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CASE REPORT

Removal of lumber spine foreign body using minimal access system with navigation

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ABSTRACT

Removal of a foreign body from the spine is often time a surgical challenge. Recent developments in computer-assisted surgery (CAS) have brought major improvements into the operating room. Most Medical procedures nowadays take advantage of the minimal invasiveness, precision, velocity and interactivity provided by the computer-assisted systems. Minimally invasive techniques (MIT) like microscopy, stereotaxy, endoscopy and neuronavigation facilitate the procedures improve neurosurgical results and reduce operative complications. In this technical report we used minimal access system with navigation to remove a broken spinal needle at L4-L5 level from an asymptomatic lady post delivery using a custom-made navigation-mounted pituitary rongeur.

Key words: Foreign body, intra-operative CT scan, spinal needle, lumbar spine, minimally invasive, neuro navigation

Introduction

Removal of a foreign body from the spine is often a surgical challenge due to its close proximity to the spinal cord. Recent developments in computer-assisted surgery (CAS) have brought major improvements into the operating rooms.[1] Continuous and ever accelerating advancements in computer science have made possible frequent use of computers in specialized medical applications for image based diagnoses and treatment of diseases, including surgical interventions. Even medical procedures which were commonly performed in a traditional way, nowadays take advantage of the minimal invasiveness, precision, velocity and interactivity provided by the computer assisted systems.[2,3] Minimally invasive techniques (MIT) like microscopy, stereotaxy, endoscopy and neuro-navigation facilitate the procedures, improve neurosurgical results and reduce operative complications.[4] In this technical report we used minimal access system with navigation to remove a broken spinal needle at L4-L5 level from an asymptomatic lady post-cesarean section.

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Case Report

A 46 year old lady, known to be diabetic and hypertensive on medications, referred to our unit from the women specialized hospital in our medical city 17 days after having a cesarean section under spinal anesthesia, regarding broken spinal needle in the lumbar area.

Upon the interview, she was not complaining of back pain or any neurological symptoms. There was no history of fever or CSF leak. On examination, she looked well, of average built and not in pain. Her vital signs were stable. Local examination of the lumbosacral area revealed no tenderness, swelling or palpable mass and her neurological examination was normal.

Lumbosacral X-rays were done and the broken needle was identified between the spinous processes of L4 and L5. It was found to be lying outside the dural space.

The foreign body was localized on a high-resolution lumbar CT scan [Figure 1]. Surgery was planned to remove the foreign body. Three-dimensional spine model was reconstructed using the Medtronic Stealth Station®. At surgery, the patient reference frame was placed on the Medtronic Percutaneous Reference Pin (PRP) which is on turn anchored to the posterior superior iliac spine (PSIS) [Figure 2]. The PSIS is located by palpation and accessed percutaneously using a scalpel then a hemostat is used to dissect muscle from the bone. The PRP is oriented 30° lateral from the midline and 30° toward the head of the patient and then docked to the PSIS using a mallet. Once the PRP and the patient Reference Frame are fixed, the navigation camera is oriented to access both the patient

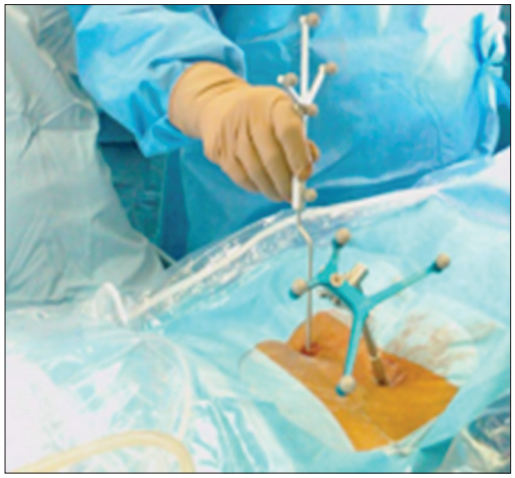

Figure 1: Surgical view showing the Percutaneous Reference Pin (PRP) anchored to the posterior superior iliac spine (PSIS) oriented 30 degree lateral to the midline and 30 degree toward the head

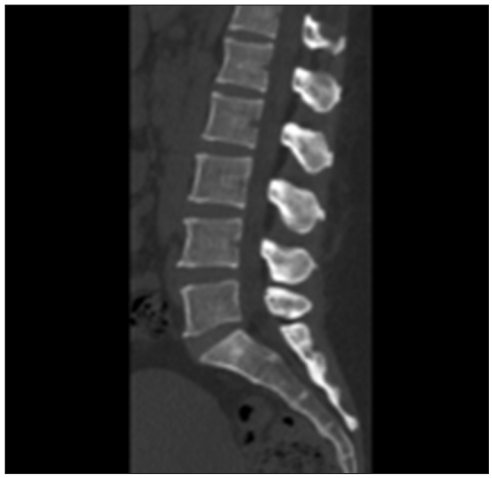

Figure 3: Post operative sagittal CT scan lumbar spine

reference Frame and the reference frame mounted on the image intensifier of the C-arm. At this point, the Anteroposterior and Lateral images were acquired and automatically transferred to the Stealth Station® system. The registration was done automatically using the Fluoro Nav® virtual fluoroscopy software. The preoperative high-resolution CT scan was fused to the Fluoro Nav® images and the navigation was then carried out using the high resolution images.

Another portable reference frame was mounted on a pituitary rongeur and the instrument was registered with the navigation system [Figure 3]. Using a small incision between the L4 and L5 spines, guided by the navigation in real time, the rongeur was advanced through the musculocutaneous tissue all the way to the broken needle which was then removed in the first go. The incision was closed using two stitches. Post operative CT scan showed complete removal of the needle [Figure 4].

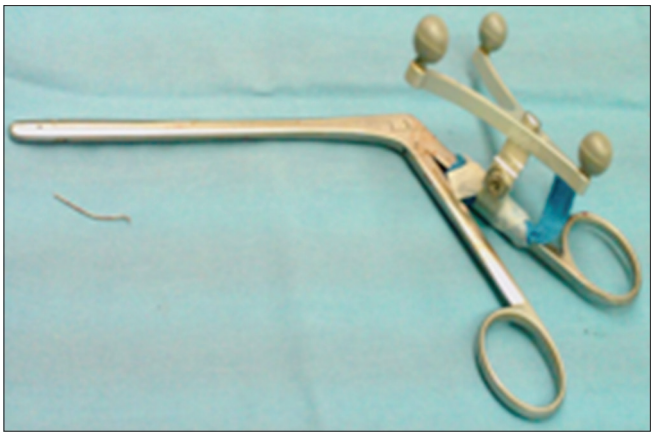

Figure 2: Pituitary rongeur mounted with reference frame

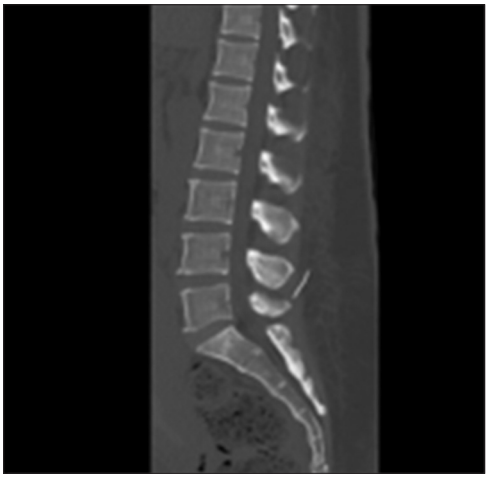

Figure 4: Sagittal CT scan lumbar spine, bone window showing the needle at the level of L4-L5 spine process

Discussion

Removal of small sharp foreign bodies from tissues can prove to be a surgeon's nightmare. Not only do such things move through tissues necessitating big exploratory incisions, locating smaller ones can be difficult as well, using the conventional fluoroscopy.

Navigation is a new tool in the operating rooms and like every new contrivance; it is being tried in different ways and in different situations. The authors have made use of navigation to remove a needle through the smallest possible incision. As far as the literature search revealed, this has not been reported before. Also, there are no reported instances of employing the small reference frame on pituitary rongeurs to use it simultaneously as a navigation probe.

Use of navigation for removal of foreign bodies from spine can prove to be an invaluable tool.

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