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Introduction

Stereotactic navigation is widely used in the placement of pedicle screws. The accuracy of pedicle screw placement is higher (89-100%) using CT navigation than the placement using flouroscopy (28-95%) or freehand (69-94%) (1). The current systems available today are expensive to acquire and maintain. They require additional staff to operate and due to their size, restrict the intraoperative working space (2). This study evaluates the use of a smartphone application specifically created to stereotactically place a pedicle screw using an off the shelf smartphone.

Methods

An application was created by the author which uses the camera on the smartphone to acquire an image of the vertebral segment. The image is then stored and an entry point and trajectory are entered by the user into the smartphone. Once this is done, the smartphone, through the use or its internal gyroscope, is used to guide the placement of the of the pedicle screw.

Results

Pedicle screws were safely and accurately placed using a smartphone. The accuracy was verified using post operative CT scans.

Conclusions

Using an a smartphone and the pedicle screw placement application, pedicle screws can be safely and accurately placed. This application has several advantages compared to the current 3-D systems: The cost is much lower both in aquisition and maintenance, it does not requre any additional personel, and due to its small size, does not obstruct the intraoperative working space

Smart phone with the navigation app opened
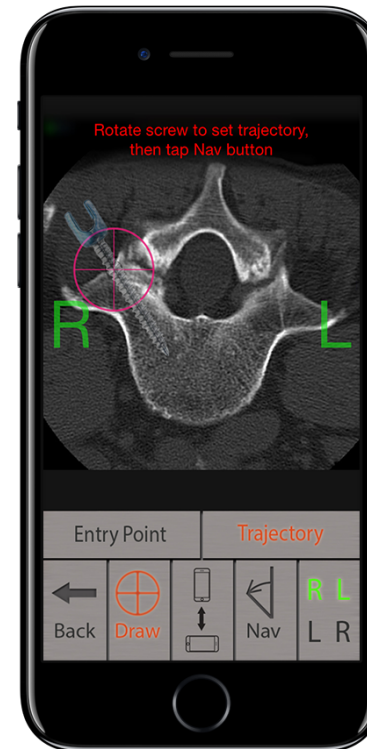
Smart phone with the navigation app opened. The surgeon can select the entry point and trajectory by dragging the cross hairs or rotating the screw respectively by using their finger.

Learning Objectives

By the conclusion of this session, participants should be able to understand and discuss an alternative system for the stereotactic placement of pedicle screws.

References

1. Xiao R, Miller J, Sabharwal N: Clinical outcomes following spinal fusion using an intraoperative computed tomographic 3D imaging system. **J Neurosurgery Spine** 26:628-637, 2017

2. Ishikawa Y, Kanemura T, Yoshida G: Intraoperative, full-rotation, three-dimensional image (O-arm)-based navigation sytemt for cervical pedicle screw insertion. **J Neurosurgery Spine** 15:472-478, 2011.