ORIGINAL ARTICLE

Cobb Angle Changes in Thoracic and Lumbar Spine Fractures Following Road Traffic Injuries in Gwagwalada, Abuja

Kawu A A

Spine Unit, Department of Orthopaedics, University of Abuja Teaching Hospital, Gwagwalada, PMB 228, Abuja FCT

Abstract

Background- *The annual incidence of spinal column fracture is 350 per million populations. with Motor vehicular accident being the major single cause of spine injuries. The victims are predominantly young and male. The aim of this study to evaluate the clinical outcome of conservative treatment of closed thoracic and lumbar spine fractures following RTI at UATH Gwagwalada Abuja by measuring the progression in kyphotic deformity.*

Methodology: *In this retrospective study, the age, gender, mechanism of the injury, time of presentation, symptoms, type of fracture, serial Cobb angle of the plain radiology between 1st Jan 2008 and 31th December 2008 were were obtained studied from the case notes.*

Result- *Sixteen patients with closed thoracic and lumbar fractures were seen during the review period. The male: female ratio was 3:1 with a mean age of 33.7± 11.4 years (males= 32.4 ± 7.9 years; females= 37.3 ± 8.4 years). The peak incidence was in the month of July (18.8%). Ten (62.5%) patients presented within a week of the injury. The predominant symptom was back pain (100%). Commercial bus (56.3%) was the commonest mode of transportation causing RTI with spinal fractures. The first lumbar vertebral (L1) (25.0%) was the most frequently fracture spine and the commonest fracture pattern was compression fracture (56.3%). At the index evaluation, the mean Cobb angle was 28.3º± 7.2º with an average progression of 9.8º± 4.2º at twenty-four weeks of conservative treatment.*

Conclusion- *The thoracolumbar spine was the commonest fracture site and the commonest fracture pattern was compression fracture. The short term clinical outcome of conservative treatment was not satisfactory.*

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Introduction

The annual incidence of spinal column fracture is 350 per million populations.[1] Motor vehicular accident (MVA) is the major single cause of spine injuries.[2-9] The occurrence of spinal fracture in MVA is stated to be 5-6%.[1,10] The victims are predominantly young (mean ages: motorcycle 30.2 years, car 37.8 years) and male (motorcycle 88.9%, car 60.6%).[11]

Well-recognised patterns of spinal injury include compression fracture, burst fracture, seatbelt injury and fracture dislocation.[12] The goals in caring for patients with spine fractures include preserving life, protecting neurologic function, minimizing the risk of further spinal column or neurologic injury; restoring and maintaining the stability of the spine.[13-14]

Progressive deformity of the spinal column following spine injury has been a subject of interest in many publications[13-25] in the last decades. This has also been a factor in the choice between surgical or conservative approach to the treatment of spine column injury.

Spine fracture may be associated with life threatening injuries and in itself may be a cause of prolonged morbidity and significant functional limitation inspite of proper management. The pattern of spine fractures, adequate assessment, treatment modality and timing of treatment constitute some of the determinants of the treatment outcome.

The main aim of this retrospective study is to evaluate the clinical outcome of conservative treatment of closed thoracic and lumbar spine fractures following RTI at UATH Gwagwalada Abuja by measuring the progression in kyphotic deformity.

Patients and Methods

The records of patients seen at the University of Abuja Teaching Hospital, Gwagwalada from 1st January 2008 to 31st December 2008 were reviewed. All patients with thoracic and lumbar spine fractures following RTI were included in this study. Data extracted were age, sex, transport to our facility, time of presentation, duration of treatment, fracture pattern and kyphotic deformity using Cobb angle[26] changes.

Fracture was classified using the Denis' classification[27] and the clinical outcome determined by Cobb angle of

Correspondence to ***Dr. Kawu Ahidjo A,*** *PMB 228, Abuja FCT, Nigeria, Email: ahidjokawu@yahoo.com*

kyphotic deformity changes on serial plain radiograph at index presentation, 6 week, 3 month and 6 month post injury. The results were analysed by means, standard deviation, simple percentages and Chi-square as appropriate using Statistical Package for Social Sciences (SPSS) 17.0 and discussed. A p-value of <0.05 is significant.

Results

There were a total of 16 patients with a mean age of 33.7± 11.4 years (males= 32.4 ± 7.9 years; females= 37.3 ± 8.4 years). The male to female ratio was 3: 1. Majority of the patients were in the age group 14-45 years. This is shown in Table I.

Majority (56.3%) of the patients sustained injury in a commercial bus accident and in the peaked in the month of July (Figure 1& 2). Ten (84.4%) patients presented in the hospital within 7 days of trauma (mean 4.1± 2.4), Evacuation of the patients was done in a majority of cases in a public transportation. Ten (62.7%) patients were transported seated in a salon car, 2(12.3%) on a motorcycle, and the others 4(25.0%) lying flat in a commercial bus. 12(75.0%) patients reported directly to our centre and the 4(25.0%) others had more than one transfer before reaching our centre.

Back pain (100%) was the predominant symptom at presentation and this is depicted in Table II. Figure 3 shows the level of injury in the thoracic and lumbar spine. The type of fracture seen following the injury is shown in Figure 4. The Cobb angle change is depicted in the Table III and the average Cobb angle change is as shown in Table IV.

Duration of hospitalization of the ranged from 1-102 days with a mean duration of 66.8± 24.3 Six (37.3%) patients were lost to follow-up at 3 month of evaluation.

Table I: Age distributions

Age	No
<1 year	0
1-14 years	0
15-44 years	11
45-64 years	3
65 years& Above	2
Total	16

Table II: Presenting complaints

Complaints	No
Back pain	16
Back deformity	10
Loss of Sensation	10

Table III: Cobb angle changes following injuries

Time of Evaluation	Cobb angle	Angle range
At Index	28.3º±7.2º	16º -38º
6Wks	32.5º ±5.6º	18º -42º
3Month	36.2º ±6.4º	24º -46º
6Month	38.1º ±4.9º	26º -48º

Table IV: Average Cobb angle change

Time of Evaluation	Average Cobb angle Change
At Index presentation	Nil
At 6 Wks	4.2º± 1.2º
At 3 Months	7.9º± 3.9º
At 6 Months	9.8º± 4.2º

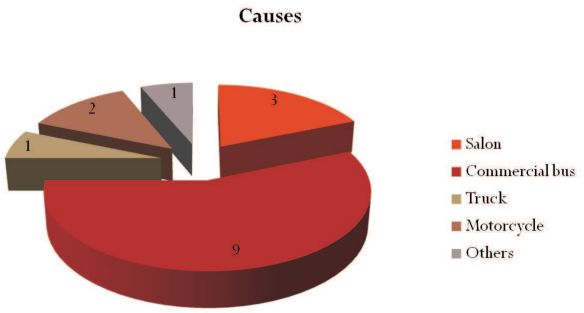

Figure 1: Causes of Injury

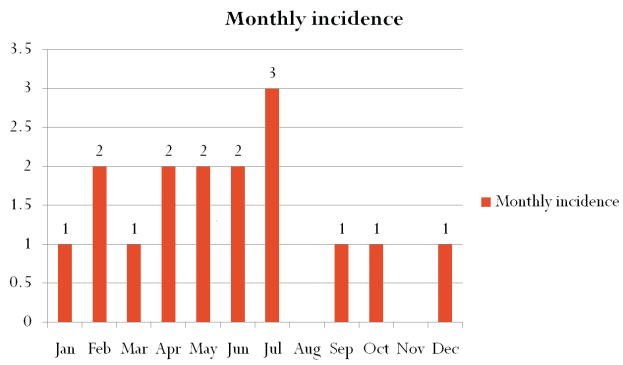

Figure 2: Month of Injury

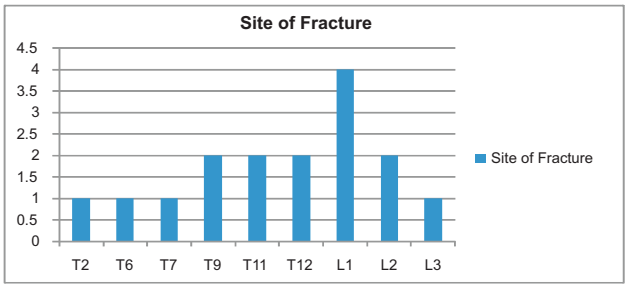

Figure 3: Site of Fractures

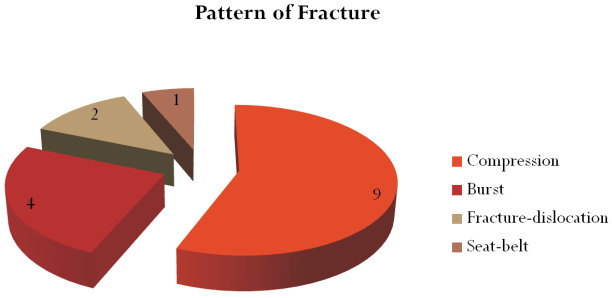

Figure 4: Pattern of fractures

Discussion

The age and sex pattern findings agree with those of other observers[2-11,26-35]. The fractures occurred commonly in victims between 15-44 years, the economically active age groups. In a study by Fine and co-workers[28], the most commonly affected age groups were similar.

The injury incidence peaked during the month of July and August in this study may be attributed to the period of maximal rainfall when the roads are slippery and the driving error may increase due to poor visibility. This was also noted in the findings of Bracken et al.[29] in the United State of America (USA) who reported July as the month of peaked incidence in their study.

Back pain, deformity, loss of sensation of the lower limb, inability to walk and sphincteric disturbance are the predominant symptoms in the thoracic and lumbar fractures. The impaired mobility, incapacitating pain and sphincteric disturbance in an economically active age group probably explains the early presentation as seen in most of the cases.

Commercial bus as a mode of transportation remains the most significant contributor to the RTI this is due to its dependency as a means of transportation in Nigeria. Other factors such as side impact, driving error, rear seat passenger and failure to use a restraint system are also contributing factors. These were also noted in the literature[2-11,25,29-30] reviewed. Nigeria as a developing nation still grapples with bad road, poor vehicle maintenance, careless attitude of our drivers, and poor observance of traffic regulation which contribute to high rate of RTI.

The thoracic spine was the most injured region of the spine but the L1 vertebral had the highest frequency. This agrees with the findings of Holmes et al.[9]. Compression fracture was the most prevalent pattern in this study, constituting 56.2%. In MVA, due to lack of spaces and failure to use the restraint system, the sitting posture serves as a fulcrum where the spine can hyperflex causing anterior column failure leading to compression fracture. This may explained this finding. This agrees with the survey[30,31] findings in Europe and USA.

In this study, progression of kyphotic deformity as measured by the Cobb angle was noted. This agrees with the reviewed literature[13,16,18,21-22,24-25,35-36] that noted similar progression in their studies. The progression of kyphotic deformity average 37.5º at 6 month of evaluation in this study, this average is greater than that defined as focal instability by Denis[27]. Also the incidence of chronic pain would be considerably higher in this subject study as defined in other studies[32-34]. Hence at 6 month of evaluation, the conservative treatment is not satisfactory.

Mode of transportation (p=0.362) at the time of the accident and fracture patterns (p=0.143) were also associated with the outcome Cobb angle measurement. Victims in salon car accident had a better outcome than those in commercial bus at index evaluation. This was however not statistically significant. This may reflect the use of restraint system in the salon car enforced by regulatory body and the higher incidence of driving error associated with the commercial bus as a mode of transportation. Subsequent review did not show any difference between these factors. A larger sample size may probably show the difference.

Similarly, compression fractures (p= 0.086) were associated with better outcome compared to the other fracture patterns [burst (p=0.082), fracture-dislocation (p= 0.078) and seatbelt (p=0.093)]. This may be due to the stable nature of compression fractures as described by Denis[27]. This was however not statistically significant.

Conclusion

This is not an uncommon fracture commonly in economically active age group with a preponderance male population. The peak period of injury is July. Commercial bus as a mode of transportation was responsible for majority of the accident.

The thoracolumbar region was the commonest injured region of the spine and the most prevalent fracture pattern was compression fracture. Progression of kyphotic deformity as measured by the Cobb angle was observed irrespective of the fracture pattern with conservative treatment; hence this treatment modality outcome is not satisfactory.

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