Thoracic pedicle

An anatomic study investigated the thoracic pedicle and its relations. The objective was to emphasize the importance of the thoracic pedicle for transpedicular screw fixation to avoid complications during surgery. Twenty cadavers were used to observe the cervical pedicle and its relations. The isthmus of the pedicle was exposed after the removal of whole-posterior bony elements, including spinous processes, laminas, lateral masses, and the inferior and superior facets. The pedicle width and height, interpedicular distance, pedicle-inferior nerve root distance, pedicle-superior nerve root distance, pedicle-dural sac distance, root exit angle, and nerve root diameter were measured. There was no distance between the pedicle and dural sac in eight specimens. There was, however, a short distance in 12 remaining specimens in the upper and lower thoracic regions. The distances between the thoracic pedicle and the adjacent nerve roots ranged from 1.5 to 6.7 mm and 0.8 to 6.0 mm superiorly and inferiorly at all levels. The mean pedicle height and width at T1-T12 ranged from 2.9 to 11.4 mm and 6.2 to 21.3 mm, respectively. The interpedicular distance decreased gradually from T1 to T5 and then increased gradually to T12. The mean root exit angle decreased consistently from 104 degrees to 60 degrees. The nerve root diameter was between 2.3 and 2.5 mm at the T1-T5 level and then increased consistently from 2.5 to 3.7 mm. All significant differences were noted at $p < 0.05$ and $p < 0.01$. The following suggestions are made based on these results. 1) More care should be taken when a transpedicular screw is placed in the horizontal plane. 2) Improper medial placement of the pedicle screw, especially in the middle thoracic spine, should be avoided, and the anatomic variations between individuals should be considered. 3) Because of substantial variations in the size of thoracic pedicles, utmost attention should be given to the findings of a computed tomographic evaluation before thoracic transpedicular fixation is begun [1)].

Preoperative planning to accurately select and insert the pedicle screw (PS) in adolescent idiopathic scoliosis should be based on the anatomical limitations in the region containing two vertebrae adjacent to the apical vertebra (APEX±1), apical vertebra level, and apical vertebral rotation degree. In APEX±1, the correlation between apical vertebral rotation and the laterality ratio of the pedicle diameter may be useful for pathobiological interpretation of the adolescent idiopathic scoliosis deformity [2)].

1)
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2)
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