MANAGEMENT OF MASS SCALE DORSO-LUMBAR INJURIES FOR EARLY REHABILITATION

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ABSTRACT

This report is a prospective study of 72 cases on treatment for dorsal and lumbar spine injury resulting from the earthquake in Gujarat state in western India in January 2001, from the point of early rehabilitation. The purpose of the study was to assess results of surgical intervention with regard to rehabilitation, in selected patients of mass scale spinal injuries following a major catastrophe. Posterior instrumentation and laminectomy were used to treat sixty patients of dorsal and lumbar spine injury with neurological deficit. Mobilisation was started as early as possible so that rehabilitation was faster and better. The remaining 12 patients had normal neurological findings and stable type of spinal injuries and hence were treated conservatively with bed rest, bracing and gradual mobilisation. Regular follow up was carried out and some patients were also followed up at their residence. None of the patients had neurological deterioration following surgery. At 2 years follow-up, 53% patients have a functionally useful motor power based on Frankel's classification. Physical, psychosocial, vocational, and sexual rehabilitation was better. There were no cases of late neurological deterioration or mechanical failures in the conservatively treated group. The authors conclude that dorsal and lumbar spine injuries can be rehabilitated much faster and better if treated with posterior stabilisation and decompression when there are large numbers affected after a major catastrophe. Chances of neurological improvement are also good because 53.3% of patients gained functionally useful motor power. Seventy three percent could perform their daily activities independently and were vocationally independent.

INTRODUCTION

Disaster has always co-existed with mankind and no community is immune to it. Many civilisations have been buried under the wrath of nature. Kutchh district of Gujarat, in India has always been prone to natural disasters and has been devastated twice before the 2001 earthquake. On the morning of 26th January 2001 at 8:46 A.M. an earthquake of the magnitude of 6.9 on Richter scale rocked the state of Gujarat. The epicentre was located at Lodai, 20 kms. from city of Bhuj of Kutchh district of Gujarat. Millions were directly and indirectly

affected by this killer quake. 1,66,000 people were injured, 13,811 died and 8,68,000 houses were damaged. In the days to follow, 800 patients were received at Paraplegia Hospital, Ahmedabad of which 500 had to be admitted. There were in all 78 (15.6%) spinal injuries of which 72 were with dorsal and lumbar level injuries.

METHOD

To manage this large patient overload the authors adhered to the following protocol very rigidly:

- Resuscitation of the patient was done wherever required.
- Neurological status was accurately noted using Frankel's classification.
- Patients were subjected to X rays, blood investigations and MRI (to know the cord status).
- Associated injuries were managed simultaneously.
- Twelve atients with normal neurological findings and stable spines were treated conservatively with adequate bed rest, bracing, muscle strengthening exercises and mobilisation as and when the pain permitted them to move.

  Sixty patients with dorsal and lumbar spine injuries with neurological deficit were treated in the following manner:

- Parentral methyl prednisolone was administered to patients with spinal injury in the following dose (1). A bolus dose of prednisolone, 30 mg. /Kg. body weight was administered over 15 minutes followed by 45 minutes pause and then in next 24 hours continuous infusion of 5.4 mg. /kg. /hour was administered.
- Posterior stabilisation was done using appropriate instrumentation and decompression was done with laminectomy. The retro-pulsed fragments were pushed anteriorly after retracting the cord wherever possible. The status of the dura was noted (whether pulsatile, non-pulsatile, crushed or continuous). Anterior decompression and fusion was done at 3-4 weeks time where the canal was compromised more than 40% (2,1). or where there was a retro-pulsed fragment with persistent neurological deficit.
- To manage this heavy overload of patients 8 operation theatres worked round the clock maintaining strict aseptic precautions.
- Routine postoperative management of dressing, antibiotics, analgesics and others was followed in all patients.
- Care was taken to prevent bedsores by using waterbeds, frequent change of posture and back care.

Post operative rehabilitation included:

- Bedside physiotherapy
- Fast tilt table mobilisation (TTM)
- Upper limb strengthening
- Passive mobilisation of lower limbs
- Deep breathing exercises
- After finishing TTM at 70 degrees, sitting with backrest on the cot was carried out.
- After finishing TTM at 90degrees, depending upon the neurological status, patients were made to walk using parallel bars with or without support.
- Progression from parallel bar to walker/ elbow crutch/ stick/ independent walking was done later.
- Bladder training was given to all patients.
- Vocational, psychosocial and sexual rehabilitation was also carried out.

Follow-up

All patients of spinal injury were meticulously followed up at 3, 6, 9, 12, 18 and 24 months. Detailed neurological examination, rehabilitation status and x-rays were done at each follow-up. A team of orthopaedic surgeon, physiotherapist, nurse, orthotist, medical social worker and occupational therapist examined those patients who could not make it to the hospital, for follow-up at their residence.

RESULTS

Twenty-four patients were males and 48 patients were females. They are classified into different age groups in table 1.

Table 1. Age distribution

Age	1-15	16-30	31-45	46-60	>60
No. Of patients (total 72)	1	8	28	22	13

Mode of injury

- Wall falling on the patient: 40 patients
- Heavy object falling on the patient: 19 patients
- Fall from height: 13 patients

Mode of transport from the site of injury

Eight patients were air lifted, 29 patients were transported by bus, 13 by truck, 15 by ambulance, and 7 by other means.

Table 2. Admission pattern

Day	1	2	3	4	5	6	7
No. Of patients Total (72)	5	19	23	21	2	1	1

Table 3. Level of injury

Level of injury	No. of patients
Dorsal	10
Dorsolumbar (D11- L2)	52
Lumbar	10
Total	**72**

Preoperative neurological status using Frankel's classification (only dorsal and lumbar spine patients):

46 patients belonged to Frankel's A an B, 18 patients to Frankel's C and 8 patients belonged to Frankel's E.

Treatment offered

Twelve patients were treated conservatively because 8 patients belonged to Frankel's grade E, in 2 patients there was local infection and 2 patients were medically unfit. Sixty patients were treated surgically, of which 54 were treated only by posterior surgery and 6 by both anterior and posterior surgery.

Table 4. Dura status and recovery pattern (in 60 operated patients of dorsal and lumbar spine injury)

Dura intact				Dura crushed	
Pulsatile 14		Non pulsatile 34		12	
NR: 0	R: 14	NR: 16	R: 18	NR :12	R: 0

NR = no neurological recovery R = neurological recovery

Complications

There was no immediate postoperative mortality or neurological deterioration. Infection was found in 4 patients (6.7%).

Average hospital stay

Average hospital stay was 20 days and further rehabilitation was done at the attached specialised paraplegia unit.

Neurological status according to Frankel's grade at 24 months at follow-up

Twenty patients' belonged to Frankel's grade A and B, 8 patients belonged to Frankel's grade C, 22 patients belonged to Frankel's grade D and 10 patients belonged to Frankel's grade E. Thus, 32 patients (53.33%) belonged to Frankel's grade D and E, thereby having functionally useful motor power.

Rehabilitation status

44 (73.3%) patients perform their daily activities independently. 26 (43.3%) patients ambulate independently with or without support and 18 (30%) patients lead a wheelchair life independently. Six (10%) patients are bed-ridden. 44 (73.3%) patients are vocationally independent. Bowel and bladder control was normal in 20 (33.33%) patients, indwelling catheter was present in 7 (11.6%) and self-catheterisation was practised in 33 (55%). Superficial bedsores were found in 20 (33.33%) and deep bedsores in 8 (13.33%).

DISCUSSION

The patients received at the institute were mainly from rural Gujarat. Females were more affected because most men were out in the fields working in the morning. As patients were from distant places most were received on the 2nd, 3rd or 4th day after the earthquake depending upon the availability of transport and speed of evacuation.

Most injuries were at thoraco-lumbar junction as this area is most mobile. Most injuries were also due to fall of a heavy object or a wall that concentrated forces at thoraco-lumbar region. Methyl prednisolone was administered to all patients of spinal injury with neurological deficit to decrease cord oedema (3,1). Posterior fixation and decompression were the treatment for patients with dorsal and lumbar spinal injuries with neurological deficits, so that compromise of the canal is removed early, facilitating axonal flow and reducing cord ischemia. This was done as early as possible so that permanent changes did not develop in the cord (3). Due to stabilisation of spine, rehabilitation could be started earlier and progress could be made much faster despite the large number of patients. Anterior surgery in the form of decompression and fusion was done in 6 patients after 3 to 4 weeks where the canal was compromised more than 40% or when there was a retro-pulsed fragment. Improved neurological function has been associated with early (4) and late anterior decompression (5,6,7,8). However, current literature on timing of anterior surgery is still inconclusive.

Four patients developed infection that was controlled with debridement and antibiotics. No patients required early implant removal. At 24 months follow-up, 53.3% of patients had functionally useful motor power that made them independent. Review of literature shows recovery rates in routine circumstances varying from 50-90% using various forms of treatment (9,10,11,12,13,14,15,8). For a major catastrophe like the earthquake in Gujarat, 53.3% recovery to a functionally useful status seems most satisfying. Because of vigorous physiotherapy 73.3% of patients could perform their daily activities independently. Vocational assistance was given to these patients after analysing their rehabilitation status and aptitude on an individual basis. Because of this process these patients were also vocationally independent. About 6 (10%) patients were bedridden and 8 (13.33%) patients had deep bedsores. This was mainly due to their poor socio-economic status, illiteracy, hot, dry and dusty weather and unwillingness of family members to treat them further.

CONCLUSION

In conditions leading to large-scale devastation like earthquake where large number of spinal injuries may have to be treated in a very short period of time the following guidelines may be helpful.

- Early evacuation of the patient.
- Immediate transfer to a centre with facilities.
- Sufficient organisation of the centre to avoid chaos arising out of the large number of patients.
- Short course steroids.
- Early stabilisation of spine and decompression of the spinal cord.
- Proper postoperative rehabilitation.
- Good psychosocial support.
- Vocational and sexual rehabilitation.

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