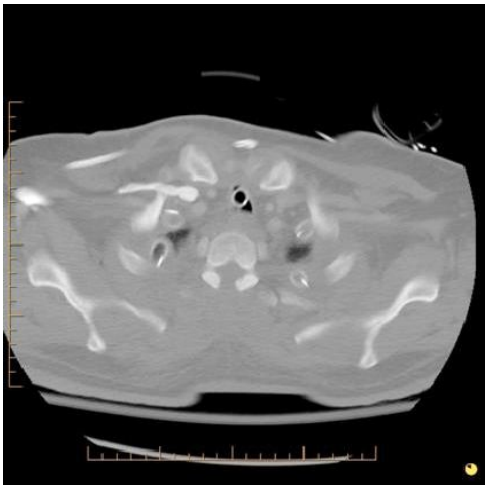


Figure 5: Axial CT scan at T7 level showing decompression and multiple chest tubes for decortication

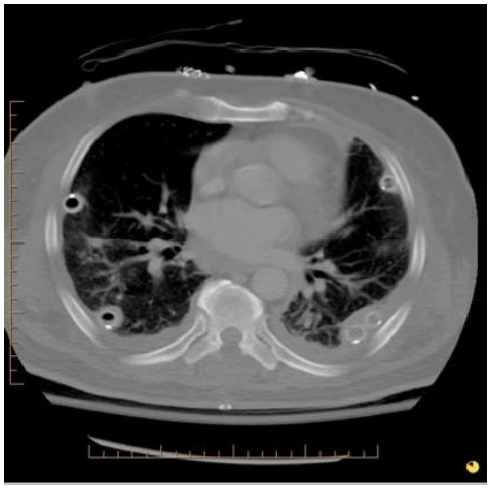


Figure 6: Axial CT at L2 level showing decompression

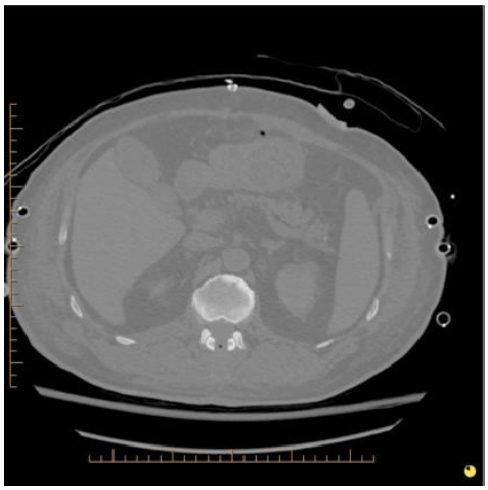


Figure 7: Axial CT at L5 level showing decompression

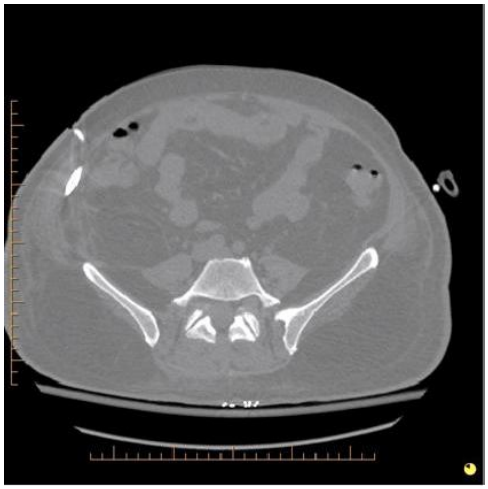


Figure 8: Fluro shot with Kelly holding the last loose screw for its removal

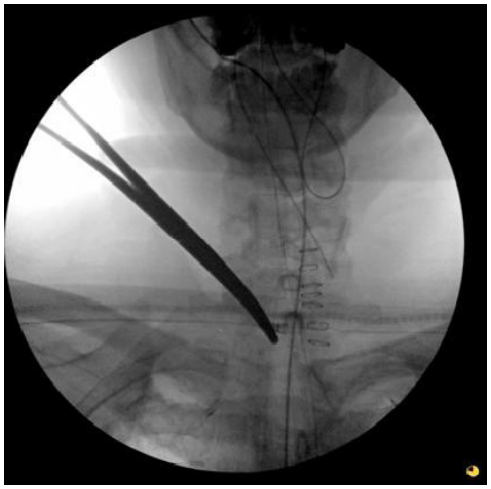


Figure 9: Sagital CT scan post removal of Hardware and T2 lamenectomy

Figure 10: X-Ray post pectorals flap for esophageal repair

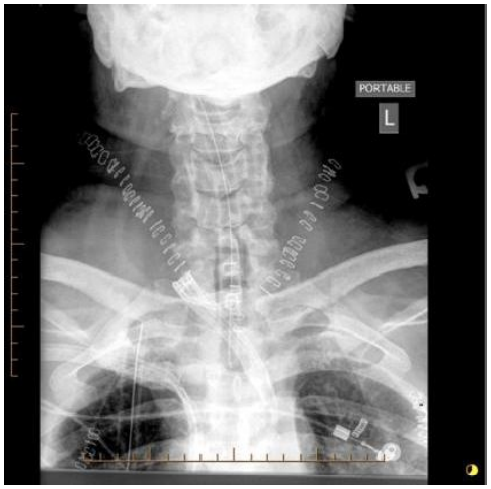


Figure 11: Sagital CT scan post corpectomy and lilac crest bone grafting

Figure 12: X-ray post posterior fusion

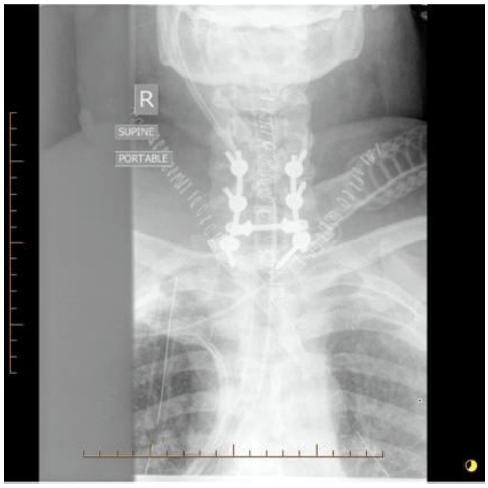


Figure 13: Sagital CT showing lateral mass screws for posterior fusion

Figure 14: X-ray at Follow up post extubation

extensive epidural abscess, cervical spondylodiscitis, Psoas abscess and bilateral empyema. (Figure 1, 2 and 3). The esophageal perforation had not yet been diagnosed. In order to better diagnose the extent of the patient's cervical infection, whole spine MRI was obtained demonstrating extensive epidural and anterior and posterior paraspinal abscess formation.

63 days post op: Due to ventilation issues the decision was to start with left lung decortication and multiple chest tube insertion.

64 days post op: 4 level laminectomy (T2, T7, L2 and L5) and irrigation debridement. (Figure 4, 5, 6 and 7).

67 days postop: anterior irrigation and debridement and hardware removal. Many of the screws had disassociated from the plate (Figure 8 and 9)

69 days postop: feeding tube as well as Right chest tube insertion performed.

70 days postop: percutaneous drainage of retroperitoneal collection carried out.

74 days postop: Due to the persistent septicemia and abscess formation , patient underwent radiological studies which confirm the diagnosis for esophageal perforation.

75 days postop: One day after diagnosis, which was two and a half months after the index procedure, right lung decortication

carried at the same setting for esophageal repair by pectoralis flap. (Figure 10)

81 days postop: Anterior spine debridement, C6-C7 corpeectomy and anterior C5-T1 fusion with Illiac crest bone graft. (Figure11)

87 days postop: Posterior C5-T1 stabilization and repeat irrigation and debridement for thoracic epidural and paraspinal abscesses. (Figure 12, 13).

90 days postop: The patient is aseptic and awake but due to failure to extubation he receives a tracheostomy, and few days later transfer to the ward.

We saw the patient two months and four months post discharge at our clinic, his neurological exam at the last follow up was 4/5 for bilateral upper limb and 3/5 for hip flexor 4/5 knees extensors and 3-4/5 for ankles dorsiflexion and planterflexors, and was off antibiotics and wounds fully healed. (Figure 14)

Discussion

Although the use of anterior plating has remained controversial, it has become a common practice among spinal surgeons.[17-19] Anterior cervical plating is not without complications; among them, extrusion of the failed instrumentation is one of the most uncommon but serious complications.[21-25] Esophageal perforations is a dreaded but know complication of anterior plating, but these perforations are generally detected immediately after the surgery.[23,25] Delayed perforations like ours are unusual but are generally associated with anterior migration or dislocation (plates, screws, wires, bone grafts) of the fixation devices.[9,29,30]

Esophageal perforation related to anterior cervical surgery is rare and therefore may not be detected early. This complication may be life threatening.[26]

The incidence of esophageal injuries ranges between 0% and 3.4%, Early presentations are mostly caused by direct injury to the esophagus by sharp instruments or retractor blades .[9,26-30]

The mortality rate for all causes of esophageal perforation is about 20%, rising to 50% if treatment is delayed.[2,31]

Perforations occur more frequently after surgery for cervical spine fractures than for degenerative disease.[9,28,30]

Most perforations occur at the levels C5–C6 and C6–C7, in accordance with the prevalence of cervical spine pathology.[26]

Delayed perforations are mainly caused by anterior migration or dislocation (plates, screws, wires, bone grafts) of the fixation devices.[9,29,30]

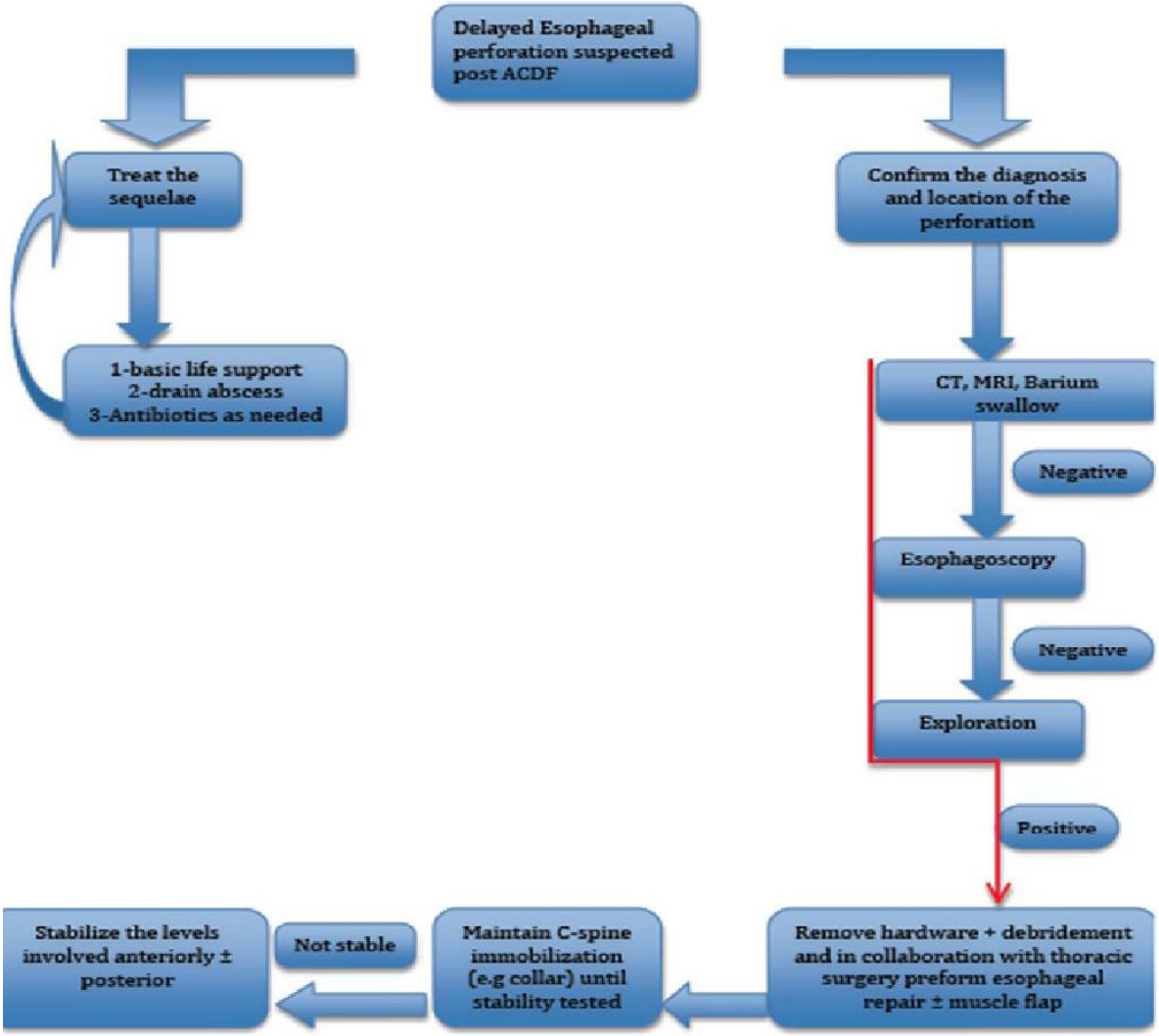
Hanci *et al* suggested that esophageal perforations were due to pressure sores caused by the metallic implant and its microtrauma effect as a mechanism of the observed esophageal perforation in three cases.[25]

Asymptomatic perforations have been described[14,32,33], but symptoms usually consist of dysphagia, local subcutaneous emphysema, fever and signs of infection. Other features are neck and throat pain, hoarseness, aspiration, unexplained tachycardia and blood in the nasogastric tube.[9,27-30,33] Symptoms of late perforation are usually discrete.

A high index of suspicion for esophageal perforations should include: (a) cervical spinal column or cord injury with previous anterior cervical spine surgery (especially when instrumentation is used); (b) systemic signs of fever, leucocytosis or an unexplained persistent tachycardia; (c) imaging evidence of air or fluid in the cervical fascial spaces or mediastinum.[9,28-29]

Diagnosis is made by imaging or endoscopic studies.[9,28-30], although these may give false-negative results. Therefore, clinical suspicion of the complication is most important. Plain X-rays may reveal subcutaneous emphysema, widening of the retropharyngeal space or loosening of hardware, but have a false-negative rate of 10–46%.[30] Contrast swallowing studies can aid

Figure 15



in the diagnosis and in determining the location of the perforation. CT scans can show graft displacement and abscess formation. However, in the series of 44 patients by Gaudinez *et al* imaging studies indicated an esophageal injury in only 72.7% of the affected patients.[9] Esophagoscopy can give false-negative results as well with a reported sensitivity ranging between 50% and 100%. [9,28,30] In cases of high clinical suspicion with inconclusive imaging studies, surgical exploration of the neck may be warranted. This was illustrated in the series by Gaudinez *et al* in which eight patients (18%) had to have the diagnosis of a perforation confirmed during a surgical exploration.[9]

The management of such a situation consists of surgery with removal of the hardware, drainage of abscesses and—if possible—primary closure of the perforation, parenteral nutrition and antibiotic therapy.[9,28-30]

If the perforation is diagnosed intra-operatively, suturing of the defect is sufficient. However, there is not much data on the role of antibiotic prophylaxis in this situation.

In early perforations, repair of the lesion may be possible with or without muscle flaps, Presence of an abscess requires surgical drainage. In case of a late diagnosis, surgical treatment should be restricted to removal of the hardware, drainage of abscesses and diversion of the salivary flow to the cervical skin.[9,30,34]

(Figure 15) summarize our management strategy.

References

1. Jenis LG, An HS, Simpson JM. A prospective comparison of the standard and reverse Robinson cervical grafting techniques: radiographic and clinical analysis. *J Spinal Disord.* 2000; 13: 369–37.
2. Bohlman H, Emery S, Goodfellow D, *et al.* Robinson anterior cervical discectomy and arthrodesis for cervical radiculopathy. *J Bone Joint Surg [Am].* 1993; 75: 1298–1307.
3. Gore D, Sepic S. Anterior cervical fusion for degenerated or protruded discs: a review of 146 patients. *Spine.* 1984; 9: 667–671.
4. Riley L, Robinson R, Johnson K, *et al.* The results of anterior interbody fusion of the cervical spine. *J Neurosurg.* 1969; 30: 127–133.
5. Robinson R, Walker A, Ferlic D, *et al.* The results of anterior interbody fusion of the cervical spine. *J Bone Joint Surg [Am].* 1962; 44: 1569–1587.
6. White A, Southwick W, DePonte R, *et al.* Relief of pain by anterior cervical spine fusions for spondylosis: a report of 65 cases. *J Bone Joint Surg [Am].* 1973; 55: 525–534.
7. Williams J, Allen M, Harkess J. Late results of cervical discectomy and interbody fusion: some factors influencing the results. *J Bone Joint Surg [Am].* 1968; 50: 277–286.
8. Pokras R. Surgical and non-surgical procedures in short-stay hospital. *Vital Health Stat.* 1983; 13: 1–41.9. Gaudinez RF, English GM, Gebhard JS, Brugman JL, Donalson DH, Brown CW. Esophageal perforations after anterior cervical surgery. *J Spinal Disord.* 2000; 13: 77–84.
10. Tew JM, Mayfield FH. Complications of surgery of the anterior cervical spine. *Clin Neurosurg.* 1976; 23: 424–434.
11. Lunsford LD, Bissonette DJ, Jannetta PJ, *et al.* Anterior surgery for cervical disc disease. *J Neurosurg.* 1980; 53: 1–11.
12. Parthiban JK, Singhania BK, Ramani PS. A radiological evaluation of allografts (ethylene oxide sterilized cadaver bone) and autografts in anterior cervical fusion. *Neurol India.* 2002; 50: 17–22.
13. Salam MA, Cable HR. Acquired pharyngeal diverticulum following anterior cervical fusion operation. *Br J Clin Pract.* 1994; 48: 109–110.
14. Cloward RB. Complications of anterior cervical disc operations and their treatment. *Surgery.* 1971; 69: 175–182.
15. Martino V, Nina P, Franco A, *et al.* Cervical myelopathy caused by median disc herniation: analysis of the complications following anterior discectomy with and without fusion. *J Neurosurg Sci.* 1997; 41: 153–158
16. Lopez-Oliva Munoz F, Garcia de las Heras B, Concejero Lopez V, *et al.* Comparison of three techniques of anterior fusion in single-level cervical disc herniation. *Eur Spine J.* 1998; 7: 512–516.
17. Grob D, Peyer JV, Dvorak J. The use of plate fixation in anterior surgery of the degenerative cervical spine: a comparative prospective clinical study. *Eur Spine J.* 2001; 10: 408–413.
18. Kaiser MG, Haid RW Jr, Subach BR, *et al.* Anterior cervical plating enhances arthrodesis after discectomy and fusion with cortical allograft. *Neurosurgery.* 2002; 50: 229–236.
19. Brown JA, Havel P, Ebraheim N, *et al.* Cervical stabilization by plate and bone fusion. *Spine.* 1988; 13: 236–240.
20. Samartzis D, Shen FH, Lyon C, *et al.* Does rigid instrumentation increase the fusion rate in one-level anterior cervical discectomy and fusion? *Spine J.* 2004; 4: 636–643.*Surg.* 1965; 91: 238–240
21. Geyer TE, Foy MA. Oral extrusion of a screw after anterior cervical spine plating. *Spine.* 2001; 26: 1814–1816.
22. Chataigner H, Gangloff S, Onimus M. Elimination spontanee de visd'osteosynthese cervicale anterieure par les voies naturelles. *Rev Chir Orthop.* 1997; 83: 78–82.
23. Yee GK, Terry AF. Esophageal penetration by an anterior cervical fixation device. *Spine.* 1993; 18: 522–527.
24. Fujibayashi S, Shikate J, Kamiya N, *et al.* Missing anterior cervical plate and screws: a case report. *Spine.* 2000; 25: 2258–2261.
25. Hanci M, Toprak M, Sarioglu AC, *et al.* Oesophageal perforation subsequent to anterior cervical spine screw/plate fixation. *Paraplegia.*

1995; 33: 606–609.

26. H Ardon & F Van Calenbergh & D Van Raemdonck ,*et al*. Oesophageal perforation after anterior cervical surgery: management in four patients. *Acta Neurochir.* 2009; 151: 297–30227.
27. Graham JJ. Complications of cervical spine surgery: A five-year report on the survey of the membership of the Cervical Spine Research Society by the morbidity and mortality committee. *Spine.* 1989; 14(10): 1046–105028.
28. Newhouse KE, Lindsay RW, Clark CR, Lieponis J, Murphy MJ. Oesophageal perforation following anterior cervical spine surgery. *Spine.* 1989; 14(10): 1051–105329.
29. Orlando ER, Caroli E, Ferrante L. Management of the cervical oesophagus and hypopharynx perforations complicating anterior cervical spine surgery. *Spine.* 2003; 28(15): E290–E29530.
30. Vrouenraets BC, Been HD, Brouwer-Mladin R, Bruno M, van Lanschot JJB. Oesophageal perforation associated with cervical spine surgery: Report of two cases and review of the literature. *Dig Surg.* 2000; 21: 246–24931.
31. Skinner DB, Belsey RHR. Penetrating wounds, crush injures, foreign bodies, and other cases of trachoesophageal fistula in Management of esophageal disease. Philadelphia: WB Saunders; 1988, 792–801.
32. Mengoli LR, Klassen KP. Conservative management of esophageal perforation. *Arch Surg* 91:238–240
33. Pompili A, Canitano S, Caroli F, Caterino M, Crecco M, Raus L,Occhipinti E. Asymptomatic oesophageal perforationcaused by late screw migration after anterior cervical plating. *Spine.* 2002; 27(23): E499–E502
34. Rubin S. Sternocleidomastoid myoplasty for the repairof chronic oesophageal fistulae. *Laryngoscope.* 1986; 96: 834–836.