

# Minimally Invasive Spine Surgery: Navigation vs. Fluoroscopy



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## Products

Spine & Trauma 3D Navigation  
(Curve Navigation, Drill Guide, Automatic Registration)

## Hospital / Authors

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## Clinical Background

Minimally invasive spine surgery (MISS) techniques are accredited with shortening operative time and hospital stays as well as reducing postoperative complications and blood loss by decreasing soft tissue and muscle damage. Therefore, accurate placement of percutaneous pedicle screws (PPSs) is a critical step for both successful stabilization and prevention of neurological damage. More technologies have come onto the market to overcome the limitations of very common fluoroscopy assisted (FA) MISS. This study was designed to evaluate the clinical impact of automatic intraoperative CT registration and drill guide technique screw insertion workflow compared to the standard FA technique.

## Aim of Study

The aim of this retrospective study was to compare the two most common techniques for MISS, FA and CTNav, in degenerative lumbar spondylolisthesis with lumbar canal stenosis. Accuracy, surgery duration, radiation dose and patient reported outcomes (PRO) were examined.

N = 192 cons. Patients / 952 PPSs, 101 FA-guided vs. 91 CTNav group

## Results

- **Accuracy (GRS\* A+B)** ( $p < 0.05$ ):  
92% FA vs. 96.4% CTNav  
**GRS\* A** ( $p < 0.05$ )  
77.7% FA vs. 92.7% CTNav  
**GRS\* E:** ( $p < 0.05$ )  
3.2% FA vs. 0% CTNav
- **Total surgery duration:** No significant differences in total duration of surgery as well as time per single screw
- **Complications and reoperation rates:** No significant differences
- **Radiation in effective dose (ED):**  
FA 1.504 mSv vs. CTNav 21.130 mSv, ( $p < 0.001$ )
- **PRO:** No significant difference in all scores 6 months after surgery (ODI, VAS-LP, VAS-BP\*)

\*GRS = Gertzbein-Robbins Scale,  
ODI = Oswestry disability index, VAS-LP/BP =  
Visual analog scale leg pain/back pain

## Summary

- CTNav demonstrated **significantly higher accuracy** compared to FA in this large cohort study
- Using CTNav resulted in **considerably more GRS\* A screws at 92.7% compared to FA which resulted in 77.7%**. Moreover, there were no outliers with CTNav (no GRS\* E screws)
- **Surgical time was not significantly affected** (including short lumbar constructs)
- Despite the significantly higher one-time radiation exposure for the patient, CTNav reduces radiation exposure for the surgical team as they do not have to be in the room during the CT scan, unlike FA