

Introduction

Pedicle screw instrumentation for spinal stabilization is a common surgical procedure. Surgeons often rely on free-hand or fluoroscopy-assisted methods to facilitate the placement of pedicle screws. Robotic technology has the potential to increase accuracy, precision, and consistency of pedicle screw placement. With the newest robotic platform recently released we aim to provide the safety, feasibility and learning curve associated with this new navigation technology.

Methods

A retrospective chart review was conducted to obtain data for 20 patients who underwent lumbar pedicle screw placement under robotic guidance after undergoing interbody fusion for lumbar spinal stabilization for degenerative disc disease with or without spondylolisthesis. The newest generation Mazor X (Mazor Robotics Ltd, Caesarea, Israel) was used. Accuracy of screw placement was determined to be Grade I-IV. Grade I was in the pedicle (no breach/deviation), grade II was breach <2mm, grade III was breach 2-4mm, and Grade IV was breach >4mm; breach direction (superior, lateral, inferior, or medial) was also recorded

Results

Twenty patients underwent robotically-assisted pedicle screw placement of 75 screws at 24 levels. Seventy-four screw placements (98.7%) were grade I, 1 (1.3%) was grade II (medial). No complications occurred. Mean time for screw placement was 3.6 minutes. Mean Fluoroscopy time was 13.1 minutes and mean radiation dose was 29.9 mGy. No statistically significant results across any of these parameters were observed across our first 10 cases and subsequent 10 cases.

Learning Objectives

Next Generation Robotic technology has the potential to increase accuracy rates for pedicle screw placement, decrease OR time, and radiation exposure compared to conventional methods of screw insertion

It is a safe and feasible method of inserting posterior pedicle screws

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Conclusions

We found that next-generation robotic spine surgery was safe and feasible with reliable and precise accuracy and minimal learning curve. As this technology improves, further novel applications are expected to develop. Further research is needed to determine long term efficacy.