

VISIUS Surgical Theatre
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Summary of Preliminary Experience with Intraoperative MRI-compatible Infant Headholder

The team at Le Bonheur Children's Hospital in Memphis, TN, recently published findings from their initial cases utilizing the IMRIS MRI-conditional horseshoe headrest intended for non-pinned neurosurgery cases.





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Technical Note

Preliminary experience with an intraoperative MRI-compatible infant headholder

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ABBREVIATIONS iMRI = intraoperative MRI; MPRAGE = magnetization-prepared rapid acquisition gradient echo.

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Abstract

The development of high-quality intraoperative MRI (iMRI) capability has offered a major advance in the care of patients with complex intracranial disease. To date, this technology has been limited by the need for pin fixation of the calvaria. The authors report their preliminary experience with an MRI-compatible horseshoe headrest that allows for the following: 1) iMRI in patients too young for pin fixation; 2) iMRI in patients with large calvarial defects; 3) the ability to move the head during iMRI surgery; and 4) the use of neuronavigation in such cases. The authors report 2 cases of infants in whom the VISIUS[®] Surgical Theatre horseshoe headrest (IMRIS Inc.) was used. Image quality was equivalent to that of pin fixation. The infants suffered no skin issues. The use of neuronavigation with the system remained accurate and could be updated with the new iMRI information. The VISIUS[®] horseshoe headrest offers a technical advance in iMRI technology for infants, for patients with cranial defects or prior craniotomies in whom pin fixation may not be safe, or for patients in whom the need to move the head during surgery is required. The image quality of the system remains excellent, and the ability to merge new images to the neuronavigation system is helpful.

Highlights of Paper

Preliminary Experience with an Intra-operative MRI-Compatible Infant Headholder: Technical Note. *Journal of Neurosurgery: Pediatrics*. Published online February 2015. pp. 1-5.

Intraoperative MRI (iMRI) has been shown to be beneficial in the treatment of patients with complex cranial disease. However, iMRI has been unavailable to infants and patients with calvarium defects due to the requirement to pin the calvarium during the procedure. The development of an MRI-conditional horseshoe headrest by IMRIS has opened up iMRI to this previously inaccessible population for iMRI. In this published Technical Note, Le Bonheur Children's Hospital, Memphis, TN, reports on its initial experience of two patients (a four-month-old and two-year-old) using the headrest.



IMRIS Horseshoe Headrest with InSitu™ wireless coil.

Key Excerpts

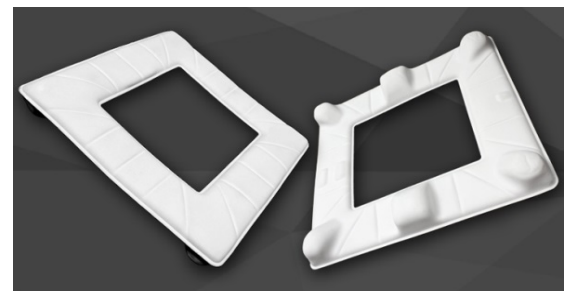
- High quality MR imaging equivalent of pinned patients with no skin integrity or skin break down issues.
- Navigation and merge of intraoperative imaging was successful using Medtronic Stealth® Axiem® Electromagnetic neuronavigation system.
- With demonstrated accuracy of targeting of 0.5 mm, headholder system will allow accurate placement of intra-cranial electrodes and biopsies.
- In both cases, residual tumor was seen on intraoperative imaging and was resected prior to closure. Thus, preventing a return trip to surgery at a later date.

Product Features

- IMRIS InSitu™ wireless coil shape and weight allows good access to patient's airway, even in prone positions.
- Imaging captured using a combination of IMRIS InSitu wireless coil below the head and a multi-channel flexible coil above the head for optimized image quality.
- Disposable, removable pads designed for head sizes from neonatal to adult sized patients.

Conclusion

- The IMRIS horseshoe headrest offers an advance in iMRI usage for infants, patients with cranial defects or prior craniotomies where pin fixation may not be safe or in patients where head repositioning during surgery is required.
- Safe and accurate for providing high quality intraoperative imaging.
- This is the first published paper related to use of the IMRIS Horseshoe Headrest.



IMRIS InSitu™ Wireless Coil



Hospital Profile

- Located in Memphis, TN, USA
- Website: <http://www.lebonheur.org/>
- Ranked among the *US News & World Report* top hospitals in seven specialties, including neurology/neurosurgery
- VISIUS Surgical Theatre iMRI suite opened September 2010.
- Nearly 500 procedures completed as of January 2015.
- Previously reported that iMRI use has reduced returns to surgery to zero for intra-cranial pediatric patients (from Le Bonheur internal newsletter, *Brain Waves*, Spring 2013).

Suggested Reading

- Berry C, Sandberg DI, Hoh DJ, Krieger MD, McComb JG: Use of cranial fixation pins in pediatric neurosurgery. **Neurosurgery** 62:913-918; discussion 918-919, 2008.
- Choudhri AF, Klimo P, Auschwitz TS, Whitehead MT, Boop FA: 3T Intraoperative MRI for Management of Pediatric CNS Neoplasms. *AJNR Am J Neuroradiol*, 2014
- Finlay JL, Wisoff JH: The impact of extent of resection in the management of malignant gliomas of childhood. *Childs Nerv Syst* 15:786-788, 1999