

A Comparison of Computed Tomography Based Intra-Operative Navigation versus Standard Single Plane Fluoroscopic Guidance in Single Level Spine Fusions

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Introduction

Recent advances over the past several years has allowed for development of intra-operative guidance systems in spine surgery. Several systems have been developed, most commonly based on intra-operative computed tomography (CT) guidance. While there is no replacement for a surgeon's superior knowledge of surgical anatomy of the spine and technical experience, there may be several benefits to the use of spinal navigation.

Methods

A retrospective chart review was performed in patients who underwent pedicle screw fusions within our practice. Patients who underwent fusion of more than one level were excluded from our study. Intra-operative guided pedicle screw placement was done using the O-arm® system. Variables including use of intra-operative navigation, sex, age, pseudarthrosis, need for pedicle screw revisions, infection, blood loss, duration of surgery, and level of fusion were extracted from patient charts for data analysis.

Results

A total of 133 subjects were included in the final sample. 87 patients underwent standard fluoroscopy while 46 patients utilized O-arm® guidance during fusion. Nearly all of the measured variables were found to be statistically significant. Of the variables measured, only blood loss was found to show a statistical significance (298mL for O-arm group, 362mL for standard group; $p=0.013$). Variables also found to be insignificant included duration of surgery, infection rate, malposition, pseudarthrosis, and need for revision.

Conclusions

Intra-operative navigation is a useful adjunct for spinal pedicle screw fusion and has great utility in a broad spectrum of spine surgeries. This study shows that there was no significant difference in duration of surgery, screw malposition, infection, pseudarthrosis, and other variables, but did show significantly lower blood loss in the O-arm group. Limitations include the retrospective nature of the study and the lack of specific information in some charts. The study does not account for additional procedures such as laminectomy which may add time to the surgeries.

Learning Objectives

- 1) To delineate any significant differences between the two modes of screw placement in single level spinal fusions
- 2) To apply these findings to clinical practice