

MID-TERM CLINICAL OUTCOMES FOLLOWING PRONE TRANSPSOAS (PTP) SURGERY

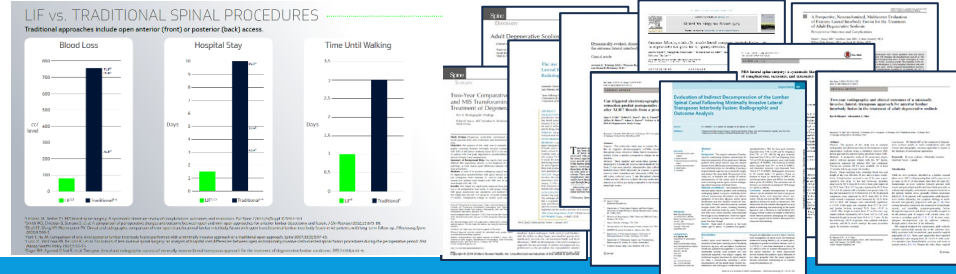
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BACKGROUND

The lateral transpsoas interbody fusion (LIF) approach is well validated.



• MIS BENEFITS:

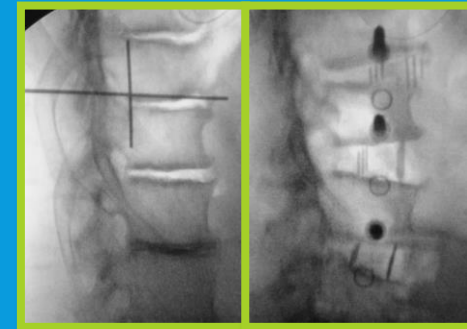
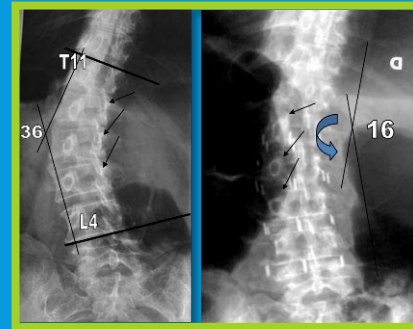
- Low blood loss, quick recovery
- Good short- and long-term results^{1,2}

• BIOMECHANICAL ADVANTAGES:

- Inherently stable³ via large footprint
- Optimized fusion environment (stability, loading, surface area⁴)
- Ligamentotaxis (also assists with indirect decompression^{5,6})

• ALIGNMENT ADVANTAGES:

- Powerful coronal correction⁷
- Modest sagittal correction⁸
- ALL release (ACR) allows for more⁹



¹Goyal A, et al. Clin Neurol Neurosurg 2018;167:122-8.

²Lehmen JA, et al. Eur Spine J 2015;24(Suppl 3):S287-313.

³Pimenta L, et al. Sci World J 2012;3:81814.

⁴Tatsumi R, et al. Eur Spine J 2015;24 Suppl 3:372-7.

⁵Elowitz EH, et al. Minim Invasive Neurosurg 2011;54(5-6):201-6.

⁶Oliveira L, et al. Spine 2010;35(26 Suppl):S331-7.

⁷Phillips FM, et al. Spine 2013;38(21):18531.

⁸Sembrano JN, et al. Int J Spine Surg 2015;9:16.

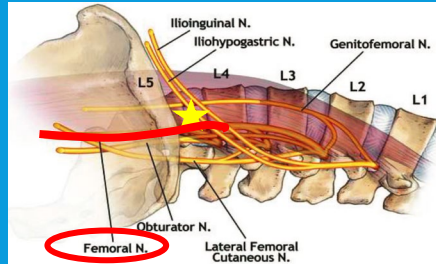
⁹Akbarnia BA, et al. J Spinal Disord Tech 2014;27:29-39

BACKGROUND

Yet LIF still not widely adopted due to a variety of challenges.

NEURAL COMPLICATIONS?

- Sensory: 16 - 36%¹
- Motor: 1.6% -5.1%¹



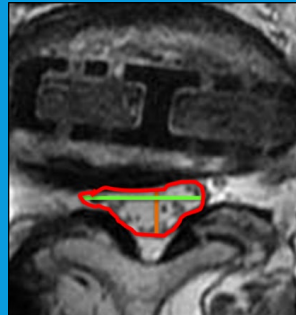
SAGITTAL ALIGNMENT?

Under-correction in lateral decubitus⁴



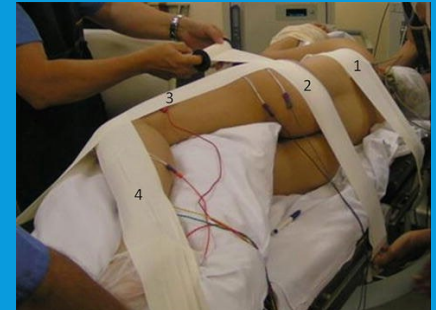
INDIRECT DECOMPRESSION?

Effective^{2,3} but in which cases?



HASSLE?

- Initial positioning⁵
- Repositioning^{5,6} for
 - pedicle screws
 - direct decompression
 - Osteotomies
 - L5-S1



¹Lehmen JA, et al. *Eur Spine J* 2015;24(Suppl 3):S287-313.

²Oliveira L, et al. *Spine* 2010;35(26 Suppl):S331-7.

³Elowitz E, et al. *Minim Invas Neurosurg* 2011;54:201-6.

⁴Siljanderr B, et al. *Spine J* 2019;19(9S):S33.

⁵Tohmeh AG, et al. *Scientific World J* 2012;2012:263637.

⁶Drizin D, et al. *BioMed Research International* 2015;2015:458284.

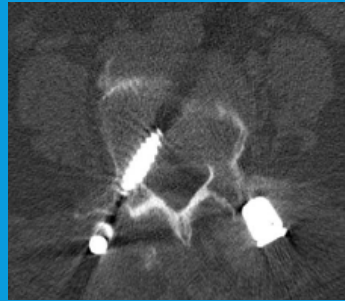
BACKGROUND

Trend had been toward lateral “single-position surgery” (i.e., anterior and posterior column work all in the lateral decubitus position) in order to avoid flip time. This strategy addresses only the repositioning hassle, not other issue...

↑ NEURAL COMPLICATIONS?

Risk to plexus same

↑ Risk during pedicle screw placement¹

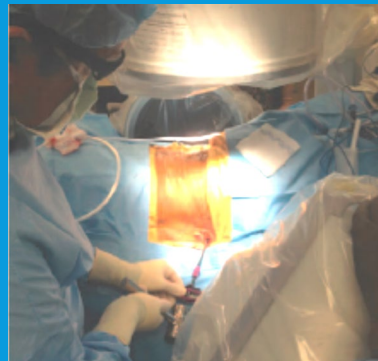


↓ ALIGNMENT?

- Limited to short-construct MIS
“Not recommended for more than two levels, small or dystrophic pedicles, or in cases of morbid obesity”²
- Not usually combining more complex procedures like releases, osteotomies

INDIRECT DECOMPRESSION?

Uncommon/difficult to perform *direct* decompression in lateral position



↑ HASSLE?

Placement of pedicle screws while in lateral decubitus

- Not easy, ↑ time / effort
- Down-side screws difficult, risk misplacement, sterility issues
5.1% breach rate, 2.8% requiring reoperation for misplaced screws¹

¹Blizzard DJ, et al. *Spine* 2018;43(6):440-6.

²Drazin D, et al. *BioMed Res Inter* 2015;2015:458284.

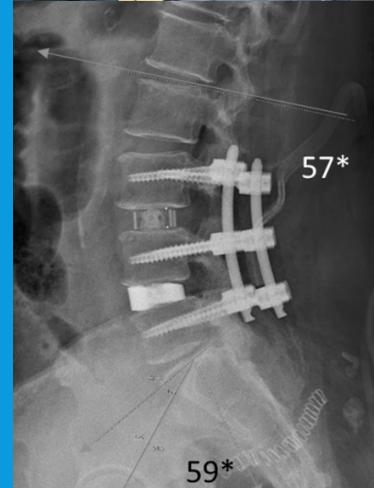
OBJECTIVE

Prone transposas (PTP) approach is also “single-position” access to anterior and posterior columns without need for flip/repositioning. In addition...

- ✓ Common, familiar, straightforward initial positioning
- ✓ Increased lordosis gains via prone positional effect^{1,2}
- ✓ Allows for advantages of lateral interbody work
 - MIS interbody approach
 - Large, stabilizing implant; optimized fusion environment
 - Naturally lordosed disc space facilitates powerful segmental correction
- ✓ Accommodates concomitant posterior procedures, as needed
 - Pedicle fixation (MIS or open; short or long constructs)
 - Direct decomp (central stenosis, locked facets, facet cysts)
 - Releases for enhanced alignment correction
 - L5-S1 P/TLIF

¹Harimaya K, et al. *Spine* 2009;34(22):2406-12.

²Benfanti PL, et al. *Spine* 1997;22(19):2299-303.



OBJECTIVE

There have been several publications already on PTP¹⁻¹⁰, but primarily limited to...

- ✓ Technique description
- ✓ Feasibility
- ✓ Short-term outcomes
- ✓ Small series

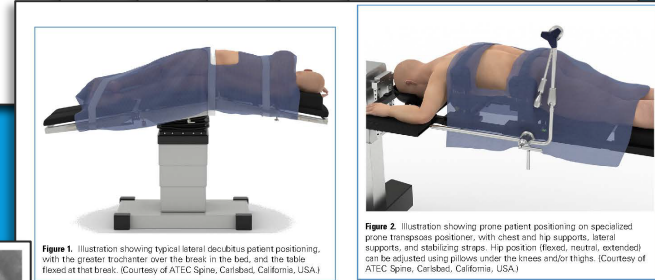
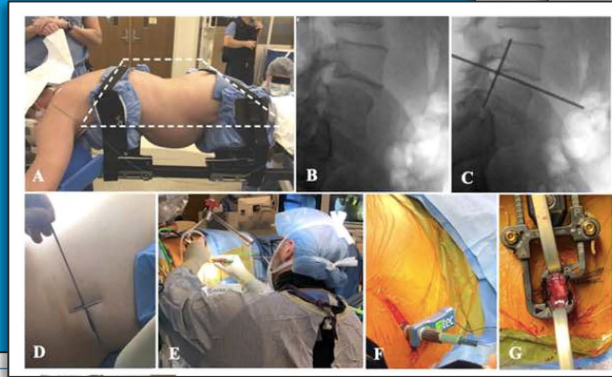
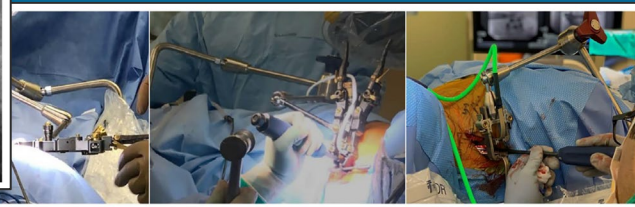


Figure 1. Illustration showing typical lateral decubitus patient positioning, with the greater trochanter over the break in the bed, and the table flexed at that break. (Courtesy of ATEC Spine, Carlsbad, California, USA.)

Figure 2. Illustration showing prone patient positioning on specialized prone transpositional positioner, with chest and hip supports, lateral supports, and stabilizing straps. Hip position (flexed, neutral, extended) can be adjusted using pillows under the knees and/or thighs. (Courtesy of ATEC Spine, Carlsbad, California, USA.)



Figure 2. Two-bladed retractor and table-attached retractor support. (A) Closed retractor. (B) Open retractor. (C) Table-attached retractor support.



¹Pimenta L, et al. *Eur Spine J* 2021 Jan;30(1):108-113. ²Pimenta L, et al. *Oper Neurosurg* 2020 Dec 15;20(1):E5-E12. ³Pimenta L, et al. *World Neurosurg* 2021 May;149:e664-e668. ⁴Smith TG, et al. *World Neurosurg* 2021 May;149:e705-e713. ⁵Smith TG, et al. *N Am Spine Soc J Mar* 4;6:100056. ⁶Stone LE, et al. *N Am Spine Soc J* 2021 Feb 19;6:100053. ⁷Soliman MAR, et al. *World Neurosurg* 2021 Aug 28;S1878-8750(21)01274-2. ⁸Soliman MA, et al. *Clin Neurol Neurosurg* 2021 Dec 28;107105. ⁹Tohmesh A, et al. *Eur Spine J* 2022 May 9. Online ahead of print. ¹⁰Wang T, et al. *Eur Spine J* 2022 May 19. Online ahead of print.

METHODS

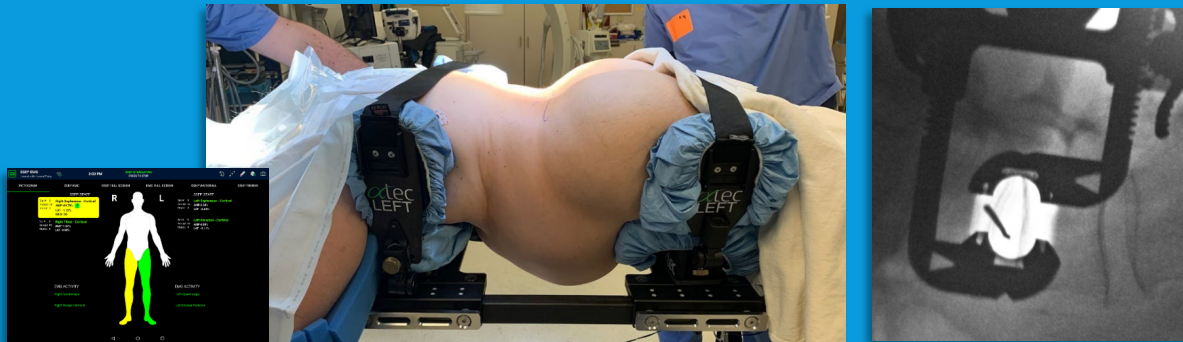
Single-center retrospective review of prospectively collected registry data.
All PTP procedures performed using saphenous SSEP lumbar plexus monitoring.

▪ 110 patients

- 59% female
- Average age: 64 yrs (range: 26-84)
- Average BMI: 31 (range: 18-51)
- Comorbidities
 - Diabetes 27%
 - Smoking 11%

▪ 170 levels

- Average 1.55 levels / patient
- Range 1-5 levels / patient
- 76% inclusive of L4-5
- Posterior fixation 1-7 levels / patient
- 44% included direct decompression



RESULTS

Single-center retrospective review of prospectively collected registry data.

- OR time averaged 146 minutes
- Blood loss averaged 47 cc
- Length of stay averaged 2.3 days
- Post-op hip flexion weakness 10.9%
- New quadriceps weakness 6.3%
- New sensory thigh deficits 10.9%

Complications:

- Cage repositioning (3)
- Partial ALL rupture (1)
- Durotomy (1)
- Epidural hematoma (1)
- Posterior wound infection (1)
- Pseudarthrosis (1)

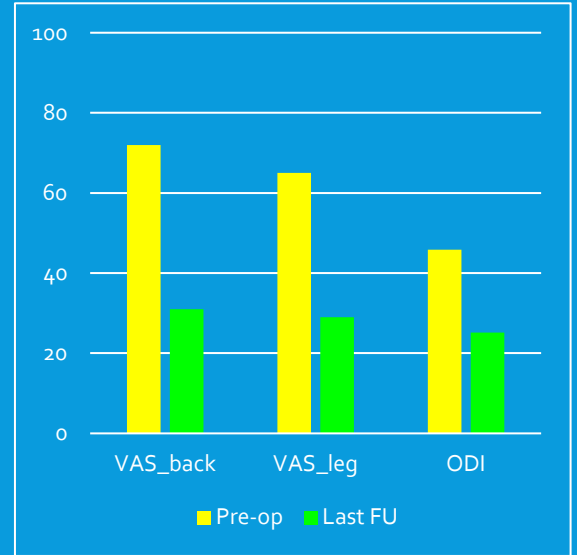
Secondary surgeries:

- Adj level decompression (2)
- Pseudo revision (1)
- Evac epidural hematoma (1)

@ Last follow-up

(ave 9 mo, range 1-30):

- Back pain improved by 57%*
- Worst leg improved by 55%*
- ODI improved by 45%*
- 88% of patients claimed to be “improved”
- 85% were “satisfied”
- 84% would elect the surgery again



CONCLUSION Large-cohort single-center series of prone transposas (PTP) showed good mid-term results, consistent with this surgeon’s prior lateral decubitus LIF experience.