ABSTRACT

TITLE: The Anatomical And Radiological Relationship Between The Pars Interarticularis And The Pedicle In The Lumbar Spine – Implications For Pedicle Screw Insertion.

DEPARTMENT: Orthopaedics

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DEGREE AND SUBJECT: M.S Orthopaedics

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OBJECTIVES:

To demonstrate that the lateral border of the pars interarticularis can be used as a consistent and reproducible anatomical landmark between D12 to L4 vertebra to guide pedicle screw placement by studying the relationship between the lateral border of the pars to the medial border of the pedicle.

METHODS:

Inter-pars (IPR) and Inter-pedicular (IPD) distance was measured at all levels between D12 to L4 vertebrae in 5 human cadaveric specimens, 100 plain radiographs, and 50 computerised tomorgram (CT) scans. Mean IPR and IPD was measured by two observers in all the three groups. IPR was measured from the narrowest part of the
right and left pars, and IPD was measured from the medial border of the pedicle at each level. The distance between the lateral border of the pars interarticularis to that of the medial border of the pedicle was derived by dividing the difference of IPR and IPD distance by two at each level (IPR-IPD/2). The mean of IPR-IPD/2 was compared in all the three groups (cadavers, X rays and CT scans) and inter observer reliability was calculated.

**RESULTS:**

The IPR and IPD distance gradually increased from D12 to L4 in all three groups - cadavers, X rays and CT scan. The mean IPR and IPD distance from D12 to L4 in all the groups were 24.2, 25.0, 27.6, 29.5, 32.7 mm and 20.8, 21.7, 22.8, 23.9, 26.1 mm respectively. Assuming that pars interarticularis and pedicle on right and left side are symmetrical in their anatomy and equidistantly placed, the difference of IPR and IPD at each level divided by 2 (IPR-IPD/2) would distance on one side i.e., distance between the lateral border of the pars interarticularis to that of the medial border of the pedicle.

The mean distance from the lateral border of the pars to that of the medial border of the pedicle was found to be 1.9, 1.9, 2.4, 2.9 and 3.5 mm respectively from D12 to L4 which almost remained constant except for a few mm variations which showed that the lateral border of pars interarticularis lies in close relationship to that of the medial border of the pedicle which further help in defining the medio-lateral entry point for pedicle screw insertion.
Key words: Inter pars distance, Inter Pedicular distance, Lateral border of pars and medial border of pedicle relationship, Pedicle screw insertion