Clinical Application of the MicroOptical MD-6 Viewer with Image Guidance using the Radionics Omnisight Excel System

James B. Macon, BA, MD
F-W Neurological Surgery, Inc. 463 Worcester Rd. Suite 205 Framingham, MA 01701

Introduction

The MD-6 Critical Data Viewer has been trialed on a neurosurgical patient with bilateral L5 spondylolysis during placement of pedicle screws to display image-guided computer data generated by the OmniSight Excel system.

Methods

The MD-6 Viewer (The MicroOptical Corporation, Westwood, MA) also named NED Vision (Radionics, Burlington, MA) mounted on loupe frames and positioned near-eye above the loupes was used to display a color virtual images of lumbar spine axial CT scans (Figure 1). These images were computer image-guided data generated by the Radionics OmniSight Excel system (Radionics, Burlington, MA) which optically tracked calibrated pedicle probes, taps and screws (Figure 2). The three-eighths inch diagonal LCD monitor presented a virtual VGA resolution color image (640x480 pixels) equivalent to a 13 inch monitor seen at one meter (Figure 3). The monitor was accessed by eye movement not interfering with hand-eye coordination or requiring head turns.

Figure 1



MD-6 Critical Data Viewer (frontal view)

Results

Several advantages were noted compared to the standard pedicle screw placement technique which required frequent referral to fluoroscopic images or a remote image guidance monitor. 1) Reference to the viewer allowed frequent adjustments to screw trajectory and accurate pedicle entry point localization. 2) Reference to the viewer required only eye movements which preserved hand-eye coordination and allowed the spine axial CT scan images to be checked more frequently during the pedicle screw placement. 3) Less frequent placement of the fluoroscopy tube considerably reduced operating time and x-ray exposure for both patient and surgeon. The screw placement accuracy was maintained despite less frequent fluoroscopic control. 4) The high resolution color images could be seen more clearly with less obstruction and appeared to be larger than when viewing a remote computer monitor. 5) There was no interference with vision through the loupes when operating and during pedicle probe, tap or screw insertion. The viewer was only seen when directing the eyes purposefully to see the CT images. 6) Preoperative planning of screw entry site, angle of trajectory and screw length can be utilized to increase accurate screw placement using the pre-planned screw outlines seen on the axial CT computer- generated images.

Conclusions

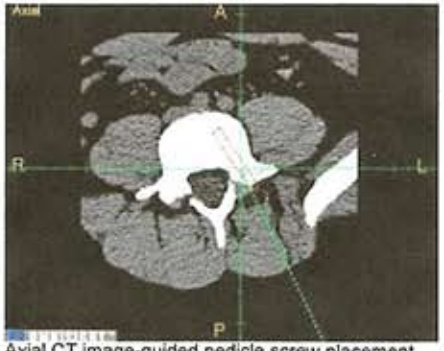
The MD-6 Critical Data Viewer is a relatively low cost adjunct to image-guided pedicle screw placement which facilitates accurate screw placement.

Figure 2



MD-6 Critical Data Viewer mounted for image-guided pedicle screw insertion (side view)

Figure 3



Axial CT image-guided pedicle screw placement as seen in MD-6 Critical Data Viewer during pedicle screw insertion

Figure 4



MD-6 Critical Data Viewer and virtual image projection while using calibrated pedicle probe

Learning Objectives

1)Understand the use of a novel minature LCD viewer attached to operating loupes or glasses frames as an adjunct for viewing image-guided data during spinal pedicle screw placement representing a significant advance in intraoperative data viewing. 2)Understand the advantage of near-eye viewers compared to remote computer monitors for intraoperative image guidance during pedicle screw fixation which allow high resolution images directly before the eyes accessible without head movement. 3)Understand the disadvantages of remote monitors which require head movement and loss of hand-eye coordination while operating.