

Is Degenerative Scoliosis a Risk Factor for Adult Thoracolumbar Spinal Fractures?

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Objective

Scoliosis is known to be biomechanically less stable than a straight spine. The correlation between spinal fractures and the prevalence of scoliosis has not been demonstrated in the literature. The aim of this study was to investigate if scoliosis is a risk factor for development of spinal fractures.

Methods

A retrospective cross-sectional study was conducted using spinal images obtained from DEXA scans of individuals aged ≥ 40 years to identify spinal fractures. The patients with spinal fractures were divided into two groups; with and without scoliosis. Spinal fracture characteristics and location of spinal fracture (at scoliosis apex, upper end vertebra (UEV) and lower end vertebra (LEV) of scoliosis curve) were described. Risk factors for fractures were analysed using SPSS software. described in detail.

Results

2.9% (203/7075) of the patients were identified to have spinal fractures. The average age of the patients with fractures was 76 (50-97) years old. 33% had scoliosis and 52% had osteoporosis. 89% of the fractures were found in Chinese patients. The average Cobb angle was 16.1° (10 to 40). The most common fracture location was the thoracolumbar junction (56.0%, 148/264). 25.8% (68/264) occurred at T12, while 30.3% (80/264) of the fractures occurred at L1. The prevalence of scoliosis in patients with spinal fractures was 33.2% (67 patients). There was an increased prevalence of spinal fractures at T11 (8.1%) in patients with scoliosis. 52.8% (58) if fracture occurred around UEV, 39.1% of fractures occurred at apex (43) and only 8.2% around LEV (9). Subgroup analysis showed that 54.8% (104/190) of fractures occurred at T12 and L1 in non-scoliotic patients, while 56.8% (44/74) of fractures occurred at T12 and L1 in scoliotic patients. In multivariate analysis, scoliosis (RR=5.37, 95%CI: 3.96-7.28), increasing Cobb angle (21-30o: RR=4.78, 95%CI: 2.63-8.68, 21-30 o: RR=4.95, 95%CI: 1.60-15.27), >30o: RR=6.14, 95%CI: 1.06-35.55), Chinese race (RR=2.64, 95%CI: 1.07-6.55), osteoporosis (RR= 1.68, 95%CI: 1.33-2.12) and increasing age (RR=1.12, 95% CI: 1.09-1.15) were identified as statistical significant risk factors for spinal fracture development.

Conclusion

This is the first report to demonstrate degenerative scoliosis as a risk factor for thoracolumbar spinal fractures development. The average fracture rate in Singaporean adults over 40 years is 2.9%. Patients with Cobb angle over 30o, Chinese race, osteoporotic and increasing age have 6.1X, 2.6X, 1.7X and 1.1X higher risk for thoracolumbar spinal fractures development respectively.