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Radiofrequency Thalamotomy for Drug-Refractory Essential Tremor

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In their interesting article “Comparative Evaluation of Magnetic Resonance-Guided Focused Ultrasound Surgery for Essential Tremor,” Kim et al. [1] have attempted a comparison of radiofrequency (RF) thalamotomy, deep brain stimulation (DBS), and magnetic resonance-guided focused ultrasound surgery (MRgFUS) for the treatment of drug-refractory essential tremor (ET). However, they fail to elucidate the detailed RF thalamotomy procedure carried out during their study.

For a proper understanding of their methodology, we believe that the specifications regarding the diameter and length of the exposed tip of the RF electrode employed must be made available as these affect the volume of the resultant lesion. They state their use of intraoperative neurophysiological testing for confirmation of target location, but with no precise information about what kind of testing or confirmation method and a lack of technical details, i.e., whether they used microelectrode recording with true microelectrodes/semi-microelectrodes or macrostimulation with side-seeking macroelectrode (SSE). The details of the additional thermocoagulation that they performed also need to be known. Selection of an appropriate lesioning temperature and duration, electrode-tip diameter and exposed tip length, and number of lesioning sites along the lesioning tract determine the lesion volume in stereotactic surgery [2].

While the Methods section on RF thalamotomy was quite vaguely described, a detailed specification of ventral intermediate (Vim) nucleus coordinates for MRgFUS was furnished. We wonder why such information was not provided for RF thalamotomy. Moreover, the size of the lesion, or its distance from the wall of the third ventricle and the region around the lateral border of the thalamus on the posttreatment MRI scans, to indicate the exact size and location of the final target achieved, are also not mentioned. All these factors greatly influence the occurrence of complications [3], and so drawing conclusions based on this incomplete description is erroneous. We frankly confess an unsettling curiosity for the reason behind such a callous elucidation of the RF thalamotomy procedure in this article.

Another important concern about this article is the strikingly high incidence of complications reported in patients treated with RF thalamotomy as opposed to MRgFUS. Besides, there exists a

lack of discussion of the reasons for this inordinate occurrence of procedure-related complications. More than half of their patients undergoing unilateral RF thalamotomy developed complications during the first week postsurgery, which, in our opinion and experience, strongly suggests inaccurate mapping of the Vim nucleus coordinates or inadequate lesioning.

Nevertheless, we maintain the perspective that a detailed elucidation of the Methods section is essentially important to convincingly insist on these significantly higher complication rates. At this point, revisiting the clarification of the procedure for intraoperative neurophysiological testing and confirmation of target location is warranted, since such a substantial incidence of procedure-related complications may imply that the procedure in fact proved futile.

At our center, we practice correct Vim nucleus coordinate mapping and careful observation, using macrostimulation under impedance monitoring which we consider essential for safe and effective RF thalamotomy. We routinely conduct Vim thalamotomy for drug-refractory ET but have never encountered the incidence of complications reported in their article [1]. We further stress the importance of watchful macrostimulation for the precise mapping of Vim nucleus coordinates to circumvent the reported complications.

Furthermore, this described high incidence of complications for RF thalamotomy at 1 week, 1 month, and 12 months after surgery would have been obtained from medical records since such procedures were performed only until 2004, and so the reliability here is uncertain. The lowest complication rates of MRgFUS appear incredible and biased [4, 5]. MRgFUS is definitely a potential treatment modality for ET depending on the patient and disease factors, but it is still under trial for the evaluation of long-term results and validation.

The authors talk of RF thalamotomy being no longer in frequent use and its abandonment from the clinical field due to the high incidence of procedure-related complications. However, RF thalamotomy has not been abandoned as stated in their article. Published guidelines from the American Academy of Neurology (AAN) in 2005, updated in 2011, recommend the use of unilateral thalamotomy for the treatment of limb ET that is refractory to medical treatment (level C) [6, 7].

As rightly pointed out, this work is a retrospective review of medical records with a significant gap of over 10 years between RF thalamotomy and MRgFUS. Consequently, the significance of a surgeon's skill and experience and knowledge of technical advances is amplified.

We unquestionably deduce that the formulation of the statements made by the authors based on insufficient information creates a misleading impression of RF thalamotomy in the field of functional neurosurgery around the world which cannot be endured. We have made a sincere attempt at correcting, or even preventing the creation of, this wrong impression precipitated (and left on young minds) by this article. We hope to provoke a sense of disbelief towards the bid to tarnish RF thalamotomy.

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