

REVIEW OF CASES OF FRACTURES OF THE SPINE AT THE UNIVERSITY HOSPITAL

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SPINAL INJURIES are not an uncommon problem the world over. In Malaysia, with its rapid development and expansion towards industrialisation, there have been many injuries to the cervical and dorsi-lumbar regions of the spine. Hitherto, the management of spinal injuries has been controversial, whether to change from the didactic teaching of earlier masters of our field like (Watson Jones, 1955) in England and (Bohler, 1956) or to the more conservative approach of (Nicoll, 1962; Bedbrook, 1969) and (Guttmann, 1959).

Today, it is accepted that compression fractures do not require perfect reduction for functional independence nor is disability proportional to residual deformity.

In the management of these fractures, a clear appreciation of the damage to soft tissues is essential. For it is indeed the consequences of such damage that often cause a persistence of pain or more seriously increases the neurological defect, (Apley, 1970). The causative factors of such injury are generally a combination of flexion and rotation. Extension injuries occur particularly in the cervical spine in the elderly, causing tetraplegia, (Barnes, 1948).

As the mechanism of the injury to the cord is uncertain in patients with cervical spine injuries hence they are best held in neutral position, for indeed flexion can aggravate the injury in flexion fractures, as extension would in an extension injury. The mechanism is probably chiefly due to rotation much more so than flexion (Roaf, 1960). Another possible cause of damage to the spinal column is vertical compression, though it is by no means common.

CLINICAL MATERIAL

Dorso-lumbar spine

During the period under review, there have been ninety-four thoraco-lumbar fractures and twenty-seven cervical column injuries. The ninety-four patients studied in this category include the patients who have had lesions above the ninth dorsal. There have been six patients with wedge fractures in this region.

Male patients have been more than females, there being seventy-three as compared to twenty-nine females. The incidence of the lesion has been highest in the twenty to twenty-nine and thirty to thirty-nine year groups. Table I.

Table I
Age and sex distribution of patients with fracture of the spine

Age Group	Males	Females	Total
0 - 9	0	0	0
10 - 19	5	4	9
20 - 29	30	5	35
30 - 39	17	2	19
40 - 49	8	2	10
50 - 59	8	2	10
60 - 69	3	5	8
70 and above	2	1	3
Total:	73	21	94

A study of the ethnic distribution showed that fifty-six patients were Chinese, fifteen Malays, nineteen Indians and four others. The Chinese preponderance is presumably due to their being more in urban areas while the Malay population is largely rural. With development and industrialisation, this pattern is changing. Table II.

Table II
Causative factors of spinal fractures at the University Hospital 1967 - 1974

Mode of Injury	Males	Females	Total
Motor vehicle accidents	23	6	29
Falls	43	13	56
Other causes	7	2	9
Total	73	21	94

The chief causative factor affecting the spine in this region has been due to falls in both sexes. There have been fifty-six patients in the category, forty-three of whom were males and thirteen females. Motor vehicle accidents including motor cycles have been the cause of injury in twenty-nine patients, twenty-three of whom were males and six females. Table III.

Table III

Level of injury and associated neurological deficit in spinal fractures at the University Hospital 1967 - 1974

Level of Vertebrae Involved	With Neurological Deficit	No Neurological Deficit	Total
D9	1	0	1
D10	1	0	1
D11	0	1	1
D12	0	5	5
T12	6	13	19
L1	11	30	41
L2	2	10	12
L3	3	11	14
L4	1	3	4
L5	0	5	5
Others	3	6	9
Total	28	84	112

In this region a total of one hundred and twelve vertebrae have been involved in the ninety-four patients. In those patients with a neurological deficit, the twelfth dorsal in six patients and the first lumbar in eleven patients have been the commonest level for the complication. On the other hand in the patients without a neurological deficit too the twelfth dorsal and first lumbar vertebrae have had the highest frequency of involvement, there being thirteen patients having lesions at the twelfth dorsal and thirty at the first lumbar vertebra. The total number of vertebrae involved with a neurological deficit have been twenty-eight, while eighty-four vertebrae have been fractured without any spinal cord lesion. Table IV.

Table IV

Analysis of patients with cervical spine fractures by age and sex

Age Group (Years)	Number of Cases		Total
	Male	Female	
0 - 19	1	2	3
20 - 39	19	3	22
40 - 59	0	1	1
60 and above	1	0	1
Total	21	6	27

In developing countries the time interval between injury and admission is an important factor. In spinal injuries, unlike in those involving both the upper and lower extremities there is a definite improvement in the right direction. Fifty-two patients having been admitted in less than twenty-four hours while twelve have been brought to casualty between twenty-four to forty eight hours. However, thirty patients, nearly one-third of the total have taken over forty-eight hours for admission. The reason for this change in the right direction is probably two-fold. First the realisation that spinal injuries are a more serious problem, particularly when a neurological deficit is present hence the desire for hospitalisation. Secondly, the injuries being due either to falls at work sites or motor vehicle accidents the patients are brought by ambulance or passers-by to hospitals. Table V.

Cervical Spine

During the period under review, twenty-seven cases of fracture of the cervical spine have been admitted for treatment. The age most affected has been in the twenty to thirty-nine year group, with

nineteen males and three females. Twenty-one of the patients have been male and the rest females. Table VI.

Table V
Causes of injury in cervical spine fractures

Mode of Injury	Number of Cases		Total
	Males	Females	
Motor vehicle accident	14	5	19
Fall	3	0	3
Other causes	4*	1†	5
Total	21	6	27

* 1 patient had a plank fall on his head.
2 patients dived into shallow water.
1 patient had his neck twisted.
† Head caught in generator

Table VI
Level of lesion in cervical fractures with and without neurological deficit

Level of Injury	Tetraparesis	Tetraplegia	No Neurological Deficit
C1	0	0	2
C2	4	0	10
C3	0	0	1
C4	1	0	1
C5	0	4	2
C6	1	1	0
Total	6	5	16

Unlike in the dorso-lumbar spine, the commonest cause of the injury has been motor vehicle accidents. There were nineteen patients, fourteen of whom were males. Table VII.

Table VII
Treatment and combinations of treatment given at the University Hospital to cervical spine fractures

Treatment Given	With Neurological Deficit	Without Neurological Deficit
Skull traction	10	9
Cervical collar	5	7
Minerva plaster	3	2
Operative treatment	1*	2†
Total	18	20

* Patient had hand surgery.
† Patients had posterior spinal fusion.

Analysis of the level of the lesion shows that fourteen of the twenty-seven patients have had fractures at the second cervical vertebra, ten patients with no neurological involvement and four with tetraparesis. Tetraplegia has been highest at the fifth and sixth cervical vertebra level.

MANAGEMENT

Dorso-Lumbar Spine Fractures

The management of these patients have been largely conservative. Of the total of twenty-four patients with neurological deficits, nine have been operated on because of pain, instability, or increase of the neurological deficit thus interfering with nursing care. Although operating for pain and instability is controversial, (Bedbrook, 1969), one patient with no neurological deficit has been operated for a fracture dislocation.

Fifteen patients with neurology and sixty-nine without have been treated by initial bed rest and physical therapy consisting largely of exercises for the spinal musculature in the non-paraplegic, while for the paraplegic it has been an intensive effort to develop the upper extremities and trunk muscle above the lesion.

Cervical Spine Fracture

The management of these patients have been largely conservative and rightly so. In cervical fractures whether they be flexion or extension injuries, it is not possible to state whether they are stable or not at this stage. (Bedbrook, 1969).

Stability of the cervical spine is due to the ligaments, particularly the anterior common ligament, the intervertebral disc, and the facet joints (Holdsworth, 1963; Bedbrook, 1969). That the need for surgery is limited has been advocated by (Guttmann, 1959; Bedbrook, 1969) and others, particularly early surgery. Generally it is about six per cent. In the present series, twelve patients have had skull traction for six weeks, followed by a collar. When indicated owing to pain or because of mild instability, a Minerva plaster is applied for a further period of six weeks. Figures 1a - f.

Routinely, all patients have flexion and extension x-rays after initial traction. This is done under careful supervision. There is considerable danger in early surgery because of disturbing the fracture haematoma anteriorly and thus interfering with interbody and anterior fusion. In instability there are more chances for anterior grafts to slip after fusion when surgery is carried out early, while,



Figure 1a - Antero-posterior view of cervical spine with fracture of C5.

posterior fusion on the other hand may endanger the blood supply of the cord by the dissection and stripping of the muscles and ligaments from the spinous processes and laminae. Ten patients with neurological deficit and nine without, have had skull traction. This had been followed by a lighter cervical collar or Minerva plaster jacket. One patient had reconstructive hand surgery and another a posterior spinal fusion.

ANALYSIS OF RESULTS

Dorso-lumbar Spine

Sixty-three patients have made a complete recovery, two a partial recovery, while there has been no improvement in nineteen patients. Ten patients have been lost to follow-up. In the com-

plete recovery group, four were paraplegic and fifty-nine were not.

Both patients with partial improvement were initially paraplegic, three patients without neurology complained of pain and disability at follow-up. Eight patients without neurology were lost to follow-up.

The duration of hospitalisation has been more in patients with a neurological deficit and markedly less in those without; five patients with a neurological deficit have been in hospital between one to four weeks while sixteen have been from one to six months. On the other hand, the majority of patients - fifty three with no neurological involvement, have been hospitalised between one week to one month.

Cervical Fractures

In the management of cervical spine fractures with a neurological deficit, there have been partial



Figure 1b - Lateral view of the same patient.



Figure 1c - Flexion x-rays to demonstrate instability after initial period of immobilisation.

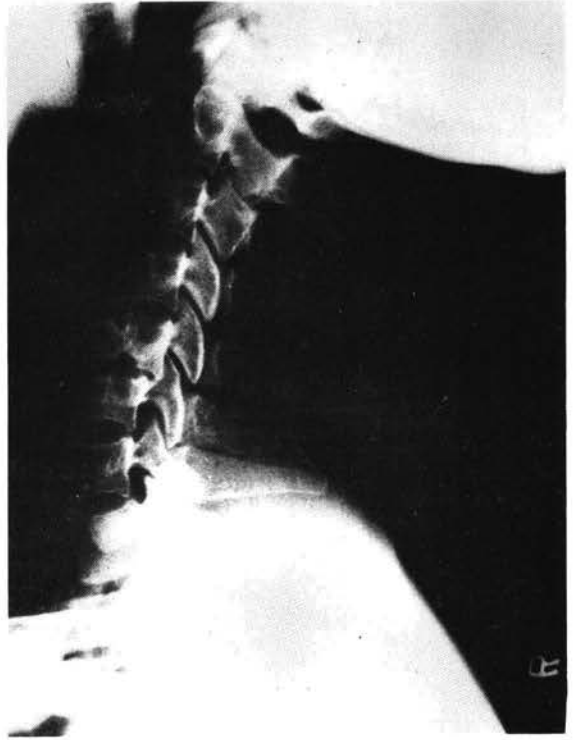
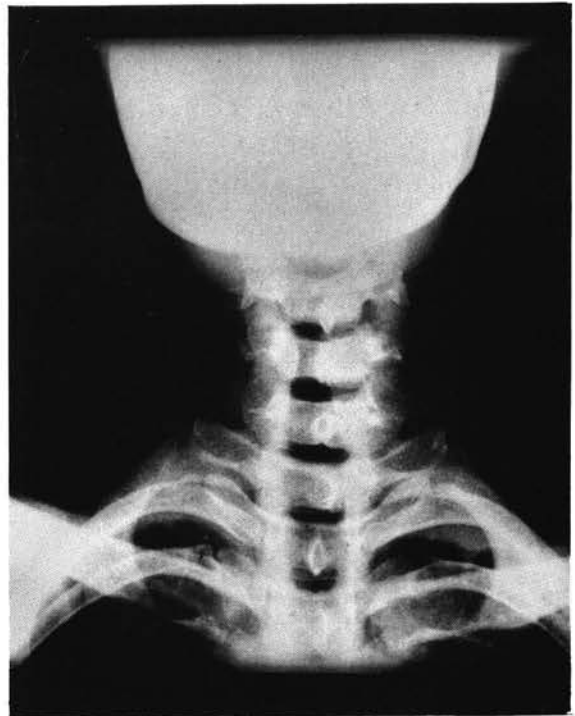


Figure 1d - Extension view to show same.



Figures 1e, 1f - Stabilisation of the fracture after further conservative treatment.

recovery in one patient with a fracture and complete recovery in another. On the other hand there has been partial recovery in three patients with fracture dislocations. Two patients have been lost to follow-up and two have died.

In those patients with no neurological lesion, there has been complete recovery in eleven patients with fractures and in three with fracture dislocations. One patient was lost to follow-up.

DISCUSSION

The controversial history of the management of spinal fractures is outlined as well as the mechanisms of the injury. The ninety-four patients with dorsi-lumbar injuries and the twenty-seven with fractures and fracture-dislocations of the cervical spine are evaluated. The study of the clinical material shows that injuries of the dorsi-lumbar spine are due chiefly to falls from heights, while the cervical injuries are due to motor vehicle accidents. The mechanism of cord compression is discussed. The ethnic group that is chiefly involved are Chinese, and males are in general more often affected than females. It has been more common for fractures of the spine to come in early for management than in those with extremity injuries.

The treatment has been chiefly conservative both in those with cord involvement and without. The hazards of surgery in both groups have been highlighted and the need for conservatism stressed.

The results of both groups have been evaluated. As would be expected, those patients with neurological involvement have had more problems and the final outcome has been less satisfactory than in those without.

SUMMARY

This paper evaluates ninety-four patients with dorso-lumbar fractures and twenty-seven patients with cervical spine fractures which have been

treated at the University Hospital, Kuala Lumpur. These cases have been analysed as to age, sex, the number of vertebrae involved, and their ethnic groups as well as causative factors. In discussing the management of this series, the need for a conservative approach has been highlighted. The results of treatment in the two groups have been analysed to justify such conservatism.

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