RETROSPECTIVE ANALYSIS OF NEUROLOGICAL RECOVERY AFTER POSTERIOR DECOMPRESSION AND POSTERIOR STABILIZATION OF DORSO - LUMBAR SPINE INJURIES

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Abstract

Background: 27 Cases included in this study were treated by posterior decompression and stabilization for Dorso-Lumbar spine injuries.

Materials and Methods:
The 27 cases of D-L spine injuries treated by posterior decompression and stabilization in Government General hospital, Chennai, Tamilnadu using Luque rod, Hartshill Rectangle, Steffe Instrumentation and Pedicle screw and rod system prior to year 2006 were taken up for study and their neurological recovery assessed retrospectively and reviewed by clinically and radiologically.

Results:
Males have higher incidence than females, and majority of them were in their 2^{nd} to 3^{rd} decade in life. 9 out of 12 patients of incomplete neurological injury and 5 out of 15 patients of complete neurological injury at admission had useful neurological recovery after surgery.

Conclusion:
Severity of the primary cord damage at the time of accident is a major factor in the neurological recovery of the patients. Earlier the intervention and less number of transfer of patients from place to place (less secondary neurological damage) gives good prognosis. Posterior decompression and posterior stabilization is an important added factor in good neurological recovery.

Introduction

Spinal injury is one of the worst and most disabling catastrophies that an individual can sustain in his lifetime.

Five thousand years ago, either a physician or a stone mason who built the pyramids for pharaohs called traumatic paraplegia “An ailment not to be treated”.

EDWIN SMITH PAPYRUS, 3000BC.

Celsus made the next important contribution, distinguishing cervical from thoracolumbar spine injuries. He also expanded on Hippocrates concept of manual extension for reduction of spinal deformities.

In 1920 Sir Ludwig Guttman emphasised on closed reduction of fractures.

Watson and Jones modified ‘Davis reduction method’ in anesthetised patient by using tables of different heights, in 1931.

Paul of Aegina 625 to 690 AD first introduced laminectomy for spinal cord injury.

Harrington revolutionised spinal care and rehabilitation with introduction of posterior spinal instrumentation devices in 1960’s.

In 1983 Nicoll has said that SCI (spinal cord injury) patient with paraplegia should either be treated superlatively or not at all.

In the past 25 years, posterior decompression combined with posterior stabilization became more popular in treating Dorso – Lumbar spine trauma with neurological injuries. The commonly

used posterior instrumentation includes Luque's rod, Hartshill rectangle, Steffe platting and Moss-miami (pedicle screw and rod) system.

Sir Robert Jones taught that 'Function is the orthopaedist's goal, his specialty is to know and able to practice the best way of obtaining it'.

Dorso-Lumbar spine injuries pose considerable difficulties in the treatment. The final outcome of treatment depends upon various factors. The primary damage of the cord due to injury, type & stability of the fracture, and secondary damage to the cord from multiple transfers.

The peak incidences of DL spine injuries are from 2^{nd} to 4^{th} decade which is the most active period of life.

Civil construction workers are highly prone to sustain D-L spine injuries when they had a slip, or a fall from height while at work.

Increasing high velocity road traffic accidents also an important cause for SCI.

Even though the stem cell research is in early stages, the neurological recovery after spinal cord injury is a major challenge to surgeon as well as to the patients.

This study emphasis on the need for early intervention by means of medical, surgical and physiotherapy.

Materials and Methods

This retrospective analysis made with patients who were admitted in government general hospital, Chennai from year 2000 to 2005.

All these patients were treated by posterior decompression and stabilization with the following implants.

1. Luque rod with sublaminar wiring
2. Hartshill rectangle
3. Steffe instrumentation
4. Moss-Miami (pedicle screw, rod) system

The used methods are:

1. Sex Incidence

Male	25
Female	2

2.Age Incidence

Age in Years	No. of Patients
10 - 20	1
20 - 30	12
30 – 40	9
40 – 50	3
50 – 60	2
> 60	0

3. Mode of Injury

Fall from height	15
Fall from tree	7
Fall of weight over back	2
Road traffic accidents	3

4. Type of Injury

Wedge compression fracture	4
Burst fracture	20
Fracture dislocation	3

5. Level of Injury

D5 – D11	1
D12	10
L1	11
L2	2
L3 – L4	3

6. Neurological Deficit on admission

Deficit	No. of patients
Complete	15
Incomplete	12

7. Follow-up

Retrospective Follow-up	No. of Patients
1 , 2 Years	11
3 , 4 Years	14
5 , 6 Years	2

8. Neurological recovery

Nature of recovery	No. of patients
Total (Complete) recovery	3
Partial (Incomplete) recovery	24

Observations and Outcomes.

This study was carried out at Government General Hospital, Chennai, Tamilnadu, India in the year 2006.

In this study the Males have higher incidence than females.

Majority of the patients were in their 2^{nd} to 4^{th} decade, which is more productive in life.

More than 70% of the cases had fall from height, and other were due to road traffic accidents and fall of heavy weight over their back.

Among fractures, more than 60% of cases were Burst fracture. Wedge compression fracture, and fracture dislocation were in the next line of frequency.

D12, L1 were the commonest level of injuries.

In this study around 60 % of the patients had complete spinal cord injury, and rest of them had incomplete (partial) injury on admission.

Average duration of stay in the hospital from admission was 4 to 8 weeks.

The most of the follow-up patients were admitted 2-4 years prior to assessment.

The commonly associated injury was calcaneal fractures. Pressure sores were common in sacrum and trochanteric region.

Three patients had complete recovery, and rest i.e. 24 out of 27 had incomplete recovery.

Analysis and Discussions

In this study 27 cases were analysed by Frankel's grading.

Frankel et al., 1969 Evaluation in 5 stages.

A. Complete both motor and sensory loss below level of lesion

B. Sensory only - some sensation present below the level of lesion but motor paralysis is complete

C. Motor useless - some motor power is present below the lesion but useless

D. Motor useful - useful motor power below the level of lesion

E. Intact - free of neurological symptoms

The results analysed are tabulated as follows:

Neurological Deficit	On Admission	Useful Recovery	Useless Recovery	No Recovery
<u>Wedge Compression Fracture</u>				
Complete	4	2	1	1
Incomplete	0	0	0	0
<u>Burst Fracture</u>				
Complete	9	2	4	3
Incomplete	11	8	3	0

Neurological Deficit	On Admission	Useful Recovery	Useless Recovery Y	No Recover Y
Fracture Dislocation				
Complete	2	1	1	0
Incomplete	1	1	0	0

In this study no case showed deterioration of neurological deficit after surgery.

5 patients (among 15 patients) had useful recovery after complete deficit at the time of admission, and 9 (among 12 patients) had useful recovery after incomplete deficit.

The earlier clinical studies may not be able to demonstrate an association between the promptness of the decompression and ultimate level of neurological function.

In 1982 Bohlman and Anderson studied a cohort of patients with complete quadriplegia who underwent late surgical decompression. According to him many patients have experienced some degree of neurological recovery ever after late decompression.

The complete cord damage, and higher the level of injury rarely show useful recovery with time.

Administration of large dose of methylprednisolone with in 6 hours of injury is of great value in neural recovery.

Conclusion

This study has 27 patients who were followed up for a period of 1 to 5 years. The following important observations have been noted in this retrospective study regarding the neurological recovery.

1. Still, neurological recovery after dorso-lumbar spinal injuries pose a great challenge to orthopaedic surgeons.
2. Severity of the primary cord damage at the time of accident is a major factor in the neurological recovery of the patients.
3. Earlier the intervention and less number of transfer of patients from place to place (less secondary neurological damage) gives good prognosis.
4. Posterior decompression and posterior stabilization is an important added factor in good neurological recovery
5. A good physiotherapy is also a contributory factor in positive neurological prognosis.

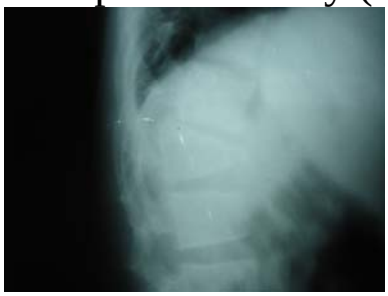
Illustrations

Case 1. Patient Name: Mr. Annamalai

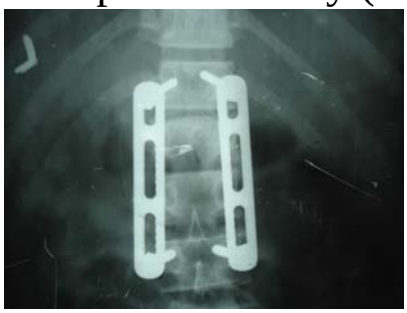
At assessment

Pre Operative x-ray (AP)

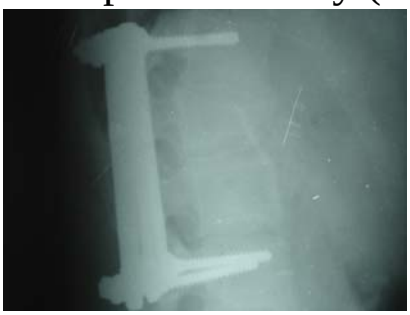
Pre Operative x-ray (Lat)



Post Operative x-ray (AP)



Post Operative x-ray (Lat)

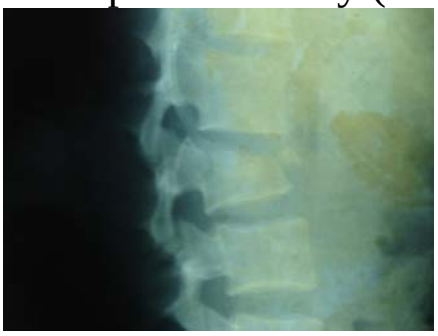


Case 2. Patient Name: Mr. Thiagarajan

At assessment.

Pre Operative x-ray (AP)

Pre Operative x-ray (Lat)



Post Operative x-ray (AP)

Post Operative x-ray (Lat)

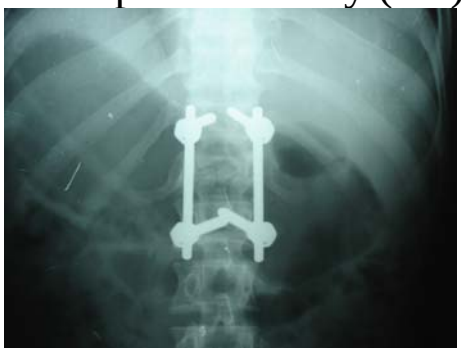
Case 3. Patient Name: Mr. Sekar.

At assessment.

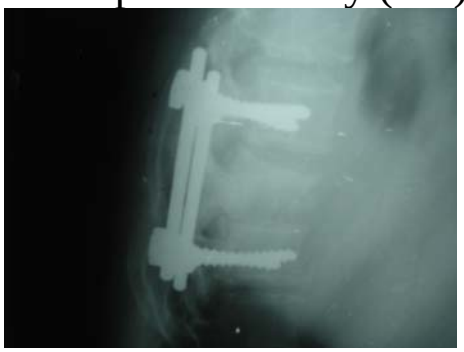
Pre Operative x-ray (AP)

Pre Operative x-ray (Lat)

Post Operative x-ray (AP)



Post Operative x-ray (Lat)



Master Chart

Sr No	Name of the Patient	Age	Sex	Date of admission	Date of assessment
1	Kandan	55	M	10.12.01	10.7.06
2	Kannaki	26	F	18.8.02	10.7.06
3	Muthukumar	29	M	14.10.03	10.7.06
4	Palani(1)	28	M	12.1.03	10.7.06
5	Palani(2)	41	M	5.5.03	10.7.06
6	Prakash	24	M	23.3.01	10.7.06
7	Ragavan	19	M	12.3.03	10.7.06
8	Ramesh	29	M	27.4.03	10.7.06
9	Sekar	37	M	18.2.02	10.7.06
10	Annamalai	28	M	15.5.04	10.7.06
11	Duraisamy	42	M	4.8.04	10.7.06
12	Ezhilarasan	25	M	13.4.03	10.7.06
13	Jaganathan	34	M	25.5.02	10.7.06

Sr. No	Name of the Patient	Age	Sex	Date of admission	Date of assessment
14	Kaliamoorthy	25	M	27.5.02	10.7.06
15	Ragupathy	25	M	19.6.04	10.7.06
16	Rajasekaran	36	M	4.4.04	10.7.06
17	Ramar(1)	24	M	11.10.04	10.7.06
18	Ranganathan	58	M	1.3.03	10.7.06
19	Sekar	32	M	8.10.04	10.7.06
20	Thiagarajan	34	M	24.2.05	10.7.06
21	Doss	49	M	6.8.03	31.7.06
22	Maniarasan	31	M	24.9.04	31.7.06
23	Palani(3)	39	M	16.2.05	31.7.06
24	Ravi	22	M	14.5.02	31.7.06
25	Murugan	26	M	29.11.04	31.7.06
26	Ramar(2)	34	M	20.2.05	31.7.06
27	Sagunthala	38	F	28.5.03	31.7.06

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