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C2-C3 Traumatic spondylolisthesis of the axis; A comparison between the typical and atypical forms.

Gad J. Velan, MD (Tel Aviv, Israel), Miguel Jimenez, MD (Rochester, MN), Bradford L. Currier, MD (Rochester, MN), Michael J. Yaszemski, MD (Rochester, MN)

INTRODUCTION: This is a retrospective review of the clinical and radiographic features of patients, with traumatic spondylolisthesis of the axis, treated at our institution. The clinical and radiographic features of the typical type, where the fracture line is through the pedicles of the axis, were compared to those of the atypical type with the fracture through the body of the axis.

METHODS AND PATIENTS: The charts and imaging studies of 534 patients treated at our institution for a cervical spine fracture, between 01/01/89 and 12/31/98, were searched for patients with a fracture through the pedicles, the posterior part of the vertebral body or the lateral mass of the axis. Only patients with plain films and CT scans, taken at time of injury, were included. Patient’s charts were studied for circumstances of injury, associated injuries, spinal cord injury, treatment method, and final clinical and radiographic outcome. Fractures were classified based on Levine and Edwards system for traumatic C2-C3 spondylolisthesis and subclassified based on the direction of the fracture line into coronal, oblique, and isolated lateral mass fractures. Comparisons of categorical variables were made with chi-square tests and Fisher’s exact tests (when expected counts were low). Continuous variables (e.g. age) were evaluated using rank sum tests. All statistical tests were two-sided, with the threshold of significance set at alpha=0.05.

RESULTS: Of 534 patients with cervical spine fractures, 37 patients met the inclusion criteria, 25 patients had a fracture through the body or the lateral mass of the axis (atypical group) and 12 had a fracture through the pedicles of the axis (typical group). Average age in the typical group was 31.2 years (Median 23, Range 12-67), and 47.0 years (Median 45, Range 18-94) in the atypical group, this difference was statistically significant (p=0.025). Gender distribution, circumstances of injury, and seatbelt use, were not significantly different between the two groups. 88% (22/25) of the patients in the atypical group and 58.4% (7/12) had associated skeletal and soft-tissue injuries. This trend approached statistical significance (p=0.137). In both groups, none of the patients had spinal cord injury, and in the atypical group two patients had C2 radiculopathy. Treatment outcome was assessed in 11 patients in the atypical group, and 7 patients in the typical group, with a minimal follow-up period of 6
months. In the atypical group 1 patient had C1-C2 fusion, 7 were treated in a halo-vest and 3 in a collar, and in the typical group 3 were treated in a halo-vest and 4 in a rigid collar. All patients in both groups had a successful radiographic union. The numbers of patients with available data regarding pain, neck range of motion and return to work was to small for statistical analysis.

DISCUSSION AND CONCLUSIONS: The atypical form of traumatic spondylolisthesis of the axis occurs in older patients than the typical form. Motor vehicle accidents are the cause of injury in the majority of cases. Skeletal and soft-tissue injuries are frequent and should be sought in every patient at the time of initial evaluation. Neurological injury in these fractures was infrequent. A prospective multi-center randomized controlled study is needed to determine the optimal treatment of choice in these fractures.