LETTERS TO THE EDITOR

Magnetic resonance–guided focused ultrasound thalamotomy for Parkinson’s disease

TO THE EDITOR: We wish to thank Zaaroor et al.² for their report on MR-guided focused ultrasound (MRgFUS) for the treatment of Parkinson’s disease (PD) and essential tremor (ET) (Zaaroor M, Sinai A, Goldsher D, et al: Magnetic resonance–guided focused ultrasound thalamotomy for tremor: a report of 30 Parkinson’s disease and essential tremor cases. J Neurosurg [epub ahead of print February 24, 2017. DOI: 10.3171/2016.10.JNS16758]). The authors described their experience with 9 patients with PD, 18 with ET, and 3 with both. The clinical efficacy was monitored using a rating scale (Clinical Rating Scale for Tremor), the scores of which improved significantly at both 1 and 6 months following the treatment. The authors reported the adverse events, which included those that were transient and related to the sonication (headache, vertigo, nausea, and vomiting) and more long-term effects (ataxia and numbness). Of note, more than one-third of the patients experienced headache, although there is no comment on the severity. Also, almost one-half experienced vertigo, although only 10% experienced nausea. Of concern, 2 patients vomited around the time of the sonication. There is no mention of claustrophobia or positional discomfort, both of which we have seen at our center. Apart from local anesthetic administration for placement of the stereotactic frame, there is no mention of any other analgesia, sedation, or antiemetic.

In a series reported by Elias et al.,¹ there was a 60% incidence of head pain during sonication, and a 33% incidence of nausea with a 20% incidence of vomiting. In our experience with more than 50 patients with ET, we have seen the following. 1) Pain. The headache experienced can be severe enough to limit the power used. This can necessitate intravenous analgesia or risk aborting the procedure. 2) Nausea and vomiting. The vertigo is a relatively consistent experience for ET patients and may contribute to the nausea. Vomiting while secured to the MRI table and helmet poses a safety threat to the patient. 3) Claustrophobia is usually mild, but we observed severe symptoms requiring moderate to heavy sedation to complete the procedure. 4) Positional discomfort is a relatively common experience for these lengthy procedures (3–4 hours) and is effectively managed with sedation.

Therefore, we contend that the comment in the authors’ conclusions that there is no need for anesthesia is premature. While general anesthesia may not be required, we believe that the presence of personnel able to provide intravenous sedation and analgesia is essential for the safety of the patients and a more comfortable experience throughout the procedure.

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References

Disclosures
Dr. Chapman states that, although he has participated in trials funded by Insightec, Inc., he has received no personal benefit.

Response
We wish to thank Drs. Chapman and Tarshis for their important comments on our report of MRgFUS for tremor. In our cohort, forehead pain was encountered in 11 patients. Forehead pain occurred during sonication, although patients were treated with preoperative 1000 mg paracetamol. Patients usually complained of pain toward the end of the procedure, when the treatment energy was high, with a temperature above 50°C. Most patients tolerated the pain or responded to intravenous paracetamol. One patient in this series asked to stop the procedure prematurely because of pain but was convinced to undergo additional sonications while holding a staff member’s hand until a target temperature above 55°C was reached. As for vertigo, we encountered short-lasting, self-limited vertigo during the sonication in 14 patients. Vertigo was rarely reported spontaneously by patients and was noted only when patients were specifically questioned about this symptom. In our patients, it was not a limiting factor for treatment. Vomiting was rare in our series, but, as the patients are secured with the stereotactic frame to
the MRI table during the procedure, it is indeed a great concern. In most cases an antiemetic was given preoperatively (8 mg ondansetron) and was administered again, during sonications, when needed. Because of the seriousness of vomiting while secured to the MRI table, our team includes an anesthesiologist for all treatments. We agree with Chapman and Tarshis that this treatment should not be performed without an anesthesiologist present during the procedure. We want to clarify that general anesthesia is not needed for MRgFUS, but an experienced anesthesiologist is required.

We did not encounter claustrophobia in our present series, probably because we questioned patients before the procedure regarding this condition. None of our patients complained of positional discomfort since special attention was given to a padded and warm patient environment with flexed legs and pads under the knees. Furthermore, between sonications, when examining the patients, we encouraged them to exercise their legs.

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Postcranioplasty changes in cerebral blood perfusion and its impact on neurological and clinical outcomes

TO THE EDITOR: We studied with keen interest the article by Shahid et al. regarding their experience of the effects of cranioplasty on neurological and clinical outcomes and its relationship with cerebral blood flow (Shahid AH, Mohanty M, Singla N, et al: The effect of cranioplasty following decompressive craniectomy on cerebral blood perfusion, neurological, and cognitive outcome. J Neurosurg [epub ahead of print March 3, 2017. DOI: 10.3171/2016.10.JNS16678]). We commend the authors for undertaking an evaluation of this commonly performed neurosurgical procedure beyond the cosmosis and mechanical protection it provides.

The authors found that all tests of cognition showed statistically significant improvement after cranioplasty, but the effect was limited regarding improvement in hemodynamic parameters. There was a significant increase in blood flow only to the occipital lobe, while the frontal lobe showed only a nonsignificant increase. It is difficult to explain the improvement in the cognitive parameters based on these findings, as most of the neuropsychological tests that were administered are of functions executed by the frontal lobe. Even the immediate and delayed recall showed improvement while SPECT revealed a decrease in blood flow to the temporal lobe, although not significant, which is opposite to the obvious expectation. Also, we suspect that there might be an indirect relationship between the decrease in blood flow to the basal ganglia and improvement in motor functions of all 10 of the 34 patients who had weakness before cranioplasty. It would have been useful if the authors had discussed the possible explanations for these counterintuitive findings. We also note that in this study an arbitrary time interval of 3 months was chosen to evaluate the effect of cranioplasty on all outcome variables, but there was no biologically plausible rationale or reference provided for this choice.

It has been noted that 2 patients had to undergo titanium mesh cranioplasty due to autologous bone infection. It would have been very interesting for the readers to know the outcomes of these 2 patients in particular. It would have helped in gaining insights regarding the differences between different materials which may make in the blood flow changes, and finally in the outcomes across various parameters.

Another very important aspect of cranioplasty that was not mentioned in the article was in regard to the postcranioplasty complications. It has been found by different studies that there is significant risk of resorption of the bone used for cranioplasty, sometimes as high as 20%. The effect that such resorption has on the cerebral hemodynamics and consequently its effect on clinical and neurological outcome variables should have been evaluated and discussed, considering its significant rate. For this, a longer follow-up duration is needed with blood flow measurements and neuropsychological testing repeated at well-defined intervals.

The initial indication for performing decompressive craniectomy was not mentioned anywhere in the article. We suspect that the initial diagnosis may have a major bearing on the final outcome of the patients. It must be mentioned whether patients with frontal lobe injury or contusion, infarct involving frontotemporal region, etc., were included without any selection bias. If not, then it will be erroneous to extrapolate the findings of this study to all patients with traumatic brain injury.

It is appreciable that the authors have compared the early (less than 6 months) and the late cranioplasty groups separately with matching. Although they found greater improvement in the neurological outcomes in the early group, they have noted that this may be confounded by the greater rate of spontaneous recovery early in the postcraniectomy phase as noted by Di Stefano et al. The question of long-term impact of early cranioplasty thus goes unanswered in spite of the prima facie advantage. The improvement attributable to cranioplasty over and above the expected spontaneous recovery has not been evaluated for either group. Although ideally a control group not undergoing cranioplasty must be considered, if the outcomes of the late cranioplasty group are also measured around the time of early cranioplasty, these may serve as controls for the early cranioplasty group.

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