

Global Spine J 2012; 02(03): 143-152

DOI: 10.1055/s-0032-1326949

Screw Placement Accuracy for Minimally Invasive Transforaminal Lumbar Interbody Fusion Surgery: A Study on 3-D Neuronavigation-Guided Surgery

#### Abstract

**Purpose** The aim of this study was to assess the impact of 3-D navigation for pedicle screw placement accuracy in minimally invasive transverse lumbar interbody fusion (MIS-TLIF).

**Methods** A retrospective review of 52 patients who had MIS-TLIF assisted with 3D navigation is presented. Clinical outcomes were assessed with the Oswestry Disability Index (ODI), Visual Analog Scales (VAS), and MacNab scores. Radiographic outcomes were assessed using X-rays and thin-slice computed tomography.

**Result** The mean age was 56.5 years, and 172 screws were implanted with 16 pedicle breaches (91.0% accuracy rate). Radiographic fusion rate at a mean follow-up of 15.6 months was 87.23%. No revision surgeries were required. The mean improvement in the VAS back pain, VAS leg pain, and ODI at 11.3 months follow-up was 4.3, 4.5, and 26.8 points, respectively. At last follow-up the mean postoperative disc height gain was 4.92 mm and the mean postoperative disc angle gain was 2.79 degrees. At L5-S1 level, there was a significant correlation between, a greater disc space height gain and a lower VAS leg score.

**Conclusion** Our data support that application of 3-D navigation in MIS-TLIF is associated with a high level of accuracy in the pedicle screw placement.

#### Keywords

minimally invasive spine surgery - transforaminal lumbar interbody fusion - 3D-NAV - neuronavigation - pedicle screw

微創經椎間孔腰椎椎間融合術固定螺釘的精確度：三維神經導航系統導引手術的研究

#### 摘要

本研究的目的是評估三維導航系統在微創的橫向腰椎椎間融合（MIS-TLIF）椎弓根螺釘置入準確性的影響。

**方法** 回顧性分析 52 個以三維導航系統輔助進行了 MIS-TLIF。臨床結果以歐式下背痛失能量表（ODI），疼痛視覺類比量表（VAS）和 MacNab 評分進行了評估。影像學結果則使用 X-射線和薄層電腦斷層掃描進行了評估。

**結果** 平均年齡為 56.5 歲，16 個椎弓根裂口中植入了 172 的螺釘（91.0%的準確率）。在平均跟進的 15.6 個月中，X 射線中的融合率是 87.23%。沒有需要進行修復手術。背部疼痛 VAS，腿部疼痛 VAS 和 ODI 在 11.3 個月的跟進中，分別平均改善了 4.3，4.5 和 26.8 點。在末次跟進時，術後椎間盤高度平均增加了 4.92 毫米，而術後椎間盤角度平均增加了 2.79 度。在 L5-S1 節段，更大的椎間盤高度增幅和低腿部 VAS 評分有顯著相關性。

**結論** 我們的數據支持在 MIS-TLIF 時使用三維導航與椎弓根螺釘置入的高度準確性有關。