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RESEARCH ARTICLE

PATTERN OF THORACOLUMBAR SPINE FRACTURES IN KASHMIRI POPULATION FOLLOWING FALL FROM WALNUT TREES

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ABSTRACT

Objectives: Aim of this study was to determine the pattern of thoracolumbar fractures due to fall from walnut trees in Kashmiri population.

Patients and methods: 60 patients with history of trauma to spine following fall from walnut trees were included in this study. On arrival to the emergency ward of our hospital the patients were assessed and resuscitated as per ATLS protocol. After admission, the patients were subject to detailed history, thorough physical and neurological examination. X-rays of Thoracic & Lumbar spine were taken to know the level and extent of injury. CT scan was done to know the exact site of injury, fracture geometry and to classify the fractures.

Results: All patients in our study were males with mean age of 37.5 years. The commonest level of vertebral involvement in thoracolumbar junction was L1 (53.33%) followed by D12 (21.67%) and L2 (16.67%) . As per McAfee classification 32 (53.33%) patients had unstable burst fractures, 14 (23.33%) patients had flexion distraction injuries, 10 (16.67%) patients had wedge compression fractures and 4 (6.67%) patients had stable burst fractures. Although most of our patients were neurologically intact, the patients withneurodeficit comprised a good amount of 30% of the cases.Among 60 cases of thoracolumbar spine fractures 27 patients had associated injuries.

Conclusion: Fall from walnut trees constitute a major cause of morbidity in people engaged in this occupation. Proper education, training and newer methods of walnut harvesting should be adopted by Kashmiri people involved in such occupation.

INTRODUCTION

Background

Falls are the second most common cause of injury associated mortality worldwide and an important type of blunt trauma which form a significant percentage of traumatic accidents and emergency department admissions (Thierauf *et al.,* 2010; Goren *et al.,* 2003).The brain, spinal cord and extremities are the most commonly injured organs (Schermer R. Carot). Abdominal and chest trauma are also seen quite frequently (Metz *et al.,* 2004).Approximately 90% of all spinal fractures occur in the thoracic and the lumbar spines. In fact, the majority (60%) of thoracic and lumbar injuries occur within the region between T11 and L2, commonly referred to as the thoracolumbar junction (Louis Soloman, Daniel A. Capen, 1998). In rural areas where the agriculture is at the fore front, falls from trees constitute a different form of falls from height and as some trees possess unique biological features the severity of injury gains intensity like walnut trees (Barss *et al.,* 1984; Tabish *et al.,* 2004). Fall from walnut trees constitutes an important entity that leads to a significant mortality and morbidity amongst those engaged in fruit collection (Baba *et al.,* 2010).In Kashmir, climbing walnut tree to harvest walnuts is an important part of rural life and the means of livelihood. The harvest season falls during the months of September and October (Wani *et al.,* 2013). Walnut is harvested in a crude traditional method that is highly risky (Tabish *et al.,* 2004). The traditional method of harvesting the walnut crop is by climbing the trees usually barefooted and striking at its branches with long sticks, the very length of which necessitates the use of both hands. Attempts are also made to dislodge the fruit by vigorous shaking of the branches (Wani *et al.,* 2013). The fruit is harvested before it attains full maturity, and hence, at a stage when it tends to be attached more tenaciously to the tree which means that more force has to be exerted to detach it (Wani *et al.,* 2013). With such practices, it is not uncommon for the farmers to lose their balance and due to lack of any support, fall to the ground and get injured. Moreover, these farmers are not formally trained or taught any technique of harvest (Wani *et al.,* 2013).

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Patients and methods

This study titled "Pattern of thoracolumbar spine fractures in Kashmiri population following fall from walnut trees" was conducted in the postgraduate department of orthopaedics, Bone and joint surgery hospital, Srinagar, an associated hospital of Govt. Medical College, Srinagar. The study was conducted from July 2012 to October 2013. 60 patients with history of trauma to spine following fall from walnut trees were included in this study. On arrival to the emergency ward of our hospital the patients were assessed and resuscitated as per ATLS protocol. Immobilization on a hard board for suspected thoracolumbar spinal injury was done. After admission, the patients were subject to detailed history, thorough physical and neurological examination. Neurological assessment was carried out according to the Frankel's grading system (1969). X-rays of Thoracic & Lumbar spine both antero-posterior (AP) & lateral views were taken to know the level of injury, extent of injury, kyphotic angle and loss of vertebral height. CT scan was done to know the exact site of injury, fracture geometry and to classify the fractures according to the McAfee classification system.

RESULTS

60 patients who sustained injuries due to fall from walnut trees were included in this study. All patients in our study were males with mean age of 37.5 years (Table 1).

Table 1. Age distribution of patients

Age in years	Number of patients	Percentage
11-20	6	10
21-30	10	16.67
31-40	20	33.33
41-50	18	30
51-60	4	6.67
>60	2	3.33
Total	60	100

The commonest level of vertebral involvement in thoracolumbar junction was L1 (53.33%) followed by D12 (21.67%) and L2 (16.67%) (Table2).

Table 2. Level of Injury

Level of injury	Number of patients	Percentage
D11	2	3.33
D12	13	21.67
L1	32	53.33
L2	10	16.67
L3	2	3.33
L4	1	1.67
Total	60	100

As per McAfee classification 32 (53.33%) patients had unstable burst fractures (Fig 1a to 1c), 14 (23.33%) patients had flexion distraction injuries (Fig 2), 10 (16.67%) patients had wedge compression fractures (Fig 3) and 4 (6.67%) patients had stable burst fractures (Table 3). Although most of our patients were neurologically intact, the patients withneurodeficit comprised a good amount of 30% of the cases (Table 4). Among 60 cases of thoracolumbar spine fractures 27 patients had associated injuries. Upper limb was injured in 5 patients, lower limb in 14 patients, head injury was seen in 3 patients, chest trauma in 2 and abdomen injury was seen in 3 patients respectively (Table 5). Upper limb injuries included 2 cases of fracture dislocation shoulder, 2 cases of colle's fracture and one case of elbow dislocation. Among lower limb fractures 4 patients had calcaneum fractures, 3 pelvic injuries, 2 patients had tibial spine fractures, 3 had femur fractures, and 2 patients had pilon fractures.

Fig. 1a. X-ray dorsolumbar spine Lateral view showing burst fracture

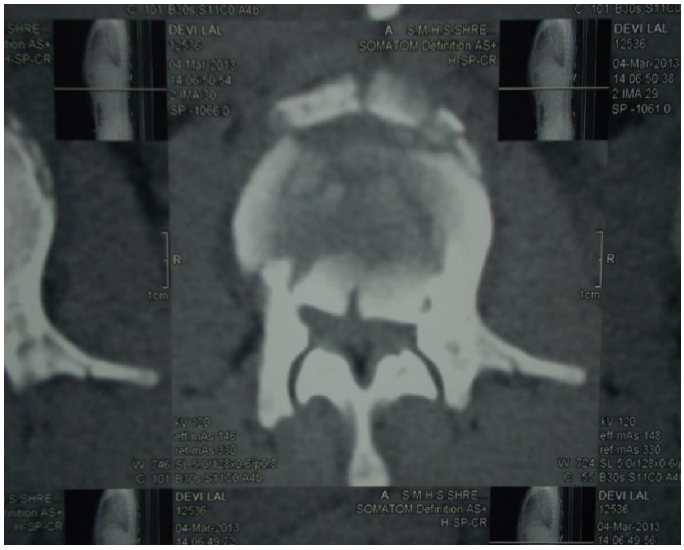

Fig. 1b. CT-scan axial view showing burst fracture

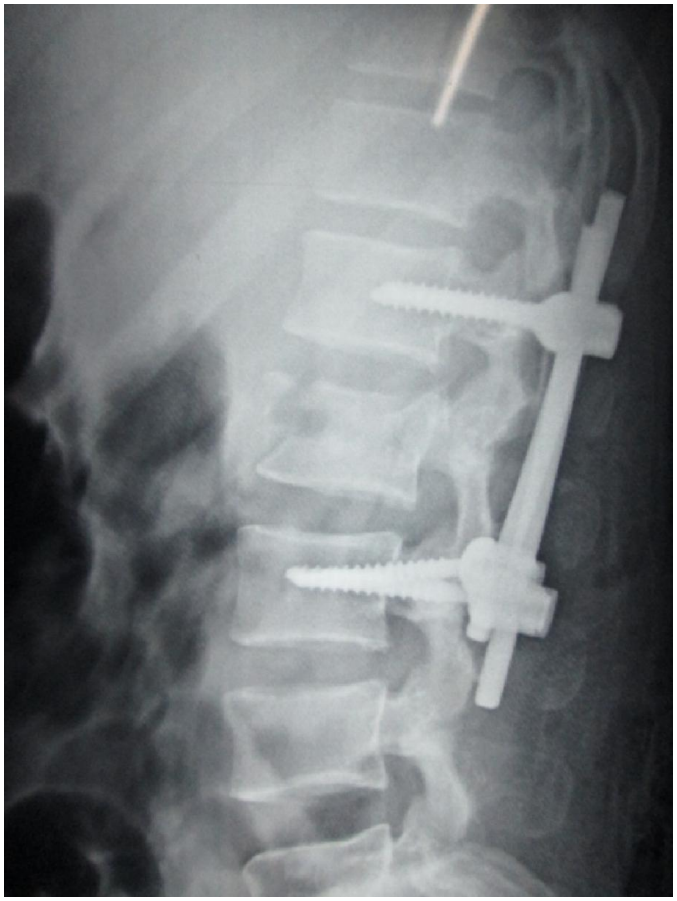

Fig. 1c. Post-operative X-ray of same patient showing restoration of kyphotic angle

Fig. 2. X-ray dorsolumbar spine Lateral view showing Flexion distraction injury

Fig. 3. X-ray dorsolumbar spine Lateral view showing Wedge compression fracture.

Type 3. Type of injury (McAfee classification 1983)

Type of injury	Number of patients	Percentage
Wedge compression	10	16.67
Stable burst	4	6.67
Unstable burst	32	53.33
Chance fracture	0	0
Flexion distraction injury	14	23.33
Translational injury	0	0
Total	60	100

Table 4. Neurological status on admission (Frankel's Scale 1969)

Grade	Number of cases	Percentage
A	2	3.33
B	2	3.33
C	8	13.33
D	6	10
E	42	70
Total	60	100

Table 5. Associated injuries

Fracture dislocation shoulder	2
Elbow dislocation	1
Colle's fracture	2
Fracture shaft of femur	2
Fracture distal femur	1
Fracture tibial spine	2
Pilon fracture	2
Fracture calcaneum	4
Pelvic fractures	3
Abdomen injury	3
Chest injury	2
Head injury	3

DISCUSSION

Falls from trees are most frequent causes of thoracolumbar spine injuries in developing countries like India during harvesting season. Injuries resulting from a fall from a walnut tree are commonly restricted to a particular season usually in harvesting season (Nabi *et al.,* 2009). Farmers or labourers involved in harvesting walnuts are mostly injured. Bajracharya (Bajracharya *et al.,* 2007) in a series of 896 Nepalese patients with spinal injury from a predominantly rural background, reported fall as the cause of injury in 188 patients (21%). Mulford (Mulford *et al.,* 2001) reported 85 patients with a history of fall from palm trees among the 104 patients with palm tree-related injuries; 60.1% of patients had fractures and 16.3% had spinal injuries, with the most common fractures being those of the skull and long bones. *Asif et al.* (Baba *et al.,* 2010) found that most common skeletal injuries in patients due to fall from walnut trees was injuries to spine. Fall from a height of more than 15 meters (m) is associated with severe injuries. The walnut tree, which grows to a height of 15-40 m, may thus be regarded as a source of severe injury to the victims (Baba *et al.,* 2010). The population engaged in walnut cultivation is composed of the young and robust males (Baba *et al.,* 2010). Injuries in this economically productive group in terms of loss of manpower and cost of managing these patients have a profound effect. In addition, the injury, being seasonal, puts a tremendous extra load on the already burdened hospitals of Kashmir. Suleyman Ersoy (Suleyman Ersoy) in a study of 54 patients with history of fall from walnut trees found that fifty (92.6%) patients were males.

Spine region was involved in (44.4%) patients and particularly lumbar area (25.9%) sustained the most of the injuries, among all body parts. Imtiaz Wani *et al* (Wani *et al.,* 2013) in a study of 72 patients found that abdominal injury was present in 17 patients, spleen was most common abdominal organ injured and skeletal injuries were seen in 53 (74%) patients. Patients who fall from walnut tree commonly suffer spine injuries particularly in the form of burst and compression wedge fractures. Spinal injuries have a more destructive influence on clinical outcomes, long-term disability and life quality of patient among all major organ systems although they have a less frequency in trauma victims and especially compression fractures are frequently associated with neurological sequel with increased mortality and long-term morbidity rates (Baba *et al.,* 2010; Suleyman Ersoy *et al.*, Leucht *et al.,* 2009). Wani *et al* suggested measures to prevent the morbidity and mortality attributable to harvesting walnuts (Wani *et al.,* 2013). Cultivation of grafted walnut trees, and gradual phasing out of the seedling origin trees, the grafted variety being dwarf sized and yielding more produce (Wani *et al.,* 2013). Educating the farmers about the proper time of harvest, that is, after the fruit is completely matured (breakage of hulls being an important indicator of the same) (Wani *et al.,* 2013).

Conclusion

Fall from walnut trees constitute a major cause of morbidity in people engaged in this occupation. Proper education, training and newer methods of walnut harvesting should be adopted by Kashmiri people involved in such occupation.

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