



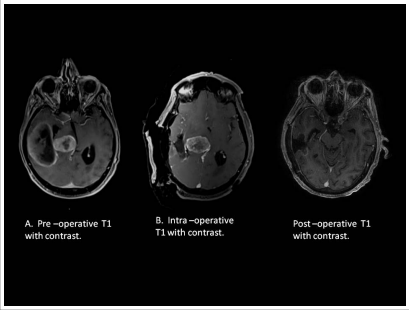
Introduction

Intraoperative MRI has demonstrated efficacy in the surgical treatment of intracranial tumors. However, advances in technology have allowed newer systems to be used outside of traditional research institutions. With the potential that more surgical procedures could benefit from intraoperative imaging, this study reviews its impact on a general neurosurgical population.

Methods

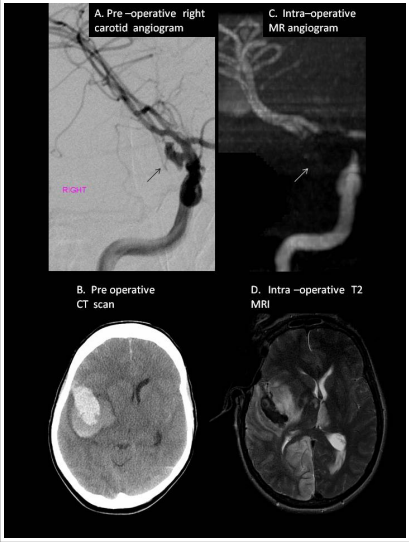
The intraoperative MRI at Wilkes-Barre General Hospital was one of the first high field units in the United States and was installed in a community hospital. All neurosurgical cases utilizing intraoperative MRI between 6/2006 and 3/2013 at this institution were reviewed. Information on procedure type, complications, outcomes, and whether

Figure 1.



63 year old with primary lung cancer had initial studies which suggested a single, right temporal tumor that extended into the lateral ventricle (A). After first resection, MRI showed residual tumor which was a separate metastasis (B). Secondary resection achieved gross total removal (C).

Figure 2.

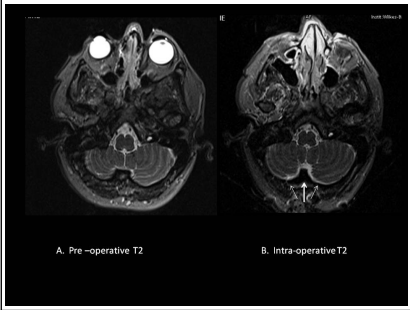


49 year old presented with Gr. IV SAH and R p. comm. aneurysm (A, black arrow). After clipping, MRA showed signal void at clip (C, white arrow), but good distal flow. MRI showed more extensive infarcts than initial CT (B, D). Patient expired.

Results

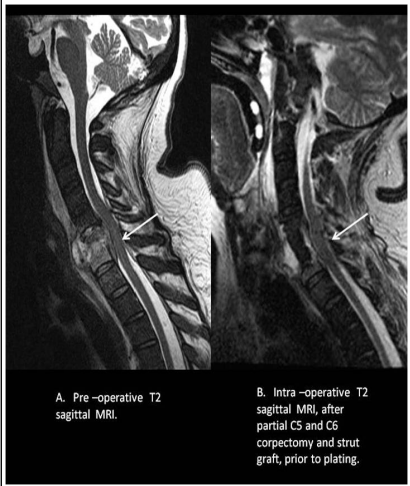
One hundred ninety five surgeries were performed during the review period. Of these, 104 were cranial and 91 were cervical. Eighty one of the cranial surgeries were tumor resections. In 26, imaging data lead to additional debulking of residual tumor. In vascular surgeries, imaging confirmed perfusion following 4 aneurysm clippings and no residual nidus following 3 AVM resections. In two Chiari decompressions, there was increased posterior fossa subarachnoid space following craniectomy and duroplasty was not performed. Of 91 cervical cases, seventy-seven were for one or two level anterior cervical discectomies. In one of these, an additional level discectomy was not performed because imaging showed less severe myelomalacia than the preoperative scan. In another case, intraoperative imaging allowed localization of an intrinsic cervical cord tumor. Several cervical cases required less extensive surgery because of the imaging data. There were no complications related to the MRI.

Figure 3.



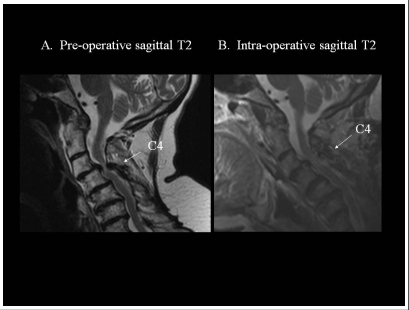
48 year old presented with headaches and bilateral shoulder pain. Preoperative MRI showed a Chiari I malformation (A). After bony decompression, intraoperative MRI showed improved posterior fossa subarachnoid space (B, white arrows). A duroplasty was not performed and the patient had improvement of all preoperative symptoms.

Figure 4.



52 year old with worsening quadriparesis was found to have a C5 osteomyelitis with C5-6 epidural abscess (A). After anterior C5-6 discectomy and partial C5 and C6 corpectomy, intraoperative MRI showed C6 abscess was decompressed (B, white arrow). No further bone removal was performed.

Figure 5.



73 year old presented with worsening myelopathy and C3-4 stenosis (A). After a minimally invasive C3 laminectomy and removal of C3-4 ligamentum flavum, intra-operative MRI showed decompression was achieved (B). C4 lamina was not removed.

Conclusions

Intraoperative MRI can be applied to neurosurgical procedures involving the cranium and cervical spine. This review showed its greatest usefulness was in improving tumor resection. There was also utility in visualizing perfusion in vascular cases, posterior fossa anatomy in Chiari decompressions, and lesions affecting the spinal cord in cervical surgeries.