

Flexion-Distraktion Injuries of the Cervical Spine

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A 29 year old woman during a non-professional, recreational, wrestling episode sustained a fall on her neck. She immediately experienced severe neck pain and felt weakness in her upper limbs. Her neurological examination in the emergency department, showed grade 3/5 motor strength in deltoid, biceps, brachioradialis, wrist and finger extensors bilaterally. The sensations were bilaterally decreased in the distribution of C5, 6 and 7 along with a diminished biceps and brachioradialis reflex. Lower limb examination was normal. Bladder and bowel function was found to be intact. Cervical spine X-rays showed that she had a complete facet dislocation at C4-5 level. She was immediately placed into halo traction and an attempt at closed reduction was made. Starting from 20 pounds of traction, weights were sequentially increased. Periodic neurologic and radiographic examination was performed by a physician during this period. The reduction was achieved at 80 pounds of weight. After reduction she underwent an MRI to rule out any disc protrusion or extrusion in the spinal canal. She underwent an anterior cervical disectomy and fusion with bone graft from the iliac crest. Instrumentation was performed using anterior cervical locking plate. She made a complete neurological recovery in 5 weeks and at 12 months follow up she was back to her activities of daily living.

Commentary

Facet dislocation in the cervical spine is caused by flexion and distraction forces, with or without an element of rotation. These injuries may be purely ligamentous or osteoligamentous in nature. The facets may be fractured, subluxated, or dislocated, either unilaterally or bilaterally. CT scan is helpful in identifying the malalignment and any facet, lamina and pedicle fractures. Management of facet dislocation begins with attempting a closed reduction with traction using skull tongs (Gardner-Wells or Halo). At the author's institution MRI compatible skull tongs with in-line traction on a specially designed spine board are used, for performing facet reductions under MRI monitoring.¹

Closed reduction with skull tongs should only be performed in the awake, cooperative patient whose neurologic status can be monitored during the reduction.² The reason being, a risk of spinal cord compression due to an intervertebral disc, during the reduction manouver. This can be reliably monitored in an awake patient by neurological examination. Periodic neurological examination and radiologic imaging is mandatory during traction to avoid over distraction. Ten to 15 pounds of weight is placed initially to accommodate for head friction followed by 3-5 lbs of weight for each level proximal to injury. No consensus exists on the safe limit for weights in skull traction but the use of weights as high as 140 lbs have been reported. Neurologic examination and cervical spine x-rays are mandatory for each increase in weight. The early reduction of fracture-dislocation injuries may improve neurological outcome. The success rate for restoring anatomic alignment by closed reduction is reported to be about 80%. The reported permanent neurological complication rate is less than 1.0% during closed reduction. The causes of neurological deterioration associated with closed reduction include over distraction, failure to recognize a more rostral noncontiguous lesion, disc herniation, epidural haematoma, and spinal cord edema.³

An MRI should be performed after all successful or unsuccessful closed reductions or in case of any neurologic deterioration during the traction procedure. The results of conservative treatment after reduction are not encouraging. Successfully reduced dislocations can be treated by anterior or posterior stabilization and fusion. In case of a disc protrusion, an anterior approach with disectomy and fusion with instrumented stabilization should be used. Open reduction of facet injury is indicated when closed reduction fails because of the presence of a facet fracture or a lateral mass dissociation, or in the presence of neurological deterioration. With either anterior or posterior techniques, the rates of fusion and the achievement of long-term stability are high, and patient outcomes (in the absence of spinal cord injury) are generally good.

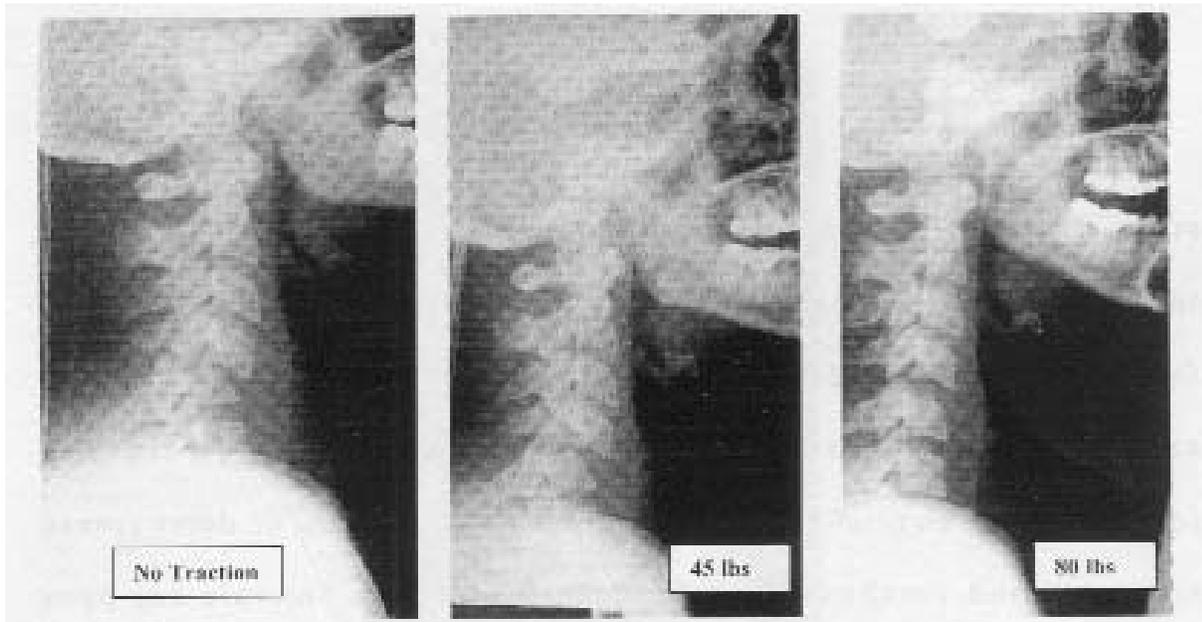


Figure 1. X-ray cervical spine, lateral view, (A) Facet dislocation at C4-5, (B) No reduction on 45 lbs of traction (C) At 80 pounds of traction, reduction was achieved. Mild over distraction can be seen at C4-5 disc level. Weights were reduced to 15 pounds once reduction was achieved.



Figure 2. MRI cervical spine (Post reduction) shows injury at C4-5 level . Small disc protrusion can be seen at the same level (compare with adjacent levels) but no extruded disc fragment could be seen.



Figure 3. Postoperative X-rays (A) lateral view (B) AP view showing the reduced position of C4-5 facets and fusion with autograft. An anterior cervical locking plate can be seen in position.

References

1. Lingard L, Tallett S, Rosenfield J. Culture and Physician-Patient Communication: A qualitative Exploration of Residents' Experiences and Attitudes. *Annals RCPSC* 2002; 25:331-40.
2. Barnow S, Linden M. Psychosocial Risk Factors of the Wish to be Dead in Elderly. *Fortchr Neurol Psychiatr* 2002; 70:185-91.
3. Dewey ME, Davidson IA, Copeland JR. Expressed wish to die and mortality in order people: a community replication. *Age Ageing* 1993; 22:109-13.
4. Manor I, Vincent M, Tyano S. The wish to die and the wish to commit suicide in the adolescent: two different matters? *Adolescence* 2004; 39:279-92.
5. Albert SM, Rabkin JG, Del Bene ML, Tider T, O'Sullivan I, Rowland LP, Mitsumoto H. Wish to die in end-stage ALS. *Neurology* 2005; 12:68-74.
6. Klempan T, Tureki G. Suicide: a neurobiological point of view. *Rev Bras Psiquiatr* 2005; 27: 1-3.
7. Asperg M, Traskman L, Thoren P. 5-HIAA on the cerebrospinal fluid. A biochemical suicide predictor? *Arch Gen Psychiatry* 1976; 339: 1193-7.
8. Pandey GN, Dwivedi Y, Rizavi HS, Ren X, Conley RR. Decreased catalytic activity and expression of protein kinase C isozyme in teenage suicide victims: a postmortem brain study. *Arch Gen Psychiatry* 2004; 61: 685-93.
9. Lalovic A, Markens L, Russell L, Arsenaault-Lapierre G, Nowaczyk MJ, Porter FD, et al. Cholesterol metabolism and suicidality in Smith-Lemli-Opitz syndrome carriers. *Am J Psychiatry* 2004; 161: 2123-6.
10. Gadit A. Sub threshold mental disorder. *Editorial J Pak Med Assoc* 2003; 53:42-3.