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Two Registration Methods for Robotic Placement of Pedicle Screws: Is there a difference?

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Introduction

Posterior pedicle screw insertion for stabilization of the spine after fusion surgery is a commonly performed procedure by spine surgeons. With the advent of navigation technology accuracy of pedicle screw insertion has increased in recent years. Robotic guidance has revolutionized the placement of pedicle screws with two distinct registration processes that allow for preoperative planning of pedicle screw insertion. This study aims to compare the two different registration processes of robotic guided navigation

Methods

Since May 2017 our institution routinely uses newest robotic guidance on the market for placement of pedicle screws. Between May 2017 and October 2017 we have performed 20 cases inserting 75 pedicle screws using robot-guided technology. The first 8 cases were done using CT-to-Fluoroscopy method while the last 12 cases were done using Scan-and-Plan method of registration. Recorded parameters included age, gender, BMI, smoking, operation time, fluoroscopy time, radiation dose, level (s), registration method, blood loss, and breach grade. Statistical tests used were Fischer exact T-test and Chi-square test and <0.05 being significant.

Results

Thirteen patients were women (65%), mean age of our study cohort was 60.3 ± 8.25, BMI was 30.3 ± 5.99, and 4 (20%) were smokers. Twelve patients (60%) had the scan and plan method, while 8(40%) were done using CT to Fluoroscopy. No statistically significant results were found between operation time, blood loss, and time for robotic use. There was a decrease from 17.75 seconds to 10.01 seconds in fluoroscopy time across CT-to-Fluoroscopy and Scan-and-Plan respectively, though this was not statistically significant, p 0.41. A significant decrease in total radiation dose was observed across the two registration techniques 141.93 mGy in CT-to-Fluoroscopy and 70.35 mGy in Scan and Plan, p. 009. No statistically significant results were observed on accuracy across the two registration methods.

Conclusions

Both methods of registration are safe and effective with the Scan-and-Plan method exposing the patient to significantly less overall radiation exposure than the CT-to-Fluroscopy method as it does not require the need for a preoperative CT scan. Further studies are needed with a larger patient population to determine accuracy of pedicle screw placement across the two registration methods.

Learning Objectives

Learning the differences in registration methods using next generation robotic technology