

Percutaneous Image-guided Lumbar Decompression (PILD): Technique, Safety and Clinical Integration



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Objectives

The audience will

- (1) learn the pathoanatomic basis of PILD;
- (2) understand patient selection for PILD;
- (3) see the stepwise technique for safe and effective execution of the procedure (illustrated)
- (4) appraise the safety data and methods to integrate PILD into practice

Methods/Materials

This presentation is based on a comprehensive literature review of, and personal experience with, the PILD procedure.

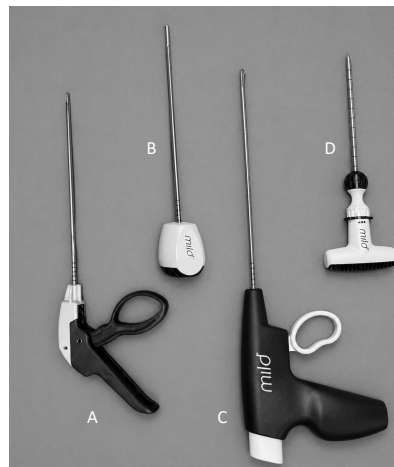
Pathoanatomic basis

Lumbar spinal stenosis (LSS) is a common age-related cause of back pain, neurogenic claudication, and impaired daily function. These patients represent an ever-growing population. These symptoms are often treated with epidural steroid injections (ESI). When injections fail, some patients face limited options because open surgery may be premature, medically risky, or undesired.

INSTRUMENTS

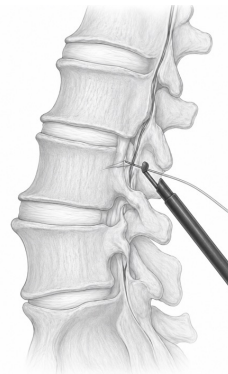
The instruments of the procedure are imaged to the right. From left to right, the instruments are:

- (A) Bone Rongeur
- (B) Bone Auger
- (C) Soft Tissue Sculptor
- (D) Access trocar



Interlaminar access, bone rongeur

In a contralateral oblique view (CLO) the bone rongeur is engaged with the inferior surface of the L2 lamina in the L2-3 interlaminar space. A 21-gauge needle is also illustrated as it is used for epidurogram.



Pathoanatomic basis (cont'd)

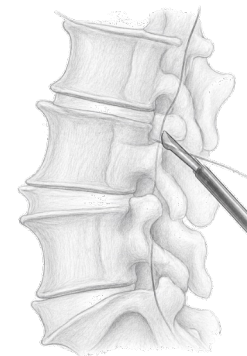
PILD, also known commercially as MILD®, has emerged as a minimally invasive outpatient treatment for selected patients. Its rationale centers on hypertrophied ligamentum flavum (LF), an extradural structure that can substantially narrow the central canal. By fluoroscopically debulking obstructive osseous and soft tissue, PILD aims to relieve neural compression while limiting tissue disruption.

Patient selection

CMS National Coverage Determination describes PILD as a treatment for patients with symptomatic LSS that has failed conservative therapy. A specified timeline or length of conservative therapy is not designated. There is not a required number of ESIs the patient needs to trial before this procedure. It is ultimately in the clinician's best interest to be patient-centered and carefully base patient selection on both clinical findings of neurogenic claudication and imaging findings of thickened LF LSS.

Technique

Patient is positioned prone. The targeted level is localized with a 21-gauge needle on the frontal view. Some operators use this needle to perform an epidurogram but not necessary. The image intensifier is then rotated to a contralateral oblique (CLO) view to visualize the laminae of the targeted level. Make a stab incision midline. Insert the access trocar needle and advance it to the superior aspect of the lamina of the lower vertebra at the targeted level.



Soft tissue Sculptor

With interlaminar access cleared from the rongeur, the tissue sculptor is advanced and, in a scooping motion, debulks the LF. This is done typically three times. Debulking is done until tactile feedback gives a "falling through" feeling.

Technique (cont'd)

With the trocar needle well positioned, remove the stylet and insert the bone rongeur. The rongeur should be open as it is advanced. Under live fluoroscopy open the rongeur and if engaged with the superior lamina apply pressure on the external handle inferiorly (and vice versa).

With bone cleared and enough space for the tissue sculptor, advance the sculptor as depicted in the image above. Then when at the LF, move the sculptor superiorly in a scooping motion. After 1-3 motions, remove the device and clear the soft tissue and repeat if determined necessary.

While not necessary in some cases, the prudent operator would repeat these steps on the contralateral side even if symptoms are unilateral as in some cases bilateral symptoms are masked by one side more symptomatic than the other.

The contralateral side can often be treated through the same midline stab incision. Another level either above or below, can in some cases be reached from the first and only stab incision as back skin is loose.

When determined complete, remove all instruments and hold pressure until hemostasis is reached. Manage the stab incision(s) similar to that from a vertebral augmentation.

Safety, efficacy and integration into practice

Safety

PILD has been classified as a low risk procedure in most selected patients. PILD has been found to have a safety profile comparable to ESI. In the landmark MiDAS ENCORE RCT (PMID: 27228511) there were 1.4% adverse PILD events and 2.2% adverse ESI events. No adverse events were reported in the MOTION RCT (DOI: 10.1093/pm/pnac028) of 138 patients. That said, real-world adverse events warrant ongoing surveillance as the procedure is adopted on a larger basis.

Efficacy

At 1-year follow-up, Mekhail et al. (DOI: 10.1111/j.1533-2500.2012.00565.x) durable results of an increased mean walking distance from 246 feet pre-PILD to 3,956 feet post-PILD. At 5-year follow-up of 75 PILD patients, 88% of patients had no subsequent surgical intervention.

Integration into practice

The addition of PILD is a natural extension for practices that already perform ESI and/or vertebral augmentation. The resources utilized are very similar to those procedures. The image-guided anatomical landmarks and required skill match those needed for both procedures as well.

Disclosure

Dr. Eugene Paik serves as a paid consultant to Stryker, outside of this work. Stryker had no role in the study design, data collection, analysis, manuscript preparation, or decision to submit.

AI Use

During the preparation of this work, the author used ChatGPT-5.5 Thinking in order to assist condensing and organizing text. This tool created the illustrations from fluoroscopic images. After using this tool, the author (PL) reviewed and edited the content as needed and takes full responsibility for the content of this work.

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