



Intraoperative MRI Facilitates Aggressive Brain Tumor Resections in Children

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Introduction

The prognosis for children with operable brain tumors correlates to the degree of resection, regardless of benign versus malignant histology. The use of adjuvant chemotherapy and/or radiation therapy is critical, but initial tumor resection remains paramount. The application of diagnostic quality intraoperative magnetic resonance imaging (iMRI) has been recently introduced to pediatric neurosurgery. We have designed and implemented a unique IMRIS iMRI operating room suite whose mobile, ceiling-mounted, 1.5 Tesla Siemens magnet glides from a diagnostic suite to the operative suite. We present our first 250+ consecutive iMRI brain tumor resections.

Methods

In February 2007, we dedicated an iMRI operating room suite housing MRI-compatible anesthesia equipment, standard operating room equipment (intraoperative neuro-navigation and mobile operating microscopes) and robust safety protocols. The iMRI room is engaged for epilepsy and Chiari surgery, vascular malformations and brain tumor resections.

Results

We employed the iMRI operating room for 251 tumor extirpation cases over an 8 year period. Patients ranged in age from infancy to late adolescence, with a mean age of 9 years. Posterior fossa tumors accounted for 41% of the resections. Low-grade neoplasms represented 67%. There were an average of 1.2 intraoperative MRI scans per procedure, with a mean scan time of 37 minutes. Intraoperative scanning prompted additional tumor resection in 43% of cases. There were no iMRI-related complications, no increased incidence of infection (one patient) and no anesthesia problems. The next day re-operation rate (going back to neurosurgery due to unresected tumor) was zero.

Conclusions

iMRI facilitates aggressive brain tumor resection in infants, children and adolescents with a low complication rate. The technology is safe and has resulted in no unanticipated 'go back' reoperations the next day as had historically occurred in our prior non-iMRI cases. iMRI during tumor resection surgery has become standard practice at our institution.

