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Diagnostic ability of CT in cervical spine injury

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Abstract
Background: Spinal cord injury without radiographic abnormality has been found to occur in 0.08% of adults. The present study was conducted to assess cervical spine trauma in adult population using CT scan.
Materials & Methods: The present study was conducted on 65 patients of cervical spine injury. A careful physical examination was performed and CT scan using Tesla 1.6 (16 slices) was obtained. Frankel grading was followed.
Results: Maximum patients were seen in age group 30-40 years (26) followed by 20-30 years (12), 50-60 years (10), 40-50 years (8), 10-20 years (5) and >60 years (4). The difference was significant ($P< 0.05$). The mechanism of trauma was RTA in 43, violence in 15, fall in 4 and sports injury in 3. The difference was significant ($P< 0.05$). Grade I was seen in 42, grade II in 11, grade III in 10, grade IV in 2 and grade E in none. The difference was significant ($P< 0.05$).
Conclusion: Cervical spine injury demands careful evaluation of functions. CT scan found to be effective in evaluating traumatic injuries to cervical spine.

Keywords: Cervical spine injury, CT scan, Frankel

Introduction
Traumatic injuries account for more than 3.2 million deaths and more than 312 million injured annually worldwide [1]. In the United States of America (USA) more than 60 million people, mostly aged up to 40 years, are victims of traumatic injuries each year. For every death due to trauma there are 19 hospital admissions, 233 medical consultations and 450 emergencies consultations [2]. 7,800 people annually suffer spinal cord injuries due to trauma to the spine, the cervical spine representing nearly half (48.7%) of these victims. In Europe, trauma is also the leading cause of death in people up to 40 years of age. Thus, trauma has been an increasingly frequent focus of studies and investment in both developed and developing countries [3].
Characteristic cervical spine injury patterns which are commonly missed include odontoid, teardrop, facet and hangman's fractures [4]. Despite these common patterns, it has been recognized that even in the absence of fractures, clinically significant instability can exist. Spinal cord injury without radiographic abnormality has been found to occur in 0.08% of adults with blunt cervical spine trauma. When injuries are missed on initial assessment, a delay in diagnosis occurs that puts the patient at risk for progressive instability and neurologic deterioration [5]. The present study was conducted to assess cervical spine trauma in adult population using CT scan.

Materials and Methods
The present study was conducted in the department of Radiodiagnosis. It comprised of 65 patients with cervical neck pain, presence of neurological deficit, reduced level of consciousness, intoxication by alcohol and other illicit drugs and increased tension in the muscles of the neck. All were informed and written consent was obtained. Ethical clearance was obtained prior to the study.
General data such as name, age, gender etc. was recorded. A careful physical examination was performed and CT scan using Tesla 1.6 (16 slices) was obtained. Frankel grading such as grade A: Complete paralysis such as grade B: Sensory function only below the injury level, grade C: Incomplete motor function below injury level, grade D: Fair to good motor function below injury level and grade E: Normal function was followed.

Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table 1: Age wise distribution of patients

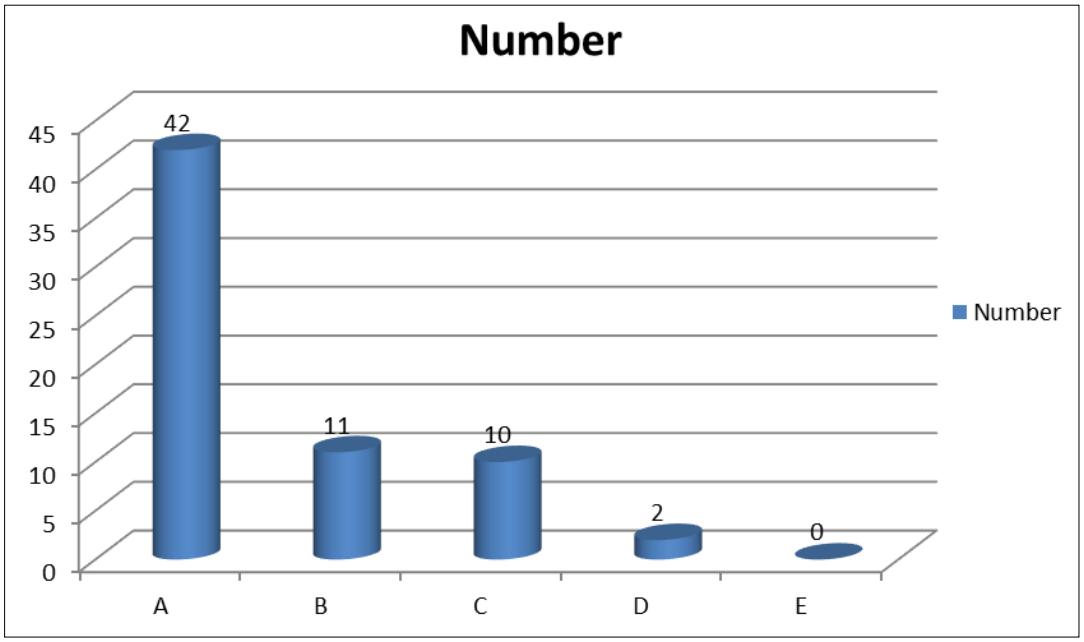
Age group (Years)	Number of patients	P value
10-20	5	0.01
20-30	12	
30-40	26	
40-50	8	
50-60	10	
>60	4	

Table 1 shows that maximum patients were seen in age group 30-40 years (26) followed by 20-30 years (12), 50-60 years (10), 40-50 years (8), 10-20 years (5) and >60 years (4). The difference was significant ($P< 0.05$).

Table 2: Mechanism of trauma

Reason	Number	P value
RTA	43	0.02
Violence	15	
Fall	4	
Sports injury	3	

Table 2 shows that mechanism of trauma was RTA in 43, violence in 15, fall in 4 and sports injury in 3. The difference was significant ($P< 0.05$).



Graph 1: Frankel Grading

Graph I shows that grade I was seen in 42, grade II in 11, grade III in 10, grade IV in 2 and grade E in none. The difference was significant ($P< 0.05$).

Discussion

Current protocols for evaluation of suspected cervical spine injury combine information from the history, clinical examination and radiographic evaluation to predict the presence of instability, identify neurological deficits and guide the need for intervention. During the course of evaluation, patients should be maintained in a supine position with rigid collar immobilization or other stable neutral immobilization, while standard Advanced Trauma Life Support protocols are performed [6]. The immediate clinical examination of the spine should include inspection and palpation of the spine, as well as a complete neurological examination. In addition, a cranial nerve examination should always be performed. Cranial nerve (CN) palsies related to CNs VI, VII, IX, X, XI and XII can occur in association with upper cervical spine injuries [7]. The present study was conducted to assess cervical spine trauma in adult population using CT scan.

In present study, maximum patients were seen in age group 30-40 years (26) followed by 20-30 years (12), 50-60 years (10), 40-50 years (8), 10-20 years (5) and >60 years (4). Schneider *et al.* [8] analyzed the epidemiology, mechanism of trauma, transportation of victims to the hospital, intra-hospital care, indication criteria for CT, diagnosis, treatment and evolution of the victims. The victims were divided into two groups: Group I - without cervical spine injury, Group II - with cervical spine injury. Computed tomography was performed in 1572 (51%) patients, with male predominance (79%) and mean age of 38.53 years in Group I and 37.60 years in Group II. The distribution of trauma mechanisms was similar in both groups. Lesions found included: 53 fractures, eight vertebral listeses and eight spinal cord injuries. Sequelae included: paraplegia in three cases, quadriplegia in eight and brain injury in five. There were seven deaths in Group II and 240 in Group I. The average length of hospital stay was 11 days for Group I and 26.2 days for Group II.

We found that mechanism of trauma was RTA in 43, violence in 15, fall in 4 and sports injury in 3. Grade I was seen in 42, grade II in 11, grade III in 10, grade IV in 2 and grade E in none. Biffl *et al.* [9] found that fifty-two patients were treated with surgery during 2013 and 2014. All patients classified as Frankel A and B developed respiratory failure. Patients classified as Frankel A, B, and C had significantly higher rates for postoperative complications ($P< 0.01$) than patients classified as Frankel D and E, except

for the rate of postoperative infections (p = 0.717). Hospitalization time was also longer in the first group ($p< 0.01$).

Traumatic injury of the cervical spinal cord is an extremely worrying problem in trauma patient care throughout the world due to the high risk of death and severe sequelae that result in serious permanent limitations, both physical, social and professional. In addition, it causes large health system expenditures, both with prolonged hospitalization and treatment [10].

Conclusion

Cervical spine injury demands careful evaluation of functions. CT scan found to be effective in evaluating traumatic injuries to cervical spine.

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