

Technical Note

How to perform the Wiltse posterolateral spinal approach: Technical note

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Abstract


Background: The paraspinal, posterolateral, or Wiltse approach is an old technique that observes the principles of an MIS procedure. The aim of this study was to provide a step-by-step description from the literature of the Wiltse paraspinal approach and analyze its main advantages and limitations.

Methods: Here, we provide a step-by-step description of the Wiltse approach. Utilizing PubMed and Lilacs and the Mesh terms “Wiltse approach,” “paraspinal approach,” “muscle sparing approach,” and “lumbar spine,” we identified 10 papers. We then put together, based on these publications, a step-by-step analysis of the preparation, patient positioning, skin incision, fascial opening, dissection, bone identification, retractors, deperiostization, decompression, discectomy, instrumentation, arthrodesis, and closure for the Wiltse technique.

Results: Most papers underscored the minimally invasive aspects of the typical Wiltse approach. Advantages included minimal intraoperative bleeding, a shorter hospital length of stay, and a low infection rate.

Conclusion: The classical approach described by Wiltse is essentially minimally invasive, sparing both the muscle planes and soft tissues, allowing for ample far lateral lumbar decompression, including discectomy and fusion, with a low complication rate.

Key Words: Lumbar spine, minimally invasive spine surgery, muscle sparing approach, paraspinal approach, Wiltse approach

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BACKGROUND

This study provides a step-by-step analysis of the Wiltse paraspinal approach, along with its pros and cons.

This is an old technique described originally in 1968. In 1988, Wiltse described additional changes to the posterolateral approach to further access foraminal lumbar disc herniations, spinal stenosis, and spondylolisthesis. This procedure additionally provided access for the removal of spinal tumors and for performing posterolateral fusions, including pedicle screws.^[7,8]

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MATERIAL AND METHODS

For the period between 1968 and 2016, we utilized PubMed and Lilacs and the Mesh terms “Wiltse approach,” “paraspinal approach,” “muscle sparing approach,” and “lumbar spine” to evaluate the Wiltse procedure.

We then analyzed the pros and cons of the Wiltse approach along with the following technical details: patient preparation, incision, fascial opening, dissection, bone identification, retractors, deperiostization, decompression, discectomy, instrumentation, arthrodesis, and closure.

Surgical technique

Multiple steps in the Wiltse surgical technique were assessed including preparation, positioning, incision, fascial opening, dissection, bone identification, retractors, deperiostization, decompression, discectomy, instrumentation, arthrodesis, and closure.

These procedures should be performed under neurophysiological monitoring (e.g., continuous EMG, triggering, and selective radicular stimulation), and somatosensory evoked potential monitoring. In addition, anesthesia should utilize total intravenous anesthesia (TIVA). The steps for performing this procedure are outlined in Table 1. The patient is placed prone and a lateral X-ray is obtained. Bilateral access is provided thorough a midline skin incision or two paravertebral incisions [Figure 1]. A lateral vertical incision is made approximately 3–4 cm lateral to the spinous processes at the correct level, and the fascia is opened longitudinally [Figure 2].^[2,4]

1. Using blunt dissection, the medial multifidus is then separated from the lateral longissimus muscle. At the L5-S1 this exposure may be hampered by the distal insertion of the multifidus muscles [Figure 3]
2. The junction of the facet joint and the transverse

processes are then identified. A Bertola tweezer is then placed for radiological confirmation of the level [Figure 4]

3. A Quadrant® (Medtronic) or Meyerding retractor then facilitates exposure, which includes removal of the periosteum from the hemilaminae to the base of the

Table 1: Steps of the Wiltse approach

Step	Comments
Preparation	TIVA for anesthesia Neuromonitoring
Positioning	Prone position, all support areas padded. In case of fusion hip extension helps to increase lordosis
Incision	Midline skin incision for better cosmesis. Two paravertebral incisions allows bilateral simultaneous work and makes the procedure shorter
Fascial opening	Superficial and deep fascias are opened longitudinally
Muscle dissection	Blunt separation of the medial multifidus and lateral longissimus
Bone identification	Identify the transverse process by palpation before deperiostization to avoid excessively deep approach. Check vertebral level on X-ray
Retractors	4 blade retractors or Meyerding retractors are used. Reduce muscle traction when retractors are not needed
Deperiostization	In fusion cases it is important to dissect bluntly the cephalad facet capsule to decrease the ASD
Decompression	Perform as in midline approach, just need to change the angulation
Discectomy	Easy access to extraforaminal and foraminal portions of the disc space, so it is not difficult to insert TLIF cages
Instrumentation	Pedicle screws need more convergence. This screw position it is better against pullout and the screw heads go deeper than in midline approach
Arthrodesis	High speed bur it is used to prepare the intertransverse - pars - facet bone bed to insert the graft
Closure	Drains usually not needed. Both fascias are closed with running stitches. It is important to close the superficial fascia with the subcutaneous tissue to avoid seromas. Skin is then closed with an intradermic suture

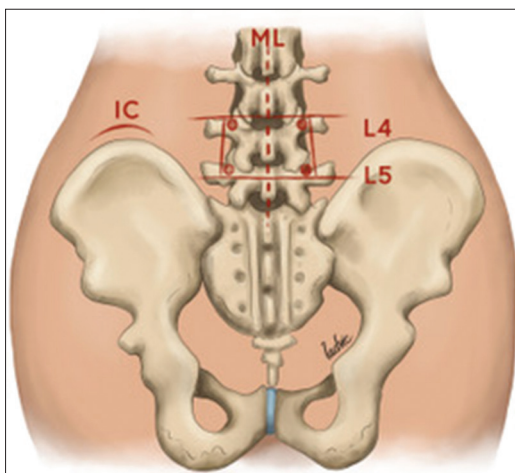


Figure 1: Note the skin marking with AP radioscropy following the pedicle line of the levels to be treated. IC: Iliac crest, ML: Midline

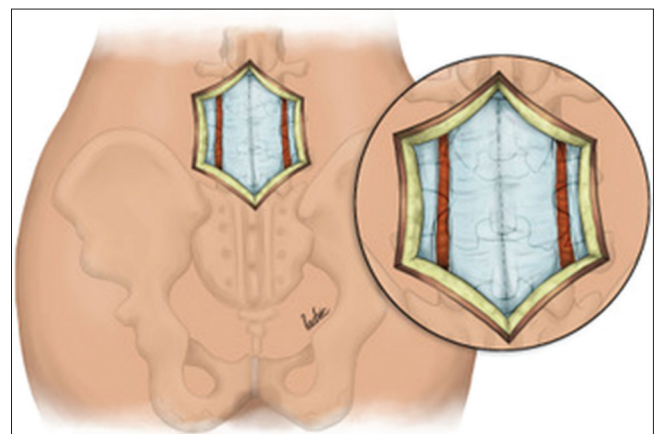


Figure 2:The drawing shows the midline skin incision and the two paravertebral fascia incisions. The opening of the superficial and deep fasciae exposes the musculature

Table 2: Principal variables analyzed in each paper showing similarities and differences

Author/date	Design	Methods	Conclusion	Limitation
Fraser <i>et al.</i> 1993	Case series	52 patients, 3 years of follow up.	Safe and useful for decompression and fusion	No group control, no clinical outcomes reported
German <i>et al.</i> 2005	Review	Literature and authors clinical experience were reviewed about benefits of MIS on painful lumbar motion segment	MIS lumbar fusion techniques were beneficial to limit soft tissue morbidity	Literature review
Tsutsumimoto <i>et al.</i> 2009	Retrospective case/control study	From 2004-2006, L4-L5 stenosis or degenerative spondy. Wiltse PLIF (n: 10) vs midline PLIF (n: 10)	Similar clinical results, multifidus muscle damage was lesser on W-PLIF.	Retrospective, non-randomized, underpowered because of small sample size
Fujibayashi <i>et al.</i> 2010	Case series	16 patients operated on with W-TLIF.	Safe procedure, allows direct visualization to decompress, distract and stabilize unstable segments	Retrospective, low evidence power
Dong <i>et al.</i> 2014	Cohort randomized study	Unilateral Wiltse PLIF (n: 20) vs. bilateral midline PLIF (n: 19)	Wiltse unilateral as safe and effective as bilateral for one level lumbar instability	Low statistical power because of small sample size
Butterman <i>et al.</i> 2015	RT, blinded, prospective	Midline (n: 25) vs Wiltse (n: 25) for 2 level fusion. 5 year- follow up	No difference between groups	Low statistical power
Ulutas <i>et al.</i> 2015	Case/control series	57 patients. 26 midline vs. 31 Wiltse. Comparison on muscle cross-sectional area	Wiltse caused less tissue damage. Shorter hospitalization and less postoperative pain	Retrospective
Street <i>et al.</i> 2016	Retrospective cohort	358 patients, between 2005-2011. One year follow up. 255 midline vs. 103 Wiltse	Wiltse had low risk of wound infections, less blood loss, and fewer adjacent segment failure and reoperations than midline.	Retrospective analysis
Tian <i>et al.</i> 2016	Cohort randomized study	Between 2009-2013. MIS-TLIF (n: 47) vs. W-TLIF (n: 50).	Both effective. MIS-TLIF less blood loss, less postop pain. W-TLIF cheaper and lower radiation dose	Not blinded
Zhou <i>et al.</i> 2016	Retrospective randomized study	69 patients with spondylolytic spondylolisthesis. Wiltse TLIF (n: 31) vs midline TLIF (n: 38)	W-TLIF reduces damage of multifidus and incidence of chronic low back pain	Retrospective

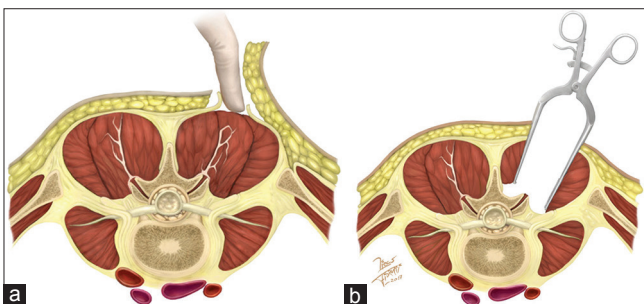


Figure 3: (a) The drawing depicts in A after the fascial opening the digital location of the intermuscular plane: the multifidus is medially located, the longissimus is lateral. (b) The Meyering retractors are placed in the deep plane, the area where the joint facet and the transverse process meeting is exposed

spinous process. If instrumentation is to be performed, blunt dissection of the cephalad facet is also effected to reduce the risk of adjacent segment disease (ASD)

- All pedicle screws are placed utilizing fluoroscopic guidance followed by application of the rods [Figure 5].

Decortication of the transverse processes, pars, and lateral facets are performed with a high-speed drill, following which bone graft is applied [Table 2].

DISCUSSION

Wiltse MIS paraspinal approach is muscle-sparing and has lower infection rates vs. midline approaches.^[1,5,6]

Street *et al.*^[6] using a midline approach found a lower infection rate (7.8% vs 1%), lower risk for adjacent segment disease requiring reoperations (14.6% vs 5.8%), and less intraoperative bleeding (703 ml vs 436 ml). For a posterolateral fusion, it provides excellent exposure of the transverse processes for applying bone graft while protecting the superior joint complex.

Although Wiltse *et al.*^[8] initially described two incisions 3 cm parallel off the midline, he later recommended a single midline incision for better cosmesis and in case secondary surgery was required.

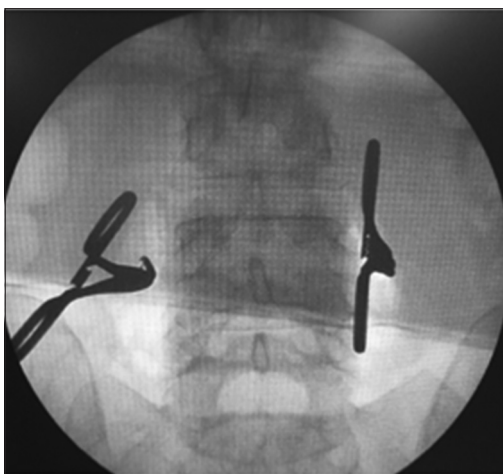


Figure 4: See the Bertola tweezers anchored in the transverse processes to radioscopically check the level to be treated before deperiostization

In 2006, Olivier *et al.*,^[3] in a cadaver study, documented that incisions 3 cm off midline were in the middle of two vascular networks and offered greater skin protection against necrosis.

CONCLUSION

Here, we described the step-by-step Wiltse lumbar paraspinous approach to the far lateral compartment for the treatment of foraminal discs or instability warranting fusions.

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Conflicts of interest

There are no conflicts of interest.

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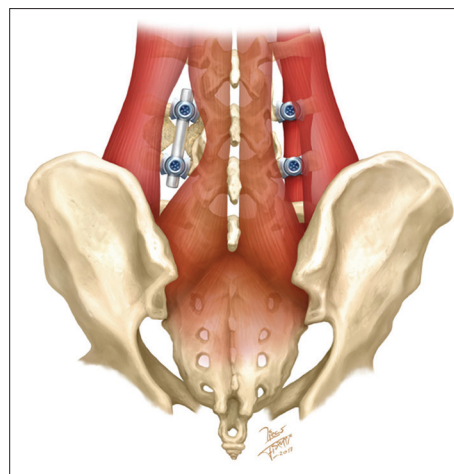


Figure 5: The drawing shows the muscular separation plane, with the implants in place, and the bone graft in the intertransverse plane and lateral to the pars interarticularis. See the multifidus muscle, which is more lateral at the level of the sacrum, which makes location of the access plane difficult. When the retractors are removed, the muscles go back to their original position, and cover the implants and the graft

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