

Real-time intraoperative ultrasonography in the surgical resection of brain lesions: A cheap, effective, and quick alternative

Sir,

Neuronavigational systems are becoming more and more available in neurosurgical operation theaters and have become a standard form of accessories in the operating room for surgical resection of brain and spinal cord lesions.^[1] Many intraoperative guiding systems have been developed, including intraoperative

magnetic resonance imaging (MRI; Brain suit) for this purpose,^[2,3] however, these instruments are quite expensive. Therefore, the need for intraoperative real-time imaging has become more important, although it may not be that efficient but it can partially overcome the problem of the cost. Apart from this it is cheap, portable, and accurate and may be more useful while working with limited resources.^[1] Five consecutive brain tumor cases in supratentorial region as well as in infratentorial region were operated and a real-time neuronavigation system was used by senior author in the near past [Figure 1]. Multiple images were taken at the start of operations, during the procedures, and at the end of the procedure. At the end, the extent of tumor excision was assessed and if there was any tumor left, further excision was performed keeping in mind "safe resection." Postoperative CT or MRI images were performed and compared with the extent shown in intraoperative ultrasonography (USG) to correlate the extent of tumor excision and reliability vis-a-vis CT or MRI imaging. It was found that the real-time intraoperative USG helped us to guide the extent of tumor and extent of excision or decompression of the tumors and correlated quite well as inferred with the postoperative CT or MRI imaging.

The intraoperative USG images may be as good as if not superior to good quality MRI images.^[4,5] The intraoperative USG imaging may easily be performed through the same opening as used for resection of tumor.^[1] Most neurosurgeons are familiar with the MRI images than the USG because they interpret MRI images every day in clinical practice, but Neurosurgeons who have started using USG and want to explore the possibilities

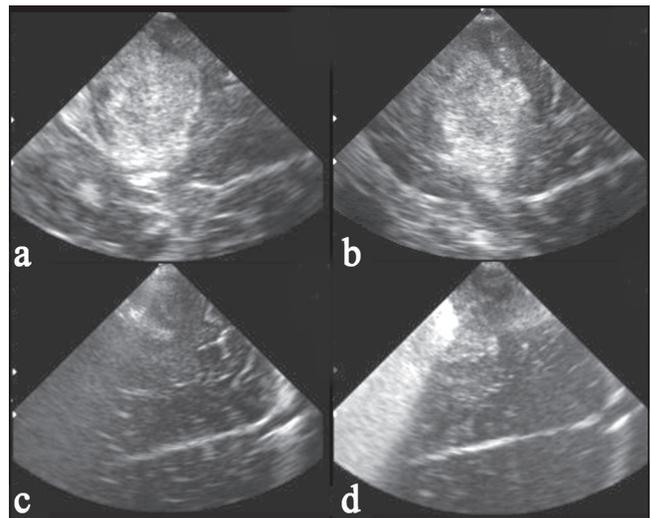


Figure 1: Intraoperative pre-excision images (a and b), intraoperative postexcision images (c and d)

need to learn the new technique very quickly.^[1] Many groups have reported the clinical efficacy of using USG to get intraoperative updates for surgical guidance and control.^[6-8] USG-guided micro-neurosurgery represents a handy, reliable, and relatively low-risk procedure for the treatment of intra-axial brain tumors.^[9] Intraoperative real-time USG can be very useful and cost-effective portable alternative as against very costly and cumbersome alternatives; however, we need to study further to assess the feasibility of this procedure.

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References

1. Unsgaard G, Rygh OM, Selbekk T, Müller TB, Kolstad F, Lindseth E, *et al.* Intra-operative 3D ultrasound in neurosurgery. *Acta Neurochir (Wien)* 2006;148:235-53.
2. Albayrak B, Samdani AF, Black PM. Intra-operative magnetic resonance imaging in neurosurgery. *Acta Neurochir (Wien)* 2004;146:543-56.
3. Nimsky C, Ganslandt O, Von Keller B, Romstöck J, Fahlbusch R. Intraoperative high-field-strength MR imaging: Implementation and experience in 200 patients. *Radiology* 2004;233:67-78.
4. Babcock DS, Barr LL, Crone KR. Intraoperative uses of ultrasound in the pediatric neurosurgical patient. *Pediatr Neurosurg* 1992;18:84-91.
5. Bonsanto MM, Staubert A, Wirtz CR, Tronnier V, Kunze S. Initial experience with an ultrasound-integrated single-RACK neuronavigation system. *Acta Neurochir (Wien)* 2001;143:1127-32.
6. Comeau RM, Fenster A, Peters TM. Intraoperative US in interactive image-guided neurosurgery. *Radiographics* 1998;18:1019-27.
7. Dohrmann GJ, Rubin JM. History of intraoperative ultrasound in neurosurgery. *Neurosurg Clin N Am* 2001;12:155-66, 9.
8. Griffith S, Pozniak MA, Mitchell CC, Ledwidge ME, Dempsey R, Peters A, *et al.* Intraoperative sonography of intracranial arteriovenous malformations: How we do it. *J Ultrasound Med* 2004;23:1065-72.
9. Roselli R, Iacoangeli M, Pentimalli L, Prezioso A, Scerrati M, Rossi GF. Intraoperative real-time ultrasonography in the microsurgical removal of subcortical or deep-seated brain tumors. *Acta Chir Belg* 1993;93:185-7.