Novel Percutaneous Scalp Mount Base for SmartFrame® Enables Minimally Invasive MR-Guided Stereotactic Laser Ablation and DBS Electrode Placement

David Lozada MD; Jon T. Willie MD, PhD; Robert E. Gross MD PhD

[Emory University School of Medicine, Atlanta]

Introduction

An expendable skull-mounted MR guidance miniframe (ClearPoint® SmartFrame®) has been optimized for DBS surgery. However, the original device disadvantageously requires a large incision and burr hole, which is not optimal for minimally invasive approaches. A recently modified scalp mounted frame base was designed for percutaneous skull fixation, accommodating minimal incisions and twist drill hole access (Figure 1). We report our experience with this device modification for multiple stereotactic applications.

Methods

We utilized the scalp mounted frame base and SmartFrame® tower to perform 23 MR-guided procedures, including 18 stereotactic laser ablations (SLA) for epilepsy and 5 GPi-DBS electrode placements for movement disorders. Approaches were either occipital (SLA, n=15) or frontal (SLA, n=3; DBS, n=5). Stereotactic accuracy, hospital length of stay, and complications were measured.

Results

The scalp-mounted frame facilitated minimal or stab incisions. For occipital and frontal approaches, mean 2D radial errors were 2.2 ± 0.3 mm and 1.3 ± 0.28 mm, respectively. For SLA and DBS indications, 2D radial errors were 2.16 ± 0.26 mm and 0.9 ± 0.22 mm, respectively. The median hospitalization for the group was 1 day. There were no surgical site complications, but one patient sustained a left occipital intraparenchymal tract hemorrhage causing transient nonoperative right superior quadrantanopsia.

Conclusions

The scalp-mounted modified SmartFrame® accommodates minimally invasive MR-guided stereotactic neurosurgical procedures while maintaining safety and accuracy.

Learning Objectives

A recently modified scalp mounted frame base was designed for percutaneous skull fixation, accommodating minimal incisions and twist drill hole access for multiple stereotactic applications.

References