



Case report

Rehabilitation of lumbar spine fracture with pedicle screw fixation and posterior decompression and fusion

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ABSTRACT

Traumatic fracture of the lumbar spine is a rare spinal injury often leading to death. Surgical intervention are effective in decreasing mortality. A 30-year-old male had a collision caused by falling of a tree on his back. His family took him Acharya Vinoba Bhave Rural Hospital (AVBRH), because of pain and swelling on his back where an fracture at L1, L2 level. Later, the patient underwent posterior surgical decompression and spinal fusion at L1 and L2 with pedicle screw fixation for spinal restoration. Later, he was referred to the physiotherapy department for rehabilitation. Rehabilitation was given to regain full range of motion, gradually to increase weight bearing and keep associated muscles strong.

Keywords: Lumbar Fracture, Pedicle Screw Fixation, Posterior Decompression and Fusion Of Lumbar Spine, Rehabilitation.

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INTRODUCTION

Based on a study in the United States of America, each year, approximately 1,60,000 patients had vertebral column injury. About 64% of those spinal injuries occurred in the thoracolumbar area. Spinal fracture considered as a fatal injury. The causes were accidents (45%), falls (20%), sports injuries (15%), violence (15%), and others (5%). Fractures, based on the damaged area and instability risk were divided into minor and major fractures. Major fractures included compression fracture, burst fracture, seat belt (chance) fracture, and dislocation fracture. As for the management of spinal fracture, immobilization, medicaments, and surgery were mentioned. In this study, we reported a case of L1 and L2 vertebral compression fracture and managed by laminectomy decompression with fusion stabilization surgery. Vertebral fracture can have a considerable impact on an individual's quality of life. There is increasing evidence that physiotherapy including manual techniques and exercise intervention may have an important treatment role. The purpose of this case report was to increase the awareness particularly about same cases scenario in the future and that if it could be managed well, quick, and adequate, even the compression fracture case, which was life-threatening, could have an optimal result and save patient's life ^{[1][2]}.

Patient Information

A 30-year-old male while walking down the road, because of the strong winds, tree uprooted from its place and collided with his back and had a fall because of it. As there was no around on the road he got up on his own and went home. By evening there was swelling

and pain in his back for which he visited Acharya Vinoba Bhave Rural Hospital (AVBRH), Datta Meghe Institute of Medical Sciences (DMIMS), Wardha, Maharashtra, India. An x-ray was taken followed by CT Scan of his back which shown traumatic L1- L2 fracture without a neuro deficit. A posterior decompression and spinal fusion of L1-L2, L2-L3 was done. He was then recommended for physiotherapy for further management.

Table 1. Timeline

Events	Date
Collided with tree	02/02/2021
Complains of low back ache	02/02/2021 (evening)
Visited AVBRH with complains of pain on low back while walking, standing, bending forward and sit to stand activities and swelling.	02/02/2021
Diagnosed with traumatic L1 –L2 fracture without neuro deficit	02/02/2021
Underwent surgery for posterior decompression and spinal fusion	12/02/2021
For further management, referred to physiotherapy	13/02/2021

Clinical findings

He was examined in supine lying position with shoulders at same level. Upon inspection, the patient maintains both legs abducted and a bit externally rotated pillow under thigh, both knees were in extended position, and both ankles slightly plantar flexed. The swelling was found to be present on the operative site. On palpation, there was rise in local temperature. Pain was present over the operative site, visual analog scale (VAS) score of 10/10.

Figure 1. Pre-operative X-ray



Figure 2. Post-operative x-ray

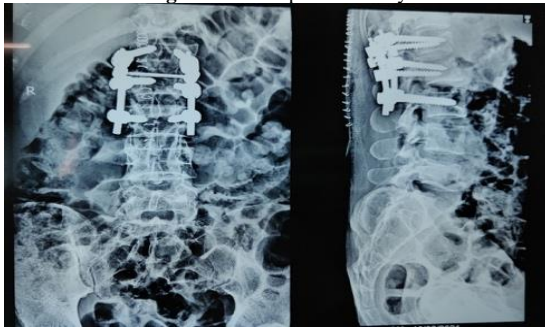


Figure 3. Spinal CT scan



Table 2. Manual Muscle testing Strength

Muscles	Right	Left
Hip		
Flexion	2 ⁺	2 ⁺
Extension	2 ⁺	2 ⁺
Abduction	2 ⁺	2 ⁺
Adduction	2 ⁺	2 ⁺
Knee		
Flexion	2 ⁺	2 ⁺
Extension	2 ⁺	2 ⁺
Ankle		
Plantar Flexion	2 ⁺	2 ⁺
Doris Flexion	2 ⁺	2 ⁺
Inversion	2 ⁺	2 ⁺
Eversion	2 ⁺	2 ⁺

Medical treatment

He visited AVBRH with complains of pain and swelling on lower back, difficult for him to do activities of daily living, where he was admitted for the same. Chest x-ray revealed traumatic lumbar fracture of L1-L2. Pre-operative medications tab zerodol SP BD, tab neuro biferate OD, tab pan 40mg OD, tab vitamin c 500mg BD. He underwent posterior decompression and spinal fusion with pedicle screw fixation at L1-L3 level. Post-operative medication instructed

drug inj pantoprazole 40mg OD 5 days, antibiotics ceftriaxone and amikacin, pain control diclofenac, other supplements tab vitamin c 500mg BD, tab calcium 500mg BD, tab multisign gold 1 tab OD and tab chymoral forate 1 tab TDS.

Table 3. Range of motion

Joint	Lt Active	Lt Passive	Rt Active	Rt Passive	Restriction
Hip					
Flexion	0-60 ⁰	0-70 ⁰	0-60 ⁰	0-70 ⁰	NA
Extension	0-10 ⁰	0-15 ⁰	0-10 ⁰	0-15 ⁰	NA
Abduction	0-30 ⁰	0-40 ⁰	0-30 ⁰	0-40 ⁰	NA
Adduction	0-30 ⁰	0-40 ⁰	0-30 ⁰	0-40 ⁰	NA
Knee					
Flexion	0-120 ⁰	0-135 ⁰	0-120 ⁰	0-135 ⁰	NA
Extension	0-120 ⁰	0-135 ⁰	0-120 ⁰	0-135 ⁰	NA
Ankle					
Plantar Flexion	0-45 ⁰	0-45 ⁰	0-45 ⁰	0-45 ⁰	NA
Doris Flexion	0-15 ⁰	0-15 ⁰	0-15 ⁰	0-15 ⁰	NA
Inversion	0-30 ⁰	0-30 ⁰	0-30 ⁰	0-30 ⁰	NA
Eversion	0-20 ⁰	0-20 ⁰	0-20 ⁰	0-20 ⁰	NA

Therapeutic Management

Goals, pre-operative: The goals were to maintain proper position so as to avoid further displacement of fracture or any cord damage, to prevent respiratory complications, reduce edema maintain joint range of motion of all the limbs.

Post-operative, the short-term goal were to prevent respiratory complication, reduce pain and edema and to increase joint range of motion and strength of all the limbs, promote early mobility, avoid pressure soars, encourage walking with brace and walker and independent ADL activities. The long term goals were to reduce pain and swelling, increase joint range of motion and strength, promote walking, balance and proprioception independent aerial activities [3][4].

Management

Pre-operative, relaxation techniques, deep breathing exercises and spirometry were given to avoid respiratory complication [5]. Ankle toe movement were given to prevent edema [6]. Proper positioning and avoid turning to side were advise to prevent dislocation of the fracture and to further damage to spinal cord. Active movements for upper limb while active assisted movements for lower limb were given for range maintenance.

Phase 1: Inpatient phase [0-7 days]

Phase 1 exercises emphasis on counselling lower limb movements, log rolling, upper limb, movements bed mobility. Supported sitting, bedside sitting with brace on, bed side standing with brace on with walker were focused.

Cryotherapy, relaxation technique, proper positioning, deep breathing exercises, ankle toe movement, were given to reduce pain retrain lungs and to prevent edema post-operatively. Active assisted movements which were progressed to active movements of lower limb like ankle toe movement, heel slide, SLR, abduction, adduction was

given and were progress as he was able to do actively. Log rolling was taught to prevent improper movements of spine. Bed side sitting with brace on were done around 2 to 3 days after surgery. Around a week after surgery bed side standing with brace on with the help of walker was encourage. Static back and static abdomen were started to facilitate activation of core muscles.

Phase 2: out-patient phase [1 to 3 weeks]

In Phase 2 most of phase 1 exercises were continue along with walking with brace on reach out activities and core strengthening exercises were the main focus. Breathing exercises, active movements and statics were continuing along with sit to stand activities reach outs to facilitate core strengthening. Active pelvic bridging was to given to enhance core activation walking with brace on along with walker to encourage to increase strength in lower limbs.

Phase 3: out-patient [4 to 8 weeks]

The goal during this phase to promote balance mobility strength, endurance. Most of the phase 2 exercises were continue along with focus on gait training and strengthening.

Progression was done to the phase 2 exercises without walker in walking sit to stand reach outs with weight was given to promote balance. Hurdle walking, tandem walking, marching in place high stepping, stair climbing was encouraging to facilitate gait training. activities like mini squats, lunges dynamic squats, were done to increase strength. These exercises were also continuing as home program for further strengthening.

DISCUSSION

In this case report, we found that a 30-year-old male who had traumatic lumbar fracture of L1-L2 and underwent surgery of posterior decompression and spinal fusion. Rehabilitation objectives were formulated with regards to core decompression with regards to the surgery done, beginning from low intensity exercises to making him to do complete ADL activities^{[7][8]}.

All the exercises were done three times a day. With the help of rehabilitation program, at the end he was able to resume his ADLs independently. Mathew Low et. al. given the isometric muscle activities for the rehabilitation were proved useful^{[9][10]}.

CONCLUSION

In this case study a 30-year-old male who had traumatic lumbar fracture of L1-L2 and underwent surgery of posterior decompression and spinal fusion. He was able to resumed daily living activities (ADLs) voluntarily with the help of regular rehabilitation. The recovery program consisted of a target-based therapy program that decreased postoperative pain, edema, increase range and enhanced patient responsiveness.

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