

OUR INITIAL EXPERIENCE WITH O-ARM BASED NAVIGATION SYSTEM IN POSTERIOR LUMBAR FUSION

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Introduction

The spinal instrumentation dramatically increased over the last two decades and pedicle screw insertion remains a challenge for every spine surgeon. Suboptimal placement of pedicle screws may lead to neurological deficit, vascular complications, postoperative pain and needs for revisions. Computer-assisted image-guided surgery has been shown to improve accuracy in these procedures. The O-arm surgical imaging system integrated with Stealth-Station surgical navigation systems provides very accurate seamless navigation for pedicle screws placement. Additionally, an intraoperative 3D imaging can be obtained after screw placement to confirm the optimal position and giving the surgeon the option to correct the position of the screw before closure.

Methods

A retrospective review of 57 consecutive patients who underwent posterior lumbar fusion surgery with O-arm utilization over a period of 2 years was performed. The study population included 18 males and 39 females. Age range was 20-80 years with an average of 58.2 years. Fourteen patients had multilevel degenerative lumbar stenosis (24.56 %) and 43 had spondylolisthesis with spinal stenosis (75.44 %).

Results

Two hundred and eighty-three pedicle screws were placed using O-arm navigation system, with a mean of 4.96 screws per patient (range 4-8). The overall rate of intraoperative malposition on the basis of intraoperative 3D imaging and subsequent adjustment of pedicle screw placement was 1.06 % (3 of 283 screws). One patient had transient mild neurological deficit and only one screw was suboptimally placed at the end of surgery, which did not result in a neurological deficit or pain and did not require a return to the operating room. With increased experience with the technique the mean duration of surgery and the mean time for screw placement decreased very significantly.

Conclusion

The use of intraoperative O-arm imaging system with computer-assisted navigation significantly increases the surgical accuracy and safety of pedicle screw placement in lumbar fusion surgery. It also reduces the duration of surgery and minimizes radiation exposure of operating room personnel.