

An Innovative Technique for Craniocaudal Pedicle Screw Guidance: A Technical Note

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Summary: In spine surgery, pedicle screw instrumentation is being used very commonly. However, putting pedicle screws in the right place and direction needs the use of image intensifier in 2 orthogonal planes. This consumes valuable time while moving the image intensifier and operating table multiple times during the surgery and also excess radiation exposure. Here, we present a simple technique to apply surgical pearl to angulate the pedicle screws in cephalocaudal direction using simple instrument available on table. This may help in reducing the usage of image intensifier and expedite the procedure.

Key Words: free-hand technique—pedicle anatomy—pedicle screw instrumentation—posterior spinal fixation.

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TECHNICAL NOTE

Pedicle screws are very commonly used for fixation of spine especially the thoracolumbar region because of their biomechanical advantage. Various techniques described are anatomic free-hand techniques or image-guided/navigation techniques with their respective pros and cons.

Pedicle screw entry point in thoracolumbar spine, and is commonly guided by superior articular facet, transverse process,

and ridge of pars interarticularis. With respect to the cranial-caudal orientation, few texts describe targeting the opposite transverse process for keeping the screws parallel to upper end plate.¹ Craniocaudal angulation varies from about 14 degrees cranial to 20 degrees caudal from T1 to S1.^{2,3}

We present a simple technique for guiding this angulation. The patient is placed in prone position with bolsters without any excessive flexion or extension with spinous processes in midline. Standard dissection is performed to expose adjacent laminae, which should be cleared of soft tissues. A small size Langenbeck or 90-degree retractor (Fig. 1A) is placed with the blade flat on the bony surface of adjacent laminae. The pedicle screws are then placed by using pars interarticularis technique. The bone is removed from anticipated entry point using small bone nibbler until pedicle blush is seen and then candle K-wire is put in the direction guided by this technical pearl. The direction of the pedicle screw is usually oriented orthogonal to the retractor blade at various levels (Fig. 1B).

The craniocaudal angulation trick works well in both thoracic and lumbar spine and also in deformity cases where vertebral bodies are not anatomically deformed. It can be used in kyphotic deformities at vertebra above and below the deformity apex (Figs. 2A, B). We do not use this technique in coronal plane deformities and scoliosis. It is difficult to

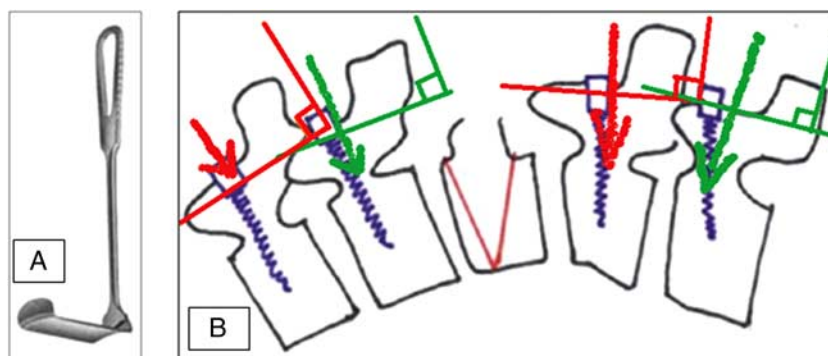


FIGURE 1. A, Simple Langenbeck retractor with retractor handle perpendicular to the retractor blade. B, Illustration of retractor blade applied to adjacent laminar surfaces (represented by lines marked with perpendicular sign) and craniocaudal screw angulation parallel to retractor handle (represented by arrows, the color matches the corresponding retractor representation).

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The authors declare that they have nothing to disclose.

For reprint requests, or additional information and guidance on the techniques described in the article, please contact Sanjay Yadav, MS, DNB, at drsanjay.pgi@gmail.com or by mail at Department of Orthopaedics, Institute of Medical Sciences, BHU, Varanasi-221005, India. You may inquire whether the author(s) will agree to phone conferences and/or visits regarding these techniques.

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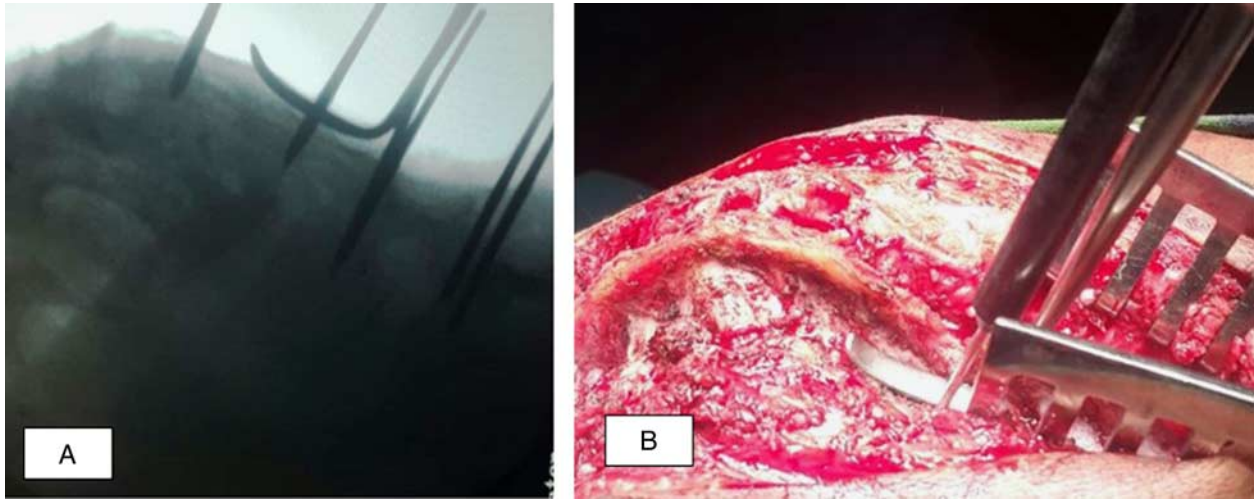


FIGURE 2. A, Intraoperative image showing a small 90-degree retractor placed on lamina and pedicle guide placed perpendicular to retractor blade in a kyphotic deformity below the apex of deformity. B, Clinical image showing lamina cleared of soft tissues and retractor placed on bony surface with pedicle guide wire placed along retractor handle.

apply when the anatomy is disturbed due to degeneration and osteophyte formation and unilateral posterior element injuries like laminar fractures. Prior compression fractures if symmetrical will cause some degree of kyphosis and screws can be directed using this method above and below the fracture levels.

This relatively simple and novel surgical tip accelerates the screw placement and reduces frequent imaging during surgery. It is easy to use and does not require any special instrument. Hence, we suggest it may be used as a guide in craniocaudal pedicle screw angulation.

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