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First Case Series of Robot-Assisted Spine Surgery with the ExcelsiusGPS

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Introduction

The ExcelsiusGPSTM (Globus Medical, Inc., Audubon, PA) robotic system was developed to address drawbacks of previous spinal robots.

Objective: To describe operative techniques using the ExcelsiusGPS in spinal surgery, and assess clinical and radiographic outcomes of the first reported series of patients undergoing surgery with this robot.

Methods

The first five consecutive patients who underwent spine surgery at a single institution with the ExcelsiusGPS surgical robotic guidance system were included in this study. We collected the following variables: demographic data (age, BMI), presenting symptoms (pain, neurologic deficits, Karnofsky Performance Status [KPS], Frankel Grade, ambulatory status), operative information (surgical indication and approach, estimated blood loss [EBL], length of case, instrumented levels), and post- operative symptoms (pain, neurologic deficits, KPS, Frankel grade, ambulatory status). Screw accuracy was determined by a blinded neuroradiologist.

Results

22 pedicle screws were placed in 5 thoracolumbar fusion cases. Average number of levels fused was 2.4±1.5. Mean operative time was 356±38 minutes; average EBL was 380±98 mL. Mean fluoroscopy exposure was 4.2±1.2 seconds. All patients experienced a statistically significant improvement in Frankel grade and KPS score by 6 weeks post-op ($p<0.05$). Among all 22 screws placed, 95.5% were accurately placed, graded Gertzbein-Robbins A (81.8%) or B (13.6%). Of lumbar screws placed, 100% were accurate: 92.9% grade A and 7.1% grade B.

Conclusions

Spinal fusion with the ExcelsiusGPS robot can be performed safely, with excellent screw accuracy and clinical outcomes, as well as decreased radiation exposure for the surgeon, staff, and patient.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Assess the benefits and limitations of previous robotic systems in spine surgery, 2) Understand real-time image-guided robot-assisted spine surgery, 3) Appreciate screw accuracy with the ExcelsiusGPS robot.

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