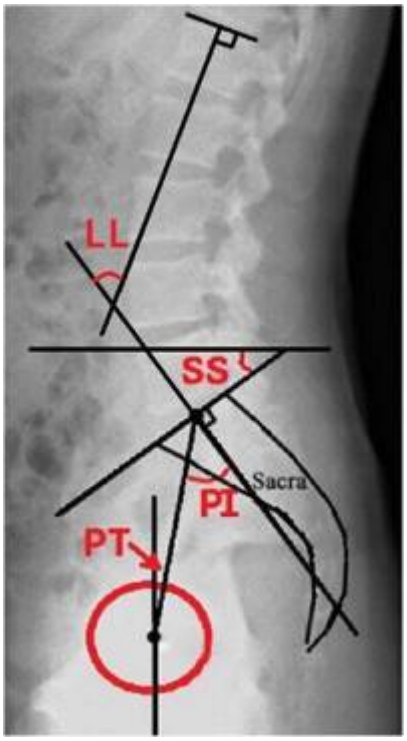
# Lumbar lordosis




Angle between the top of S1 and the top of L1.

Normal 20-40 º

Alignment objective LL = Pelvic incidence +/- 9º

In the spinal regional division, the strong correlation of pelvic incidence and lumbar lordosis has been noted in several studies [1)].

The normal, anteriorly convex curvature of the lumbar segment of the vertebral column; lumbar lordosis is a secondary curvature of the vertebral column, acquired postnatally as the upright posture is assumed when one learns to walk.

Measurement of Spino-pelvic sagittal parameters. Lumbar lordosis (LL) measured using the Cobb angle between the superior endplate of the L1 and S1. The pelvic tilt angle (PT) defined as the angle between a straight line connecting the midpoint of the bilateral femoral head centre to the midpoint of the sacral plate and the plumb line. The pelvic incidence angle (PI) defined as the angle between the perpendicular line of the sacral plate and the line of the midpoint of the superior endplate of S1 joining with the center of the hip axis. The sacral slope (SS) is defined as the angle formed by the upper endplate of S1 and the horizontal plane.

PI: Pelvic incidence

SS: Sacral slope

PT: Pelvic tilt

## Classification

see Roussouly classification.

In the surgical treatment of a spinal deformity, the importance of restoring lumbar lordosis is well recognized.

Smith Petersen osteotomy (SPOs) yield approximately 10° of lordosis per level, whereas pedicle subtraction osteotomies result in as much as 30° increased lumbar lordosis. Recently, selective release of the anterior longitudinal ligament (ALL) and placement of lordotic interbody grafts using the minimally invasive lateral retroperitoneal transpsoas approach (XLIF) has been performed as an attempt to increase lumbar lordosis while avoiding the morbidity of osteotomy.

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The goal of a study from the Mount Sinai Hospital, in New York, was to conduct an evidence-based, quantitative assessment of the correction of lumbar lordosis achieved by each of the three principle lumbar interbody fusion techniques: anterior lumbar interbody fusion (ALIF), lateral lumbar interbody fusion (L-LIF), and transforaminal lumbar interbody fusion (TLIF).

A systematic review of the literature was conducted to identify studies containing degrees of correction of lumbar lordosis achieved by ALIF, L-LIF, and TLIF as demonstrated on standing lumbar x-rays at least six weeks following surgical intervention. Pooled and Forest plot analyses were performed for the studies that met inclusion criteria.

For ALIF, 21 studies were identified with mean correction 4.67° (SD +/- 4.24) and median correction 5.20°. 15 studies were identified that met criteria for forest plot analysis with mean correction 4.90° (SEM +/- 0.40). For L-LIF, 17 studies were identified with mean correction 4.47° (SD +/- 4.80) and median correction 4.00°. 9 studies were identified that met criteria for forest plot analysis with mean correction 2.91° (SEM +/- 0.56). For TLIF, 31 studies were identified with mean correction 3.89° (SD +/- 4.33) and median correction 3.50°. 25 studies were identified that met criteria for forest plot analysis with mean correction 5.33° (SEM+/- 0.27) [2)].

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# Comparison of the amount of lumbar lordosis that can be obtained from various surgical techniques

Technique - Degrees of lumbar lordosis

TLIF/PLIF - < 0 (i.e., kyphosis) up to 2°

LLIF - 1°

ALIF - 6°

Schwab Grade 1 osteotomy (SPO) - 5–10°

Schwab Grade 1 osteotomy + ACR - 16°

Schwab Grade 3 osteotomy (PSO) - 30–40°.

1)
Knott PT, Mardjetko SM, Techy F. The use of the T1 sagittal angle in predicting overall sagittal balance of the spine. Spine J. 2010;10:994–998.
2)
Rothrock RJ, McNeill IT, Yaeger K, Oermann EK, Cho SK, Caridi JM. Lumbar Lordosis Correction with Interbody Fusion: Systematic Literature Review and Analysis. World Neurosurg. 2018 Jul 4. pii: S1878-8750(18)31432-3. doi: 10.1016/j.wneu.2018.06.216. [Epub ahead of print] Review. PubMed PMID: 29981462.