USEFULNESS OF SPINE NAVIGATION IN TRANSPEDICULAR SCREW PLACEMENT VERSUS THE CONVENTIONAL SURGERY

Thesis

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TO MY LATE MOTHER,

MY GREAT FATHER,

MY WIFE

&

MY SON ABDALLAH

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ABSTRACT

The study aims at comparing the screw placement using the navigation and conventional free hand technique

The study is based on the radiological and clinical follow up of 20 patients indicated for fixation with different pathologies for 6 months to detect the clinical, radiological and functional outcomes. It was found that neuronavigation is superior to the free hand technique in screw placement especially in the thoracic region because of the anatomical considerations related to the pedicle and the spinal canal relationship.

Keywords:

Neuronavigation

Transpedicular screws

Free hand technique

INTRODUCTION

INTRODUCTION

Use of pedicle screw systems for spinal stabilization has become increasingly common in spine surgery. A variety of pedicle screw systems have been described and new anatomical landmarks of screw placement **(Cortet et al., 1999).**

The first descriptions of the use of bone screws to obtain internal spinal fixation at the time of fusion were by Tourney in 1943 and King in 1944. Boucher in 1959 was the first to use pedicle screws. Roy-Camille was the first to use pedicle screws connected to a dorsal plate **(Chetan et al., 2002)**.

Since pedicle screws traverse all three columns of the vertebrae, they can rigidly stabilize both the ventral and dorsal aspects of the spine. The pedicle also represents the strongest point of attachment of the spine and thus significant forces can be applied to the spine without failure of the bone-metal junction. Furthermore, the rigidity of pedicle fixation allows for the incorporation of fewer normal motion segments in order to achieve stabilization of an abnormal level **(Jean Jacques et al., 2008).**

The principle indications for pedicle fixation are existing painful spinal instability as in post-laminectomy spondylolisthesis and painful pseudoarthrosis, potential instability as in spinal stenosis and degenerative scoliosis, unstable fractures and in stabilizing spinal osteotomies and contraindicated in spinal infections, Laminectomies that will not cause instability and Fusions which are normally successful without fixation **(Deramond et al., 1998).**

Safety concerns on the violation of the spinal canal leading to potential harm to vascular, neural and other vital structures have been encouraging surgeons to improve the accuracy of pedicle screw placement by trying various approach **(Nai-Feag et al., 2009).**

The reported pedicle screws misplacement in historical spinal literature can be as high as 20-39.8%, but only a small number leads to complications (neurological, vascular or visceral injuries). But these complications can be potentially life and limb threatening **(Rajeev Verma et al., 2010).**

The inaccuracies of pedicle screw placement are many, as misplacement rates of up to 30% in the lumbar spine and up to 55% in the thoracic spine have been reported. Different techniques of pedicle screw placement have been described in the past. However, none of these techniques reduced the incidence of misplacement **(Thorsten Tjardes et al., 2010)**.

Image-guided spinal navigation is a computer-based surgical technology that was originally developed to improve a spine surgeon's orientation to the unexposed anatomy during complex spinal procedures **(J. Romero et al., 1994).**

It allows for the intraoperative manipulation of multiplanar CT scans, which can be oriented to any selected point in the surgical field. Although it is not an intraoperative imaging device, it provides the spine surgeon with superior imaging data compared with conventional intraoperative imaging technology **(Martin et al., 1999).**

AIM OF THE WORK

AIM OF THE WORK

A non-randomized comparative study, comparing the accuracy of pedicle screw placement and the safety offered to the surrounding structure during screw placement using spine navigation and screw placement using the conventional surgery and postoperative assessment using CT scan.

REVIEW OF LITERATURE