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The apex vertebrae of the scoliotic curves. Study of their frequency in 11758 cases

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Background and Aim: This descriptive study differs from the usual classification of scoliotic curves according to the segment of the spinal column affected by the misalignment (thoracic, thoracolumbar, and lumbar) but aims to identify the vertebrae that most frequently represent the apex in the scoliotic curves.

Methods: The following inclusion criteria were defined from a database of 8061 subjects classified as scoliotic patients:

- Curves with apexes from T4 to L4 of at least 10 Cobb degrees.
- Males and females
- Age 9-18
- Without previous treatments (brace or specific exercises)

Considering 8061 scoliosis subjects with 4470 single curves, 3485 with double curves (6970 curves), and 106 with triple curves (318 curves), the apical vertebrae of a total of 11758 curves were identified.

Results: The most frequent apical vertebrae in the case of single curves are concentrated in a segment of three adjacent vertebrae (T12 23% - L1 15.5% and L2 14.5%).

In the case of double curves, the most frequent apical vertebrae are concentrated in two pairs of vertebrae. D8 18% and T9 18% for a total of 36% and L1 14% and L2 19% for a total of 25%.

In cases of triple curves, the apexes are concentrated in three groups of vertebrae. In the upper part of the spine, D4 21% - D5 5.6% - D6 6.2% for a total of 33%.

In the middle part of the thoracic portion D8 6.8% - D9 13.1% - D10 8.1% for a total of 28% In the lumbar portion of the spine L1 6.5% - L2 14.4% - L3 8.7% for a total of 30%.

Conclusion: In the case of single curves, in 63% of them, the apex is concentrated in the portion of the spine defined as the thoracolumbar portion and which geometrically corresponds to the middle segment of the spine. Even if the number of thoracic vertebrae is more than doubled in respect to the lumbar vertebrae, the height of the lumbar vertebrae is considerably greater than the thoracic vertebrae and this suggests that the biomechanics underlying the deviations do not consider the number of vertebral segments but their total height.

In the case of double curves, the apexes of the curves are mainly located in the upper and lower portion of the portion defined as the thoracolumbar spine and which corresponds to a sort of curve inversion point. In the case of triple curves, the situation is comparable to cases of scoliosis with double curves. The most frequent apex vertebrae are the same, both in the case of scoliosis with double and triple curves. The curves of the upper portion of the spine seem to be an event that is added to the more typical lower misalignments.