



CWIS Chest Wall Injury Summit 2023

Oral Presentation Abstract Submission

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Title of Presentation CHEST WALL INJURY FRACTURE PATTERNS AND MECHANISM

Background

The amount of research for rib fracture management has expediently increased over the last several years. Yet, there is a paucity of research on mechanism of injury and rib fracture injury patterns. Fracture patterns based on mechanism, age, gender, and other possible correlations may help allocate resources and improve prevention strategies. Evaluation of fracture patterns may have significant implications in care pathways and help development treatment strategies. The Chest Injury International Database(CIID) is the largest prospective repository of the operative and non-operative management of patients with severe chest wall trauma representing 10 trauma centers. Our objective is to evaluate mechanism of injury in rib fracture patients and if there is a distinct rib fracture pattern of injury based on mechanism of injury. Our hypothesis is that specific mechanisms of injury have distinct rib fracture patterns associated with them.

Methods

We analyzed data from CIID to analyze fracture (fx) patterns based on mechanism of injury(MOI). Specifically, we reviewed the records and compared patients injured by different MOI (falls, motor vehicle collision (MVC), motorcycle collision (MCC), auto-pedestrian (auto-Ped), bicycle) and their fracture locations, associated injuries, and patient specific variables. Data was analyzed using Microsoft Excel and SPSS v.25. Heat maps were created to display the fx incidence by rib number and location (anterior(Ant), anterior-lateral(AntLat), lateral(Lat), posterior-lateral(PostLat), and posterior(Post)). The incidence of fx in each of these locations was compared based on MOI. Our primary endpoint is to section the chest wall to match injury mechanism with distribution patterns of injuries.

Results

The study cohort consisted of 1,121 patients with a median RIBSCORE of 2(0-3) and 9,353 fx. They had an average age of 57+/-20 years and 64% were male. MOI, number of patients, and number of fractures was falls (n=474, fx=3,360), MVC (n=353, fx=3,268), MCC (n=165, fx=1,505), auto-ped (n=70, fx=713), bicycle (n=59, fx=507). The most common fx was lateral and the most injured rib was #6. Heatmaps for each MOI are presented as Figure 1. Each cell represents the percent of fractures in each location. Red is higher and blue is lower percent of injury. Statistically significant differences in location and pattern of fracture were identified comparing each MOI except for MCC vs. bicycle.

Conclusion

Different mechanisms of injury result in unique patterns of rib fractures. These differences should be considered in the work-up and management of these patients for thoracic injuries. The mechanism of injury should be independently considered in future studies of non-operative and operative management of rib fractures given the nonhomogeneous distribution of injury locations.