Two Technical Modifications for the Leksell Stereotactic Frame

F Jumaa, S Al-kaabi, B kadhum, M Faraj

Citation


Abstract

Objective:
We describe newly designed frame holder applied to the head before pin fixation. The already available ear plugs facilitate the straight alignment of the frame by fixing it to the external auditory meatus, but they are quite painful for most of the patients and not prevent the anterior posterior rotation. (2,3) The Leksell frame (Elekta, Sweden) is provided with a clamp that fits only with Mayfield head frame(SM, USA).(1) We performed certain modifications to make the frame fit to the Sugita head clamp (Mizuho, Japan); the only sort of head frame we have in our hospital.

Patients & methods:
The new modifications were used to fifteen patients in whom the application of the frame was indicated. A new designed net made of sewed ribbons applied to the head before pin fixation. It prevents slipping of the frame especially with the aid of the top plastic cup for its suction ability over a well shaved head. No pain recorded with its use. The other modification was to make few changes with the sugita head clamp middle piece to make it adaptable with that of the leksell which was originally designed for the Mayfield head clamp.

Results:
The newly designed net caused no pain to all the patients. Slipping was minimal. The time of the application of the frame shortened. With the use of the new adapter with the leksell frame, we were able to perform surgical interventions even as long as 8 hours as in deep brain stimulation operations with no movement noticed between the frame and the operating table.

Conclusion:
These two technical modifications were useful to help in application of the frame over the patients head with minimal slipping movement and no pain. It permitted us to use the leksell frame with the sugita head frame which is the only sort of head frame we have in our hospital.

NOTICE

This paper has been designed to resolve certain problems we faced in our work in the neurosciences hospital. We did not receive any financial support from any company mentioned in this paper.

INTRODUCTION

The Leksell Frame (Elekta, Sweden) is widely used for functional neurosurgical operations. For the proper application of the frame on the patients head; it is provided with ear plugs .these will prevent side way movement but it is quite painful & cannot be tolerated actually with all our patients. Also it will not prevent the foreword backward slipping of the frame. (2,3) The frame is provided with head clamp compatible with only the Mayfield head holder (SM, USA) (1); making it unadoptable with the head frames like the sugita head frame (Mizuho, Japan); the only sort of head frame we have in our hospital.

PATIENTS & METHODS

In late 2007 & early 2008 we used these techniques for fifteen patients. Nine had deep brain stimulation (DBS) of the subthalamalic nucleus for Parkinson's disease; one patient had DBS of the ventral intermediate nucleus for rubral tremor. One patient had DBS of the Globous pallidus internus nucleus for Dystonia. One patient had stereotactic removal of tuberculomas using the Steiner Lindquist laser guide (Elekta, Sweden); the last three patients it was used for stereotactic biopsy of deeply seated brain tumors.

The Leksell frame fixation is usually done in the radiology department. The head frame holder is composed of three
straps sewed together to hold the temporal & occipital bars of the frame. The top of each strap is connected with plastic cup to fit firmly to the head & prevents its slipping by its suction ability over a well shaved head. Each one of them is sewed in its end with a tag to allow readjustment of the frame on the head. The straps on the temporal bars composed of two pairs to let an opening to observe the external auditory meatus; this is needed to align the frame along the canthomeatal line. We apply it of the patients head & fit the frame within its multi adhesive tags. The alignment of the frame can be readjusted frequently until we fix the pins & remove the straps. These straps didn't cause any pain or discomfort as the ear plug did to all the patients. They also prevent unwanted wide movement or slipping of the frame. Figures (1, 2, 3)

**Figure 1**
Figure 1: The five straps sewed together, they are connected in their ends with tags to adjust its length.

In the operating theatre in order to apply the leksell frame to the sugitta head frame, we took the middle piece of the head holder. We removed the central slide adjusting screw & change it with a longer one with a knob that is usually available in the intravenous fluids (i.v.) stand. The paramedian screws exchanged with another longer ones. Figures (4, 5, 6)

The Cognave of the leksell clamp is attached to the outer surface of the sugitta middle piece head holder. The long knob of the i.v. stand will connect both of them together & the lateral screws will help to prevent its movement by the engagement with the teeth of the Cognave. Figures (7, 8)

**RESULTS**
During its use no pain or discomfort were noticed on our patients. The frame fixed firmly to the table attachment of the sugitta head frame. No movement was noticed during the whole procedures between the operating table & the frame even in those DBS cases were the surgery with the frame applied to the patient extended for 8 hours. Figures (9, 10)
DISCUSSION
These technical modifications were important in our practice to facilitate the application of the frame over the head with minimal movement & shorter time. Although it may resemble that of the CRW frame (Radionics, USA) put the design is different & the slipping is much less than that with CRW frame. The adapter we made to fit the Leksell frame to the sugita was quite useful especially we not have the Mayfield head clamp in our hospital.

CONCLUSION
These two modifications are good alternatives to replace the ear plug which is quite painful for many patients & it will make those centers that have only the sugitta head frame to use it with the leksell stereotactic frame.

CORRESPONDENCE TO
Moneer K. Faraj, M.D., F.I.C.S. Chief Dept. of Neurosurgery Hospital of Neurosciences P.O.BOX 8148, salihiyia Baghdad 12222 Baghdad, Iraq Tel. 009647905599944 E-mail: drmkfaraj@yahoo.com

References
Author Information

Faiz A. Jumaa
operating theatre technician, Hospital of Neurosciences

Samir Z. Al-kaabi
operating theatre technician, Hospital of Neurosciences

Bashar Kadhum
biomedical Engineer, Hospital of Neurosciences

Moneer K. Faraj, M.D., F.I.C.S.
Chief Dept. of Neurosurgery, Hospital of Neurosciences