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First rib asymmetry and shoulder imbalance – assessment of first rib index (FRI) in thoracic X-rays of people without scoliosis

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Background

In a previous study we evaluated the predictive value of First Rib Asymmetry (First Rib Index (FRI)) as related to postoperative Shoulder Height Imbalance in Adolescent Idiopathic Scoliosis.

Objective

The present study evaluates a) if shoulder height differences exist in normal people, without scoliosis and b) if such differences are related to First Rib Asymmetry (FRI).

Materials and methods

We studied 73 posteroanterior routine thoracic X-rays in patients with no signs of scoliosis. The difference in shoulder height is measured as the perpendicular distance from the upper surface of the acromial end of the left clavicle and the horizontal level of the upper surface of the acromial end of the right clavicle. Shoulder asymmetry was defined as any value of this distance greater than 1 cm. First rib asymmetry was assessed by the FRI. FRI is the difference between left and right 1st rib radius, measured from the centre of the vertebra of the corresponding level (usually T2) to the most distal point of the rib arch.

Results

We found shoulder height differences in 23 of 73 radiographs (31% of cases), 7 having the right and 16 the left shoulder higher, with a mean difference of 0,4 cm [(-)2,0 - (+) 3,0 cm]. The mean value of the First Rib Index (FRI) turned out to be 0,001 cm [(-)0,4 - (+)1,1 cm]. In 53 cases with FRI < 0.5 cm, 15 had shoulder asymmetry (28%), while in 20 cases with FRI > 0,5 cm, 8 had shoulder asymmetry (40%).

Conclusion

Shoulder asymmetry in Idiopathic Scoliosis is usually related to the presence of a Proximal Thoracic Curve. An interesting observation is that 31% of people without scoliosis may have shoulder asymmetry >1 cm. It appears that beside scoliosis, there maybe other factors resulting in such shoulders asymmetries. This shoulder difference seems to be related to some degree to first rib asymmetry assessed by FRI, a finding also related to idiopathic scoliosis.

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