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Review Article

APPLYING BOTH ANTERIOR AND POSTERIOR APPROACH FOR MID CERVICAL TRAUMA: CASE REPORT

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ABSTRACT

Cervical spine trauma is a very common problem which range from minor injury to frank osteo-ligamentous instability with spinal cord injury. Cervical spine injuries often involve permanent complete or partial loss of sensory function, and many associated complications.Spinal cord injuries at the cervical (neck) level result in full or partial tetraplegia (also called quadriplegia). Depending on the specific location and severity of trauma, limited function may be retained. Early diagnosis and treatment is crucial.The interest of this case basically focused on the surgical approach, both anterior and posterior. Majority of cases are treated either only by anterior approach or only by posterior approach, but in my case we did both approach at the same time for better prognosis.

We report, case of a 25 years old male injured in road traffic accident and got cervical spinal cord injury and dislocation.

Keywords: Cervical spine injuries, anterior and posterior approach, road traffic accident.

EPIDEMIOLOGY

Cervical spine injuries has been reported in 2.4% of blunt trauma victims[1]. Some demographic factors are known to be associated with blunt cervical spine injury: age greater than 65 years, male sex and white ethnicity[2]. To date, only one population-based study of spinal column injuries has been performed in a complete population from 1981–1984.[3]. The most common mechanism of injury was noted to be accidental falls, with motor vehicle/transport injuries being the second most common. According to another study, the most common site of injury was the atlantoaxial region, with the most commonly injured levels in the subaxial cervical spine being C6 and C7.About one-third of the injuries identified in this study were considered clinically insignificant. Despite this surprising number of clinically minor injuries, the cervical spine remains the most common level for spinal cord injury (SCI), representing 55% of all SCIs.[4]

Report of a case:

The patient, a 25-year-old male, presented at our hospital after car accident with a complaint of neck pain and difficulty of neck movement,bleeding from scalp,difficulty in movement of upper and lower extremities since one hour after the accident. Examination showed no nausea, no vomiting, no chest tightness, no difficulty in breathing, no loss of consciousness. Numbness present on distal extremities.The laboratory studies were unremarkable. For detail study and doubtful symptom patient was advised for CT scan which revealed C4 and C5 cervical vertebrae dislocation, further more cervical MRI was advised , which showed the cervical disc herniation at the level between C4 and C5 with compressing the spinal cord which result the symptoms in this patient(fig1).

Surgical Treatment:

The goal of surgery is to relieve symptoms by "decompressing," or relieving pressure onthe spinal cord. This involves removing the pieces of bone or soft tissue (such as a herniated disk) that may be taking up space in the spinal canal. This relieves pressure by creating more space for the spinal cord. The choice of a surgical approach for cervical spinal injuries is variable and depends on a number of factors including the patient's neurological status, the presence of traumatic disc herniation, the success of closed reduction, unilateral or bilateral facet dislocation, the presence of vertebral body fractures, and the experience and training of the surgeon .Here in our case , we first did posterior approach and then we did anterior approach.

POSTERIOR APPROACH

Posterior lateral mass screw fixation for C4 –C5 dislocation:

Patient was placed in prone position. We adequately accomplished imaging before preparation and

draping. Gave incision in the skin over the exposed area and exposed posterior cervical spine to the far lateral border of the facet joint after verifying level. After incision cervical spinous processes were exposed at the level of C3 ,C4, C5and C6 level .Entrance point for screw insertion was located at the top of the lateral hill of the lateral mass of C4 and C5, exactly at its mid point by 2mm drill bit, perpendicular to the vertebral plane and 10 degree lateral to the sagittal plane. The drilled hole was further tapped with 3.5 mm tap and cortical screw of 3.5 mm diameter were inserted. We used 3.5mm diameter, 30mm long and 3.5 mm rod fixed with lateral mass screw.

Figure 1: pre- operative MRI shows spinal cord compression due to C4-C5 disc herniation.

Figure 2: cervical X-Ray, AP view showing bilateral cervical lateral mass screw fixation with rod.

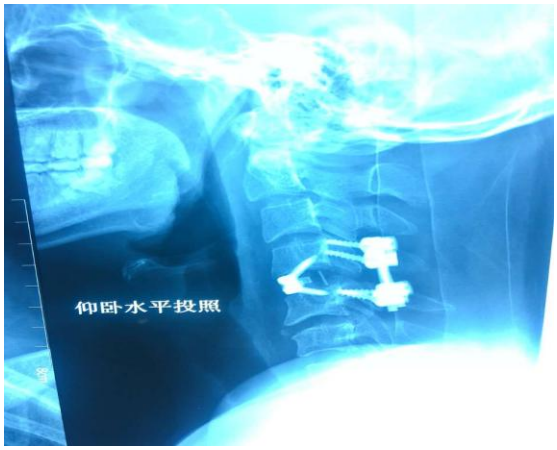

Figure 3: X-ray lateral view showing both anterior and posterior screw fixation

Figure 4: post- operative x- ray AP and lateral view

ANTERIOR APPROACH

It is important to avoid spinal cord injury during intubation due to cervical spine extension, especially in patients with cervical spinal myelopathy and/or unstable cervical spinal fractures. In such patients, fiberopticawake intubation may be considered.

The patient was first positioned supine on the operating table. Electrodes were placed and secured appropriately. A bladder Foley catheter might be considered and inserted.

The patient's hips and knees were slightly flexed by placing soft pillows underneath the knees to prevent stretch injuries. The patient's elbows, wrists, and ankles were appropriately padded, and the patient was secured to the table using safety straps or belts. In addition, the patient's shoulders were taped down to

place some mild traction on the shoulders and security to the table, facilitating visualization of the cervical spine. It is important to avoid excessive traction of the shoulders to avoid brachial plexus stretch injuries. Lastly, a folded towel was placed under the patient's neck to provide support during anterior pressure from screw placement.

Surgical techniques:

After successful anesthesia and preoperative preparation, patients was placed in a supine position, with the shoulders and back elevated and the neck slightly extended. A transverse incision was made on the right side of the neck (Smith–Robinson approach). Blunt dissection was performed from the space between cervical vessel sheath and trachea -esophageal sheath to the pre-vertebral fascia. Vertebral bodies of C4 and C5were drilled. A Caspar pin was driven into the drilled hole. An anterior cervical titanium plate with a length equivalent to the distance of distraction by the retractor was placed between the 2 Caspar pins. A half-thread cancellous bone screw with a 3.5-mm diameter and 18- to 22-mm length was driven into the drilled hole by a constant force and elevated and pulled until it was pressed against the plate. The position of the screw varied with different conditions of the locked facet joints. Decompression followed by bone graft with mesh; an appropriate anterior cervical locking plate was selected. The screws were fixed and tightened. An X-ray examination was done, which was satisfactory.

DISCUSSION

Cervical spine injuries can result in significant and long-term disability. The cervical spine encompasses seven vertebrae and serves as a protection to the spinal cord. The segment of the spine most susceptible to injury is the cervical spine based on its anatomy and flexibility

The management of cervical spine injuries has certain inherent problems due to the smaller size of the osseous elements, inconsistent anatomical landmarks, complex congenital anomalies and the close proximity of vital neurovascular structures[5]

Recent advances have changed the treatment of unstable cervical spine injuries.Surgical stabilization with anterior plates or posterior lateral mass screw fixation improved stability, fusion rates and maintenance of alignment. Often there are clear indications to stabilize from either the anterior or posterior approach to allow decompression of the spinal cord or facilitate reduction. Sometimes either approach can be used, however, there is little in the literature comparing the results of these two treatment options.

The combined approach provides the strongest fixation, significantly limiting motion. A combined fixation for cervical dislocation increases the fusion rate with the additional advantage for neurological recovery. A combined approach may be considered for patients with chronic injuries associated with pseudo-

arthrosis or cervical misalignment, when an osteotomy may be required to restore cervical alignment and neural decompression. Patients with poor bone quality, such as those with osteoporosis, ankylosing spondylitis or other chronic conditions, may also be candidates for a combined approach.

Lateral mass screw fixation is the preferred method of posterior stabilization in the cervicalspine[6]. Unlike the lateral mass screw, cervical pedicle screw systems have not gained much popularity. Abumi*et al.*, reported the successful use of cervical pedicle screws in various conditions like traumatic disorders, cervical kyphosis and spondyloarthropathes[[7]Though commonly used in the cervical spine, its use in the thorasic and lumbar spine is limited [8].Lateral mass screw fixation became the standard method for posterior cervical spine fixation. It is especially optimum for cervical stability reconstruction following posterior cervical decompression.Lateral mass screw fixation became one of the most common procedures of posterior cervical fixation worldwide. Despite reported success, lateral mass screw fixation is not free of complications. Injury or violation of adjacent structures (vertebral artery [VA], facet joint, and/or nerve root) and lateral mass fracture are potential reported complications. The key risk factor of most, if not all, of those complications is the screw trajectory[9],[10],[11].The direction of the screw is 15° superiorly and 30° laterally for C3–C6[12, 13]. When placing screws in such an easy anatomical guidance into the small area of the lateral mass, without any fluoroscopic guidance, screw malposition could be avoided[14].

ABBREVIATIONS:

CT: Computed Tomography, AP: Anterior- posterior , SCI: spinal cord injury

CONCLUSION

Combined approach successfully decompressed the cervical spine resulting into improving prognosis of patient and increased the rate of bone healing. The numbness associated with herniated dics subsided after two week of surgery .weakness of muscle, Paresthesia dissipated few weeks after surgery.Therefore combined approach give more stability to the vertebrae than single and showed better prognosis.

REFERENCES

1. Goldberg, W., et al., *Distribution and patterns of blunt traumatic cervical spine injury.* Ann Emerg Med, 2001. **38**(1): p. 17-21.

2. Lowery, D.W., et al., *Epidemiology of cervical spine injury victims.* Ann Emerg Med, 2001. **38**(1): p. 12-6.

3. Hu, R., C.A. Mustard, and C. Burns, *Epidemiology of incident spinal fracture in a complete population.* Spine (Phila Pa 1976), 1996. **21**(4): p. 492-9.

4. Sekhon, L.H. and M.G. Fehlings, *Epidemiology, demographics, and pathophysiology of acute spinal cord*

injury. Spine (Phila Pa 1976), 2001. **26**(24 Suppl): p. S2-12.

5. Jea, A., et al., *Incorporation of C-1 lateral mass screws in occipitocervical and atlantoaxial fusions for children 8 years of age or younger. Technical note.* J Neurosurg, 2007. **107**(2 Suppl): p. 178-83.

6. Ludwig, S.C., et al., *Transpedicle screw fixation of the cervical spine.* Clin Orthop Relat Res, 1999(359): p. 77-88.

7. Abumi, K. and K. Kaneda, *Pedicle screw fixation for nontraumatic lesions of the cervical spine.* Spine (Phila Pa 1976), 1997. **22**(16): p. 1853-63.

8. Richter, M., B. Cakir, and R. Schmidt, *Cervical pedicle screws: conventional versus computer-assisted placement of cannulated screws.* Spine (Phila Pa 1976), 2005. **30**(20): p. 2280-7.

9. Inoue, S., et al., *Cervical lateral mass screw fixation without fluoroscopic control: analysis of risk factors for complications associated with screw insertion.* Arch Orthop Trauma Surg, 2012. **132**(7): p. 947-53.

10. Inoue, S., et al., Risk factors for intraoperative lateral mass fracture of lateral mass screw fixation in the subaxial cervical spine. J Neurosurg Spine, 2014. 20(1): p. 11-7.

11. Heller, J.G., D.H. Silcox, 3rd, and C.E. Sutterlin, 3rd, Complications of posterior cervical plating. Spine (Phila Pa 1976), 1995. 20(22): p. 2442-8.

12. Jeanneret, B., et al., Posterior stabilization of the cervical spine with hook plates. Spine (Phila Pa 1976), 1991. 16(3 Suppl): p. S56-63.

13. Ebraheim, N.A., et al., Safe lateral-mass screw lengths in the Roy-Camille and Magerl techniques. An anatomic study. Spine (Phila Pa 1976), 1998. 23(16): p. 1739-42.

14. Graham, A.W., et al., Posterior cervical arthrodesis and stabilization with a lateral mass plate. Clinical and computed tomographic evaluation of lateral mass screw placement and associated complications. Spine (Phila Pa 1976), 1996. 21(3): p. 323-8; discussion 329.