

# Mini-Open or Percutaneous Bilateral Lumbar Transfacet Pedicle Screw Fixation

## A Technical Note

Kingsley R. Chin, MD,\* Jason Seale, MBBS,\* and Vanessa Cumming, MBBS†

**Study Design:** Case report.

**Objective:** To describe the technique used to place bilateral lumbar transfacet pedicle screws.

**Summary of Background Data:** Transfacet pedicle screw fixation is a growing alternative and biomechanically comparable with traditional pedicle screw fixation. There is no clear description of technique steps for placing transfacet pedicle screws available in the literature, despite recognizing that screw placement is not intuitive even with fluoroscopy, and is dissimilar to placing traditional pedicle screws or translaminar facet screws.

**Methods:** We present 2 illustrative cases where bilateral transfacet pedicle screws were placed for posterior instrumentation after a step-by-step technique that can be used in a mini-open or percutaneous procedure.

**Results:** Postoperatively, both patients had adequately placed transfacet pedicle screws bilaterally on x-ray imaging with 1 patient demonstrating fusion and intact fixation at 11 months follow-up.

**Conclusions:** Transfacet pedicle screws were successfully placed in 2 patients in a stepwise technique described to achieve lumbar fusion.

**Key Words:** stepwise technique description, bilateral lumbar transfacet pedicle screws, lumbar fusion using bilateral transfacet pedicle screws

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From the \*Institute for Modern & Innovative Surgery (iMIS), Fort Lauderdale; and †Society of Facet Surgical Techniques and Technologies Inc., LES Society, Wilton Manors, FL.

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Reprints: Kingsley R. Chin, MD, Institute for Modern & Innovative Surgery (iMIS)/Charles E Schmidt College of Medicine at FAU, 1100 W. Oakland Park Blvd., Suite #3, Fort Lauderdale, FL 33311 (e-mail: kingsleychin@gmail.com).

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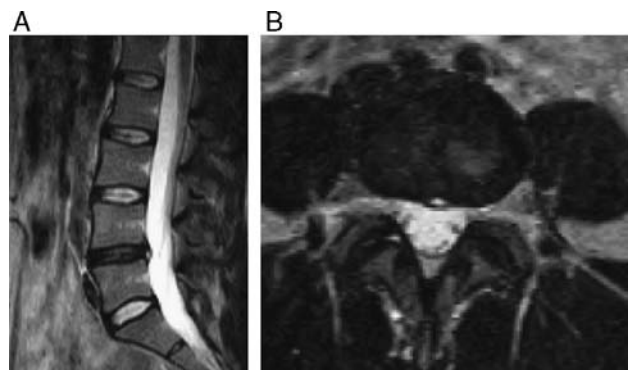
Pedicle screw and rod constructs have been the predominant method for posterior fixation in spine fusion. Facet screw fixation is a growing alternative and has been shown to be biomechanically comparable with pedicle screw fixation.<sup>1–3</sup> The literature is lacking a clear description of technique steps for placing transfacet pedicle screws. Recognizing that screw placement is not intuitive could help avoid the experience of the pedicle screw era when early adoption led to substantial lawsuits around complications,<sup>4</sup> which required amended FDA rules and regulations governing their use.<sup>5</sup> Knowledge of lumbar facet anatomy can be used to provide the anatomic landmarks for placement of transfacet fixation.<sup>6</sup>

Here we describe technique steps used to place transfacet pedicle screws as a guide for surgeons and to assist their understanding of starting points and trajectories on anteroposterior and lateral fluoroscopy.

## MATERIALS AND METHODS

### Illustrative Case 1

A 38-year-old female presented with back pain, right leg pain, and sciatica after a motor vehicle accident 1 year prior. Magnetic resonance imaging revealed a L4–5 central herniated nucleus pulposus with an annular tear and disk desiccation (Figs. 1A, B). A L4–5 discogram was positive. We recommended L4–5 instrumented fusion with percutaneous bilateral transfacet pedicle screw fixation.



**FIGURE 1.** Case 1: Preoperative magnetic resonance imaging; (A) sagittal view showing L4–5 herniated disk, annular tear and disk desiccation; (B) axial view showing L4–5 annular tear and central herniation.

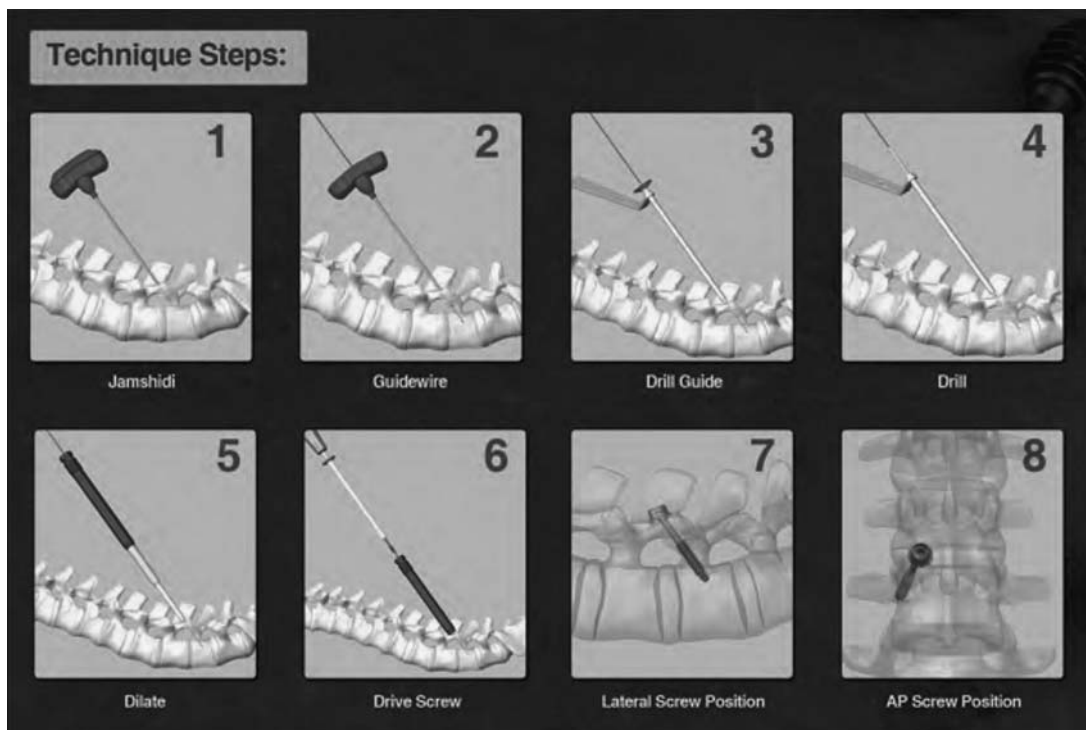


FIGURE 2. Case 1: Summary of the technique steps for placement of transfacet pedicle screws.

**Operative Technique**

The patient was placed prone on a Wilson frame. A midline incision was used for decompression and placement of a L4–5 transforaminal lumbar interbody fusion polyetheretherketone (SpineFrontier Inc., Beverly, MA) interbody cage. The Wilson frame was taken down to restore lordosis. We used a separate 1-inch midline incision just about the L3 spinous process for placement of

2 transfacet pedicle screws (FacetFuse; SpineFrontier Inc., Beverly, MA) as described below (Fig. 2).

Step 1: Started with a Jamshidi needle.

1. The needle was placed on the L4 lamina just medial to the inferior L4 facet.
2. The anteroposterior trajectory was obtained (Figs. 3A, B).
3. The lateral trajectory was located (Figs. 4A, B).
4. A mallet was used to place the needle into position.

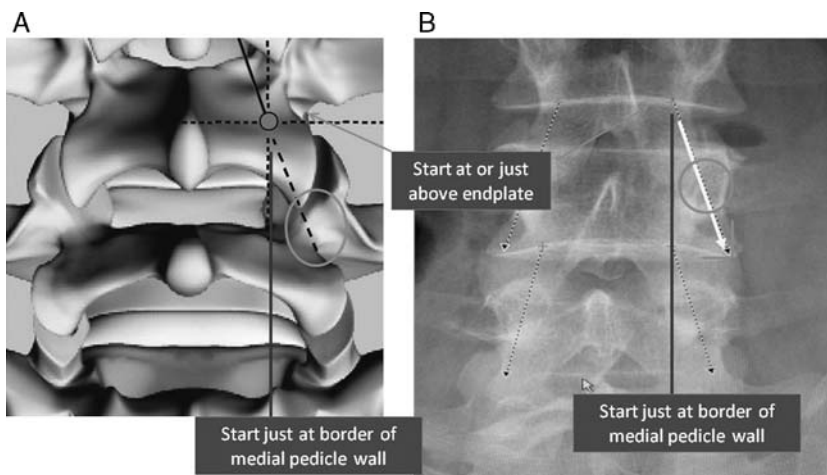
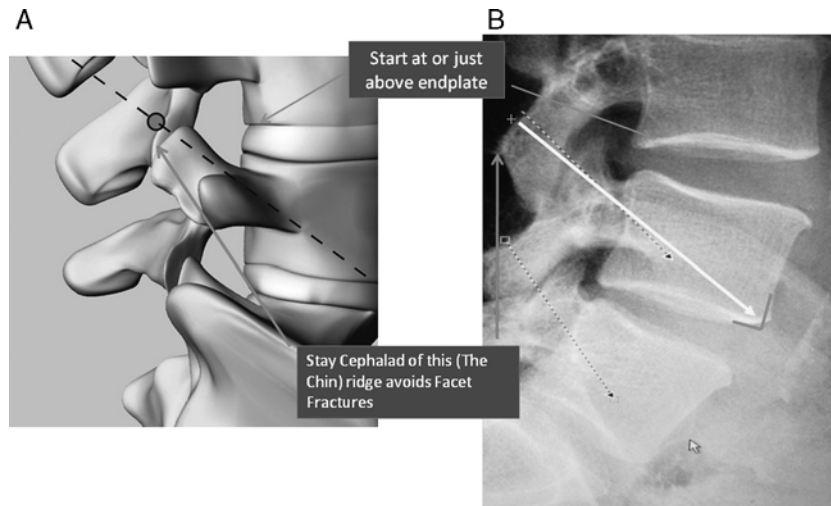


FIGURE 3. Case 1: Illustration (A) and radiographic view (B) of anteroposterior starting locations and trajectories for transfacet screw placement.



**FIGURE 4.** Case 1: Illustration (A) and radiographic (B) view of lateral starting locations and trajectories for transfacet screw placement.

**Step 2: Guidewire.**

The inner needle of the Jamshidi was removed and a guidewire was drilled along the trajectory, identified in step 1, into the vertebral body until approximately 40 mm in depth (Figs. 5A, B).

**Step 3: Drill guide.**

**Step 4: Drill.**

A cannulated drill was used over the guidewire to enter across the posterior vertebral body wall cortex (Figs. 6A, B).

**Step 5: Dilator.**

The dilator was then placed over the guidewire. The screw cannula was inserted and the dilator removed.

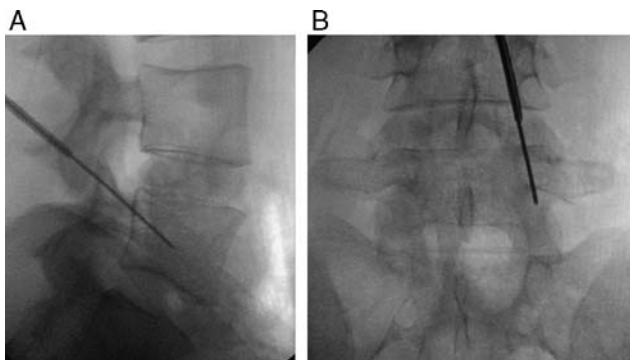
**Step 6:** A 5.5 × 50 mm cannulated screw was then placed.

**Steps 7 and 8:** Fluoroscopy was obtained to confirm accurate screw placement and step 1–8 were repeated for contralateral transfacet screw placement (Figs. 7A, B)

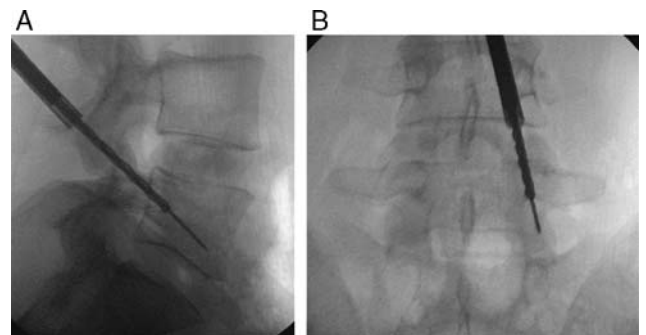
through the same incision (Fig. 8). Postoperative radiograph at 1 week demonstrated satisfactory placement of bilateral facet screws (Fig. 9).

**Illustrative Case 2**

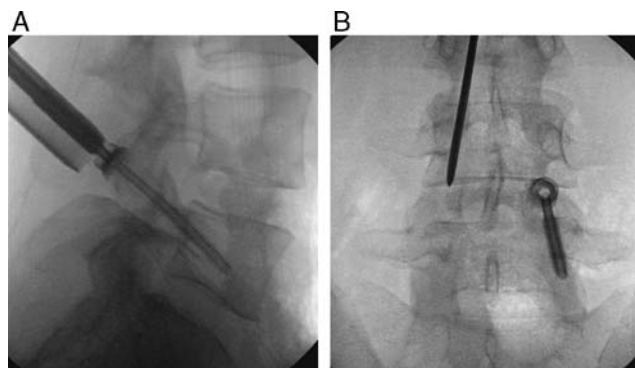
A 61-year-old female presented with a history of prior lumbar surgery, chronic lower back pain, and left leg radiculitis. Magnetic resonance imaging revealed possible L5–S1 hemilaminectomy defect, L4–5 herniated nucleus pulposus with severe L4–5 spinal stenosis, disk collapse at L4–5, and endplate changes at L4–5 (Figs. 10A, B). The patient underwent a revision L4–5 posterior decompression and instrumented fusion with placement of transfacet pedicle screws using an open midline approach, which followed the same steps we have described above.



**FIGURE 5.** Case 1: Intraoperative fluoroscopic images showing guidewire placement on (A) lateral and (B) anteroposterior views.



**FIGURE 6.** Case 1: Intraoperative fluoroscopic images showing drilling over the guidewire on (A) lateral and (B) anteroposterior views.



**FIGURE 7.** Case 1: Intraoperative fluoroscopic images showing (A) lateral view and (B) anteroposterior view of facet screw placement.

**RESULTS**

Postoperative radiographs at 11 months showed intact fixation and evidence of fusion (Figs. 11A, B).

**DISCUSSION**

A successful fusion can be aided by a rigid construct to obtain arthrodesis.<sup>7</sup> The use of interbody cages along with posterior instrumentation works together to increase stability in all directions at the targeted level.<sup>8</sup> With a growing interest in less exposure surgery for the advantages of preserving the anatomy (eg, facets) and decreasing tissue disruption for lumbar surgeries, there has been resurgence in facet screw fixation as an alternative to pedicle screw-rod fixation.<sup>9</sup>

Facet fixation has a long history; King<sup>10</sup> first described placement of a short screw transversely across the inferior border of the lamina through the facet joints for spine internal fixation in 1948. In 1959, Boucher<sup>11</sup> described placement of a longer screw starting obliquely on

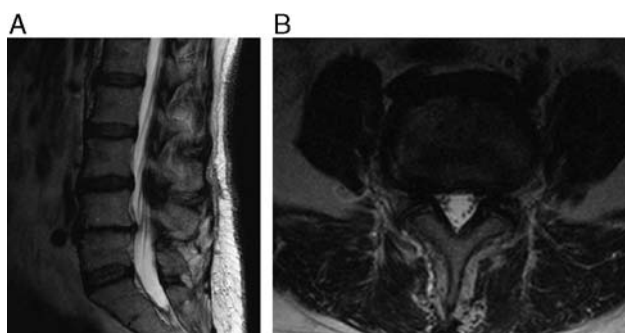


**FIGURE 8.** Case 1: Two 5.5 × 50 mm facet screws placed through 1-inch skin incision.

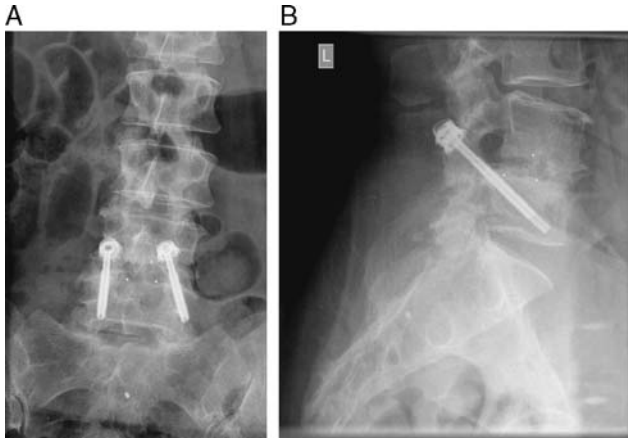


**FIGURE 9.** Case 1: Postoperative anteroposterior radiographic view showing bilateral L4–5 transfacet pedicle screw placement.

the lamina, through the facet joint, and into the pedicle. The Boucher technique described in this report has the advantages of a small midline incision to fix multiple levels with less exposure of the spine, avoidance of the adjacent facets, diminished extensive soft tissue dissection, and decreased blood loss and operative time. In addition, this fixation technique has demonstrated biomechanical equivalence to pedicle screws.<sup>1–3,12</sup>



**FIGURE 10.** Case 2: Preoperative magnetic resonance imaging; (A) sagittal view showing L4–5 herniated disk, L4–5 spinal stenosis, L4–5 disk collapse and end plate edema; (B) axial view showing L4–5 spinal stenosis.



**FIGURE 11.** Case 2: Postoperative radiograph showing L4–5 interbody fusion on (A) anteroposterior and (B) lateral views.

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