

# ANTERIOR DECOMPRESSION AND INTERNAL FIXATION BY PLATING FOR UNSTABLE HANGMAN'S FRACTURES

## Clinical Article Orthopaedics

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### Abstract:

**Introduction:** Hangman's fracture is the second common fracture of second cervical vertebra. It constitutes the bilateral arch fracture of pars interarticularis with variable displacement of C2 on C3. In unstable fracture, extension forces cause disruption of the anterior longitudinal ligament, posterior longitudinal ligament and C2-C3 disc. Type II, IIA and III injuries are unstable and need to be managed by rigid fixation. Conservative strategies include traction and external immobilisation often have poor results. The optimal strategy for unstable fracture remains controversial. In cases of significant displacement and instability, surgical reduction and stabilisation is done either by anterior or posterior fusion.

**Materials & Methods:** In our study we present ten (10) cases of Hangman's fracture with subluxation of C2 on C3 with instability. All ten cases come under Levine type II with > 5mm displacement. 1 patient came with complete quadriplegia and 2 others with quadriparesis. Their age group was between 40-50 years.

All patients were treated by anterior decompression and fusion by iliac bone graft and plating after achieving reduction by preoperative skull tongs. The follow up period was 2 years.

**Results:** All ten (10) patients recovered well with neurological recovery. One patient had C2-C3 subluxation post operatively. All three patients

achieved anterior C2-C3 interbody fusion at end of 6 months.

**Conclusion:** In our experience the anterior approach with primary internal stabilisation is a safe method to treat unstable hangman's fracture.

**Key words:** Hangman's fracture, Instability, Fusion

**Introduction:**

Hangman’s fractures are the 2nd most common type of axis fracture (38%). It constitutes the bilateral arch fracture of pars interarticularis with variable displacement of C2 on C3. It is a common type of fatal cervical

spine injury. Upper cervical spine is unusual for subluxation in adults. The mechanism of injury is hyperextension, axial loading followed by flexion as well (at times). Effendi classification is used to classify the hangman’s fracture.

- 10 patients study

**Inclusion Criteria**

- Skeletally mature patients
- Unstable hangman’s fracture
- Medically fit for surgery

**Exclusion Criteria**

- Paediatric fractures
- Stable hangman’s fracture
- Medical comorbidities

**Pre op protocol:**

Strict immobilisation was obtained. Airway assessment, Vitals monitoring were monitored. Alpha bed was provided. Bladder catheterisation was done. Dexamethasone was given. Thorough neurological examination was done immediately & repeated after 48 hrs. Neurological chart was maintained. Basic blood investigations. X Rays, CT cervical spine & MRI cervical spine with whole spine survey were done. Subluxation measured in CT scan. Skull traction was applied immediately in emergency room. Gardner well tongs & halters traction kit were used. Traction is maintained till day of surgery.

**Surgical Technique:**

Supine position /General anaesthesia .Anterior approach to cervical spine (preferred left sided). Level is marked under C arm .Disc material is removed in toto .If subluxation is present – reduction achieved using intra op traction using skull tong.

**Problems encountered:**

Less working space .Difficult screw placement in C2 body .Chance of injury to hypoglossal nerve & oesophagus.

S.N.	TYPES	MECHANISM
1	TYPE I	< 3mm horizontal displacement C2/3 No angulation C2/3 disc remains intact stable fx pattern
2	TYPE II	> 3mm of horizontal displacement Significant angulation C2/3 disc and PLL are disrupted Vertical fracture line Unstable fracture pattern
3	TYPE IIA	No horizontal displacement Significant angulation Horizontal fracture line Unstable fracture pattern
4	TYPE III	Type I fracture with associated bilateral C2-3 facet dislocation Rare injury pattern

The treatment options are conservative and surgical. The conservative treatment includes rigid collar immobilisation, simple traction for reduction, and halo vest Immobilisation. The surgical options are anterior and posterior approaches. The anterior approach is anterior C2-C3 fusion and posterior approach includes C1-C3 lateral mass, pedicle screws, occiputocervical fusion. Type I injury can be treated by conservative method for better results with less morbidity and Type II injury with intact disc can also be treated by traction, reduction and strict immobilisation where as Type IIA,III injury pattern needs definite surgical fusion.

Advantages & disadvantages - Anterior & Posterior approach

Anterior	Posterior
<ul style="list-style-type: none"> <li>• Supine position</li> <li>• Direct &amp; adequate decompression</li> <li>• Complicated approach</li> <li>• Crowded space</li> <li>• Instrumentation needs less learning curve</li> </ul>	<ul style="list-style-type: none"> <li>• Prone position – complications</li> <li>• Indirect compression</li> <li>• Easy approach</li> <li>• Wide working space</li> <li>• Instrumentation needs longer learning curve</li> </ul>

**AIM**

To study the functional outcome of unstable hangman’s fractures treated by anterior decompression and fusion by plating & grafting

**Materials & Methods**

- Prospective study
- June 2014 – January 2017
- Govt Mohan Kumaramangalam Medical College hospital, Salem

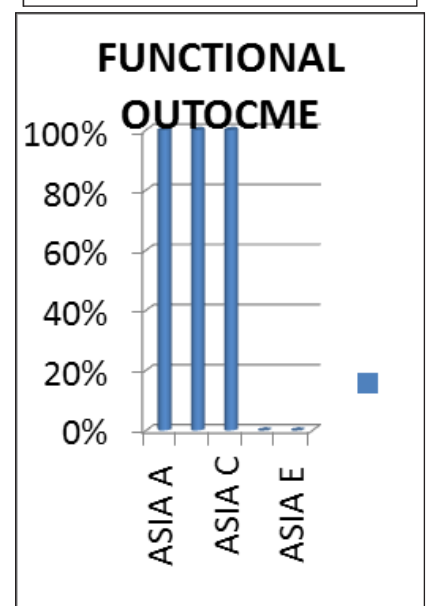
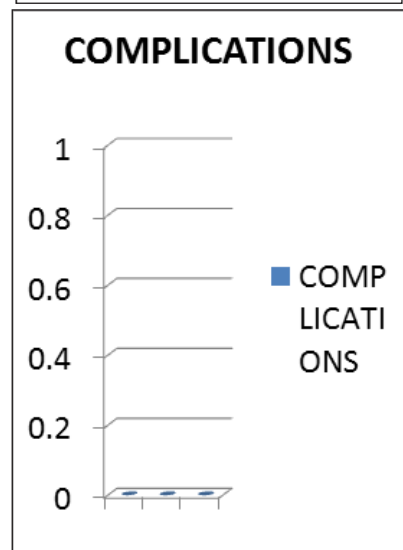
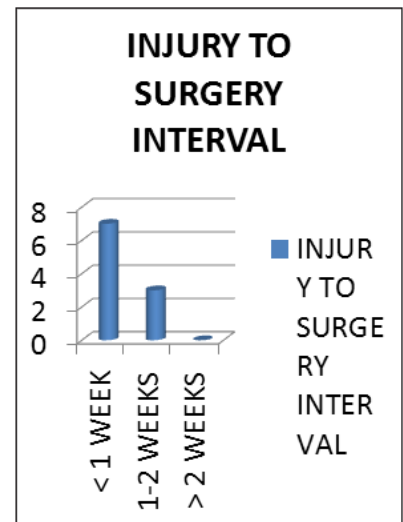
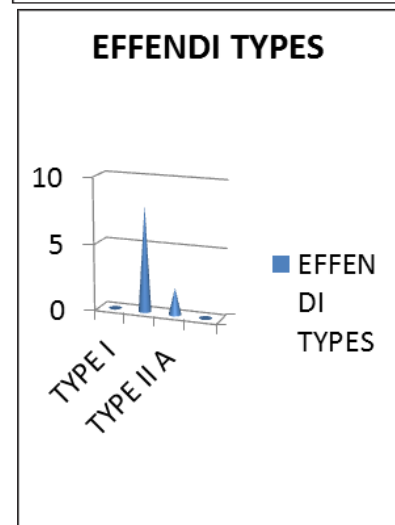
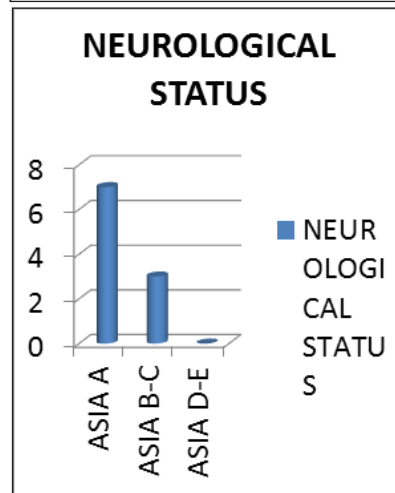
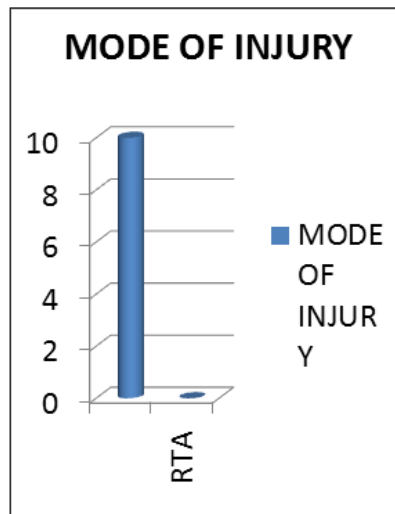
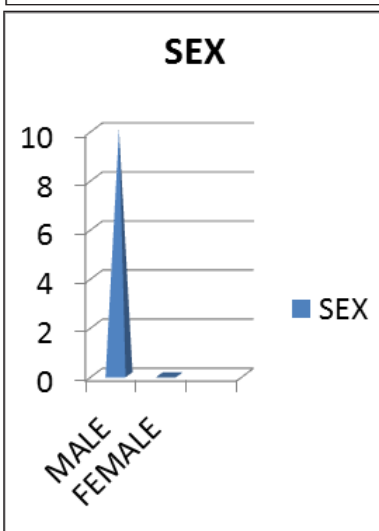
**Post OP Protocol:**

Philadelphia collar was given immediately after surgery. Patient has been advised sitting at first week and walking from second week. Daily neurological chart was obtained for first 2 weeks. We maintained cervical collar for 2 months.

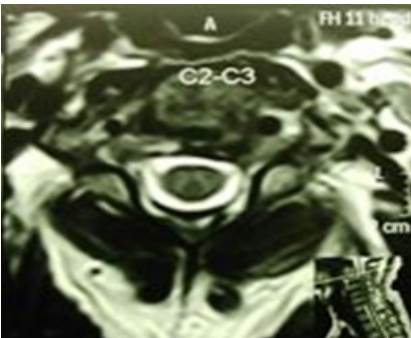
**Follow Up:**

Every month till first 3 months, after that every 6 months. Follow up - x rays with neurological assessment. Maximum follow up in our study is 2 years.

**Results:**



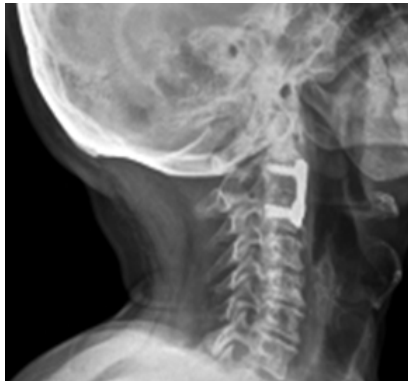
CASE 1: FIG 1



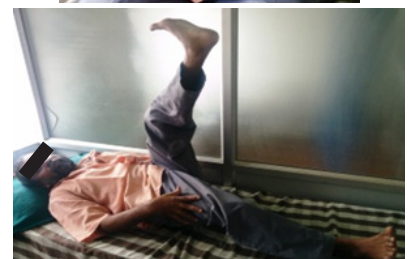
**FIG 2:Reduction Bytraction**



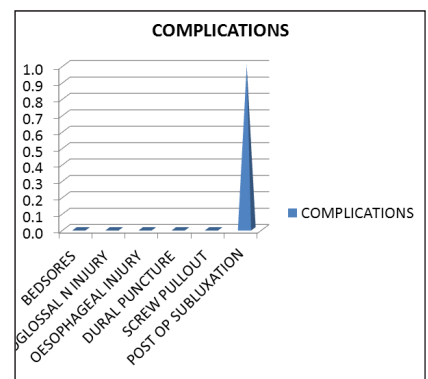
**Fig 3 : Immediate Post Op X Ray**



**Fig 4: 2 Years Follow Up Showing Good Fusion**



**Fig 5: 2 Years Clinical Outcome – Asia C To Asia E**





**FIG 6: At 6 months follow up patient presented with screw loosening with subluxation**

### Discussion:

In our study, most common age group is 40 to 50 years. All our patients are male. Most common mechanism of injury is fall.

According to ASIA scale grading 7 patients had ASIA A grade, 3 patients had ASIA B-C grade.

According to effendi classification 8 patients had type II pattern and 2 patients had type II A pattern.

The average interval period between injury and surgery is one week. All patients were improved after fixation which was measured by ASIA scale.

One patient had post op subluxation without neurological deficit. All patients showed good fusion rate and near full range of cervical spine rotatory movements with less complications.

### Conclusion:

In our experience the anterior approach with primary internal stabilisation is a safe method to treat unstable hangman's fracture.

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