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

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.17,8
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 through 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].

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 |
| Deperiostizacion | In fusion cases it is important to dissect bluntly the cephalad facet capsule to decreases 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 radioscopy following the pedicle line of the levels to be treated. IC: Iliac crest, ML: Midline spine.

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.
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. Street et al. 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. 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.

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

| Author/date | Design              | Methods                                           | Conclusion                                                                                   | Limitation                                      |
|------------|---------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------|
| Fraser et al. | Case series | 52 patients, 3 years of follow up.                | Safe and useful for decompression and fusion                                                 | No group control, no clinical outcomes reported |
| German et al. | 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 et al. | Retrospective    | From 2004-2006, L4-L5 stenosis or degenerative spondylysis. 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 et al. | 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 et al. | 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 et al. | RT, blinded, prospective | Midline (n: 25) vs Wiltse (n: 25) for 2 level fusion. | No difference between groups                                                              | Low statistical power                           |
| Ulutas et al. | 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 et al. | 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 et al. | 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 et al. | Retrospective randomized study | 69 patients with spondyloytic spondylolisthesis. Wiltse TLIF (n: 31) vs midline TLIF (n: 38) | W-TLIF reduces damage of multifidus and incidence of chronic low back pain                  | Retrospective                                  |
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 paraspinal 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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