

Case Report

Neglected hangman fracture

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Abstract

Acute management of hangman fracture is well described; however the surgical management of neglected hangman fracture has not been described in literature. We report the surgical management of an untreated hangman's fracture. A 30-year-old male had fallen from a tree 12 weeks back. Patient presented with cervical myelopathy and restricted neck movements. Radiographs and computed tomography (CT) scan revealed fracture of pars interarticularis of axis with Grade III C2-C3 spondylolisthesis with localized kyphosis of 33°. Gentle reduction under general anesthesia (GA) failed to improve the alignment. Patient was operated in three stages in a single setting. In Stage I, release of contracted anterior structures and C2-C3 discectomy was done in supine position followed by C2-C3 posterior fixation and fusion in Stage II. C2-C3 interbody bone grafting and anterior plating completed the third stage. C2-C3 interbody fusion was seen at 5 months and a CT scan at 18 months postoperative confirmed fusion and maintenance of alignment. The satisfactory outcome in our patient leads us to believe that anterior-posterior-anterior is the appropriate surgical approach for treatment of such patients.

Key words: Anterior-posterior-anterior approach, hangman fracture, neglected hangman fracture

INTRODUCTION

Acute management of hangman fracture is well discussed in literature. It includes nonoperative management with traction followed by immobilization in halo vest or SOMI brace^[1] or operative management in the form of posterior fixation with C2 pedicle screw only^[2,3] or C2-C3 fusion with C2 pedicle and C3 lateral mass screw^[4] and C2-C3 anterior fusion.^[5] However, when untreated it poses a complicated problem. The surgical management of untreated hangman fracture is not reported in literature. We report the surgical management of untreated hangman's fracture in a 30-year-old male who reported to us 12 weeks following injury.

CASE REPORT

A 30-year-old man, manual laborer by occupation had fallen from 20 feet height. He had acute pain in the neck and took treatment in the form of over the counter medication. Over 12 weeks, he had persistent pain and developed progressive difficulty in walking. On presentation to the OPD, he was having tenderness on the upper cervical spine and severe limitation of cervical spine movements in all directions. He had spasticity and exaggerated deep tendon reflexes in all 4 extremities,

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however the muscle power and sensation were normal. The plantar response was extensor. Radiograph revealed a type IIA hangman fracture (Levine and Edward modification of Effendi classification) with localized C2-C3 kyphosis of 33° [Figure 1]. Dynamic radiographs did not reveal significant C2-C3 mobility [Figure 2]. Computed tomography (CT) scan revealed fracture of pars interarticularis of C2 with spondylolisthesis of C2 over C3. Magnetic resonance imaging revealed the compression of epidural space posterior to C3 with intensity changes in the odontoid process [Figure 3]. Preoperative traction was avoided and the patient was taken for surgery under GA. After the application of Gardner-Wells tongs, gentle reduction maneuver was attempted; however the reduction could not be achieved. A three-staged surgery in single setting was done:

1. Stage 1: With patient in supine position, anterior exposure was done using Smith-Robinson approach. This was followed by release of contracted soft tissues and C2-C3 discectomy. Wound was closed in layers.
2. Stage 2: Following anterior release and C2-C3 discectomy, gradual extension resulted in improved C2-C3 alignment. Patient was then carefully turned to prone position and posterior



Figure 1: Type IIA hangman fracture. Grade III spondylolisthesis of C2 over C3 with localized kyphosis of 33°



Figure 3: Magnetic resonance imaging showing edema of odontoid process with compression of epidural sac posterior to C3

midline exposure was carried out. C2 pedicle screw and C3 lateral mass screw were passed under fluoroscopic guidance. Further reduction was carried out by using a well-contoured rod pulling the C2 posteriorly. Acceptable reduction was confirmed under fluoroscopy. Autologous posterior iliac crest bone grafting was done and wound closed in layers over a drain.

3. Stage 3: Patient was again placed in supine position and C2 and C3 bodies were exposed via the previous incision. C2-C3 anterior fusion was done using tri-cortical iliac crest bone graft and stabilization was carried out with the anterior cervical plate. Wound was closed in layers over a drain.

Patient was mobilized on day 5-postoperative with SOMI brace. Anterior C2-C3 union was noted at 5 months postoperative and confirmed with X-ray [Figure 4] and CT scan [Figure 5], following which brace was discontinued. At 18 months postoperative, the patient had normal neurological examination and had resumed his pretrauma occupation.

DISCUSSION

Neglected spinal injuries, either secondary to overlooked diagnosis^[6] or due to the circumstantial and socioeconomic

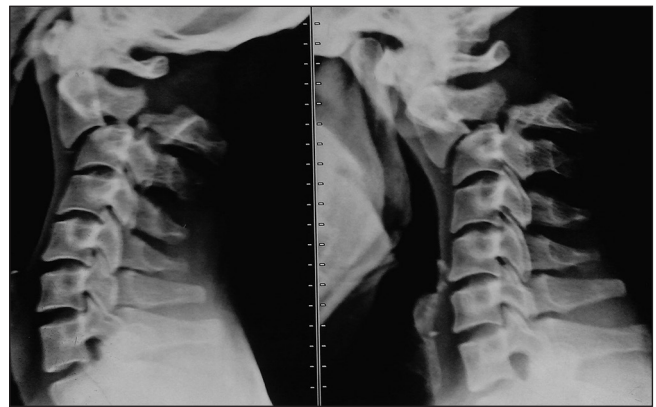


Figure 2: Dynamic X rays showing absence of any significant C2-C3 mobility



Figure 4: X-ray at 5 months showing acceptable C2-C3 alignment with C2-C3 anterior fusion

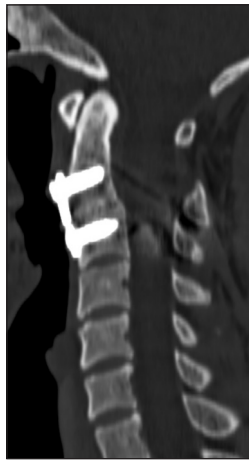


Figure 5: Computed tomography scan at 18 months showing solid C2-C3 interbody fusion

factors,^[7] are not uncommon but discussed infrequently in the literature.^[6,7] Management of cervical dislocations is challenging when it is delayed by more than 3 weeks. Formation of fibro cartilaginous tissue around facet joints and contracture of anterior supporting ligament, muscles, and disc make closed reduction extremely difficult and sometimes hazardous.

The management of neglected subaxial cervical spine dislocation has been discussed in literature and varying approaches have been suggested. These are posterior release followed by anterior fusion,^[8] anterior release followed by posterior fixation^[9] and posterior release followed by anterior discectomy, and fusion followed by posterior fixation.^[10] Role of preoperative traction is controversial.^[8,11,12]

The management of neglected type 2A hangman's fracture poses unique problems and guideline for the treatment of neglected subaxial cervical spine dislocation cannot be applied. Preoperative traction was contraindicated in our case as being a type IIA hangman fracture which is a flexion distraction injury, damage to annulus and posterior longitudinal ligament is expected and traction can lead to injury to the spinal cord or nerve roots. Moreover, traction on the newly formed fibro cartilaginous tissue within the canal between fractured pars and remaining posterior elements, may lead to kinking and worsening of neurological deficit. Due to these reasons, preoperative traction was avoided.

Liu *et al.*, Srivastava *et al.* and Jain *et al.*^[12-14] reported satisfactory results by a two-staged procedure consisting of posterior release and partial facetectomy followed by for anterior discectomy and fusion, for neglected subaxial dislocations. In our case, since the C2-C3 facet was already aligned, release of contracted anterior structures and C2-C3 discectomy is to be the logical first step.

This ensures feasibility of reduction and neural protection by preventing retropulsion of C2-C3 disc during reduction. In Stage II, posterior fixation is to be done as putting implant on the tensile (posterior) surface provides a biomechanically sound construct. Following reduction and posterior instrumentation, anterior void in C2-C3 disc space must be fused to prevent abnormal load on the posterior instrumentation. Hence, anterior C2-C3 fusion is recommended.

CONCLUSION

Neglected hangman fracture is very uncommon. The satisfactory outcome in our patient leads us to believe that anterior-posterior-anterior is the appropriate surgical approach for the treatment of such patients.

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Conflicts of interest

There are no conflicts of interest.

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