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THE MYTH OF THE SOLID POSTERIOR LATERAL FUSION.
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Assessment of solidity of fusion in failed back surgery (FBS) is a key issue because it represents a surgically correctable source of pain in some cases. Anterior exposure of the vertebral bodies allows for absolutely correct assessment of the presence of motion across a previous posterior lateral fusion (PLF). We measured the amount of motion present between neutral and extension during anterior lumbar fusion in a group of patients with failed back surgery (FBS) and PLF. Templates were used to measure the change in anterior vertebral border interspace height supine in neutral to full extension by raising the operating table kidney rest to the same height for every procedure. We then assessed the specificity and sensitivity of diagnostic techniques used to indicate fusion solidity. From January 1987 to April 1989, 39 patients underwent anterior lumbar interbody fusions (ALIF) for FBS with previous PLF. Seventy-eight previously fused intervertebral segments were evaluated. Preoperative CT scan with multiplanar reconstruction (MPR), lateral flexion extension and AP roentgenograms were reviewed for evidence of pseudarthrosis by a radiologist who had no knowledge of the surgical findings.

Fifty-four levels were evaluated by preoperative CT with MPR. There was a 42% inaccuracy rate in determining the preoperative status of the fusion mass overall. Seventeen levels (31%) were false-negative for pseudarthroses and 6 (11%) were false-positive.

Sixty-seven levels were evaluated by lateral bending x-rays in decubitus with a 36% inaccuracy rate. There were 20 (30%) false-negative and 4 (6%) false-positive pseudarthroses. Fifty of 67 (75%) had motion and 17 of 67 did not at surgery.

Sixty levels were reviewed using AP roentgenograms. There were 44 (73%) found to have motion at surgery and 16 without. There were 24 (40%) false-negative and

7 (12%) false-positive for pseudarthroses totalling a 52% preoperative inaccuracy.

In patients with one year follow up it was noted that three of three who had previous solid PLF at ALIF did not improve at all. Five of 11 (45%) who had revision by ALIF and did not solidify all their fused segments improved significantly. In those who solidified all their non-fused segments 17 of 20 (85%) improved by one or more categories from preoperative state using excellent, good, fair and poor clinical categories. Twelve of 20 (60%) were in the good and excellent categories. This data suggests that small amounts of residual anterior vertebral body motion after PLF is a common cause of FBS despite conventional tests indicating fusion solidity, and that successful repair usually results in significant improvement in carefully selected patients. The role of the solidity of fusions in surgical outcome cannot have been accurately assessed previously since many patients with apparent solid fusions have pseudarthroses. Even posterior exploration may not be accurate as the fusion may be confluent posteriorly and not attached to the vertebral bodies anteriorly.

SINGLE PLANE MIDLINE FLEXION AND EXTENSION
LATERAL TOMOGRAPHY AS A METHOD FOR EVALUATING
THE INTEGRITY OF LUMBAR SPINAL FUSION.
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Standard imaging techniques may fail to establish the presence of a pseudoarthrosis following spinal fusion. Lateral flexion and extension radiographs can be of value but may not show motion when a pseudoarthrosis is present. A simple technique, not previously described in the literature, using a single midline lateral tomogram in flexion and extension has revealed the presence of pseudoarthrosis in difficult cases.

Methods: (1) Standard radiographic equipment used for making tomographic images was employed. (2) A radiologist actively participated in positioning the patients prior to taking each radiograph. (3) Two midline tomographic radiographs were taken of the lumbar spine of each patient in the study, one in flexion and one in extension. (4) Seventy-eight patients at our facility where studied in this fashion.

Results: Lateral flexion and extension tomography revealed motion of fused lumbar spine segments where other studies did not, including standard flexion and extension radiographs. This technique is inexpensive, easy to perform, and requires minimal radiation exposure. It should be considered in patients who exhibit symptoms of instability or pseudoarthrosis.