

INTRA-OPERATIVE MRI AND ITS EFFECT ON OUTCOME IN PATIENTS UNDERGOING INTRACRANIAL TUMOR SURGERY: A RETROSPECTIVE STUDY

Anurag Tewari, MD; Shobhana Rajan, MD; Rajkalyan Chakrabarti, MD, Mohamaddi A, MD and Rafi Avitsian MD
Cleveland Clinics Foundation, Cleveland, Ohio

ABSTRACT

TITLE: Intraoperative MRI And Its Effect On Outcome In Patients Undergoing Intracranial Tumor Surgery: A Retrospective Study.

BACKGROUND:

Intraoperative MRI in neurosurgery provides an edge by early detection of complete or near complete tumor excision. We report the 30 day outcome after craniotomy for intracranial tumor excision in an intraoperative MRI (iMRI) milieu. Due to paucity of studies looking at the usefulness of the iMRI compared to standard resection techniques, we decided to undertake this study

OBJECTIVE:

Retrospective chart review and analysis of an existing database from electronic patient records and paper charts of patient who underwent iMRIS was carried out. We examined the 30 day outcome of patients who were operated in the last three years. A compilation of seven endpoints were used to determine the patient outcome.

RESULTS:

From a total of 133 patients who underwent iMRIS in the last three years, medical records of 127 patients were reviewed. The distribution for the location of the patients on the 30th day after surgery was home (83%), rehabilitation center (10%) and ICU (7%). The average length of stay in HDU/ICU was 2.7 days. Only 4.2% patients had repeat surgeries within the 30 days for minor surgeries. The average Karnofsky performance score was 77 on the 30th day postoperatively.

The average surgical time was 283.5 minutes while the anesthesia time was 372.3 minutes. Immediate postoperative anesthesia complications comprised of PONV (7.8%), Pain (3.6%) and delayed emergence (1.7%). Surgical complications were very minor and comprised transitory speech and movement disorders, wound infections, subgaleal fluid collection, and hydrocephalus.

CONCLUSIONS:

The results may suggest patients undergoing iMRIS had fewer surgical complications and re-operations within the stipulated study period we need more data collection and statistical comparison to confirm our hypothesis. The anesthetic time however does increase secondary to a cumbersome and prolonged patient preparation and MRI scan time.,

METHODS

Our primary hypothesis was that intraoperative open iMRI brings about better outcome in patients who undergo surgical resection of intracranial tumor.

We looked for 30 day outcome of the patients who were operated in the last two years in CCF by conduction a retrospective chart review and analysis of an existing database

Institutional review board (IRB) approval was obtained and health insurance portability and accountability act standard was strictly followed for this retrospective study.

End Points:

- The average surgical time
- The average anesthesia time
- Post operative surgery related complications
- Post operative anesthesia related complications
- The average length of stay in HDU/ICU
- The location of the patients on the 30th day after surgery
- Incidence of surgical re-exploration (repeat surgery)
- The average Karnofsky performance score on the 30th day postoperatively

Definition	Score	Criteria
Able to carry on normal activity and to work; no special care needed	100	Normal, no complaints; no evidence of disease
Unable to work; able to live at home and care for most personal needs; varying amount of assistance needed	90	Able to carry on normal activity; minor signs or symptoms of disease
Unable to care for self; requires equivalent of institutional or hospital care; disease may be progressing rapidly	80	Normal activity with effort; some signs or symptoms of disease
	70	Cares for self; unable to carry on normal activity or to do active work
	60	Requires occasional assistance, but is able to care for most personal needs
	50	Requires considerable assistance and frequent medical care
	40	Disabled; requires special care and assistance
	30	Severely disabled; hospital admission is indicated although death not imminent
	20	Very sick; hospital admission necessary; active supportive treatment necessary
	10	Moribund; fatal processes progressing rapidly
	0	Dead

Source: Reference 6.

Exclusion Criteria:

- Patients who did not undergo the complete surgery in the MRI suite
- Patients who could not be followed up for the whole study period
- Patients with incomplete/incomprehensible paper charted anesthesia records (as electronic patient records were not available for iMRIS)

Data Collection:

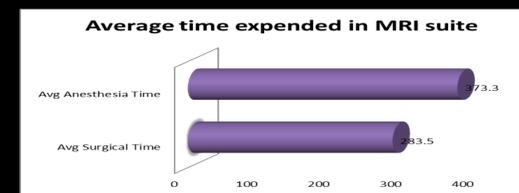
All patients included in the study were operated in one institution (CCF).

The study included iMRI surgeries done from June 2010 to September 2013.

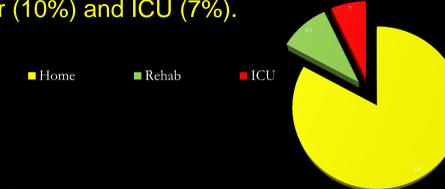
The data was compiled and at present the study is undergoing appropriate statistical tests and analysis.

RESULTS

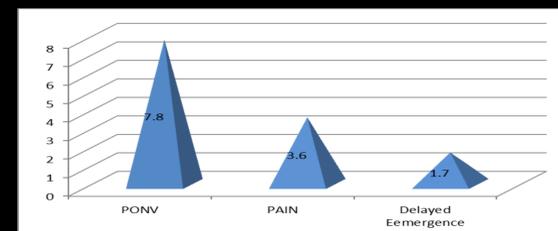
- From a total of 133 patients who underwent iMRIS in the last three years, medical records of 127 patients were included for the study and reviewed.
- There were 55 males and 74 females with an average age of 49.4 years.
- The average time for iMRIS was 283.5±2.34 minutes while the anesthesia time was 372.3 ± 3.05 minutes.



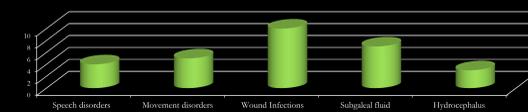
- The distribution for the location of the patients on the 30th day after surgery was home (83%), rehabilitation center (10%) and ICU (7%).



- Immediate postoperative anesthesia complications comprised of PONV (7.8%), Pain (3.6%) and delayed emergence (1.7%).



- Surgical complications were very minor and comprised transitory speech and movement disorders, wound infections, subgaleal fluid collection, and hydrocephalus.



- There were no mortalities within the study period, though 14% had expired after the 30 days

- All patients were shifted to post anesthesia care unit (PACU) and then to lower dependency units

- Only 4.2% patients had repeat surgeries within the 30 days for minor surgeries (wound infection, drain removal etc).

DISCUSSION



Currently we are reporting the 30 day outcome after craniotomy for intracranial tumors in an iMRIS setting. For comparison, we looked into the literature: A prospective analyses of the American College of Surgeons' National Surgical Quality-Improvement Project (NSQIP) database from 2006 to 2010 of 970 patients shows The median length of hospital stay was 5 days; the rate of minor and major complications were 5.9% and 13.1%, respectively; 5.7% of patients returned to the operating room; and 4.3% of patients died within 30 days.

Another retrospective study looked at 13,685 admissions for the resection of metastatic brain tumors identified in the NIS database between 1988–2000. In-hospital mortality for the entire cohort was 3.1%. Approximately 5.5% of the patients were discharged to long-term care facilities, 11.2% were discharged to other facilities such as rehabilitation hospitals, and 80.2% were discharged directly home.

We plan to compare our results with those being performed in a non-iMRI setting in the future, and we believe that our current results may suggest patients undergoing iMRIS had fewer surgical complications and re-operations within the stipulated study period.

LIMITATIONS

Our relatively small population and the retrospective data collection are limitations of our study.

However, the prospective collection of our intraoperative observations and its comparison to non iMRIS intracranial surgery might improves the strength of this analysis.

REFERENCES

- Berkman S, Acta Neurochir (Wien). 2014 Sep 2
- Claus EB, Cancer 103:1227–1233
- De Witt Hamer PC. J Clin Oncol 30(20):2559–2565
- Senft C, Neurosurgery. 2008 Oct;63(4 Suppl 2):257–66;
- Seicean A; Cancer, Volume 119, Issue 5, pages 1058–1064, 1 March 2013
- Barker F: Cancer March 1, 2004 / Volume 100 / Number 5