

Efficiency of Intraoperative MRI (iMRI) in Balancing the Extent of Resection and Complications in Pediatric Posterior Fossa Tumors

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The authors disclose no conflict of interest

Introduction

- Posterior fossa tumors are the most common pediatric central nervous system tumors.
- The commonest of these being medulloblastoma, epyndymoma and pilocytic astrocytoma, which together comprises the majority of posterior fossa tumors.
- The role of iMRI as an adjuvant in specific resection of posterior fossa tumors, in order to achieve the balance of complete safe resection without increasing surgical complications is not clear.

Methods

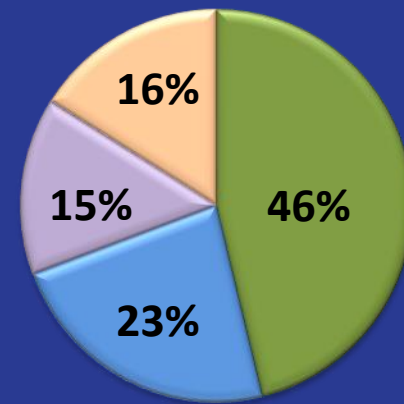
- A retrospective database review was conducted, for all patients who underwent surgical resection of posterior fossa tumors at pediatric neurosurgery department in King Fahad Medical City, from January 2006 until December 2011.
- The sample was divided into two groups:
 - Group 1:** underwent resection with the use of (1.5 Tesla) iMRI.
 - Group 2:** underwent conventional resection without iMRI.
- Variables studied for comparison in each group were demographics, blood loss, length of hospital stay, tumor histopathology, extent of tumor resection and post-operative complications.

Methods

- The complications were further sub analyzed by type through grouping them into 3 main categories: (1) Infection (2) Cerebellar injury and (3) Brain stem injury.
- Statistical analysis was performed using SPSS v22.0 software through Chai-Square (for complications and resection extent assessment) and T-test (for EBL, LOS, and age assessment).

Results

74 patients	
Group 1	Group 2
48	26



- Medulloblastoma
- pilocytic astrocytoma
- other
- ependymoma

Results

Variable	Group 1 (n=46)	Group2 (n=26)	P value
Complete resection	32 (66.6%)	10 (38.4%)	P= 0.019
Median EBL (ml) + interquartile range	250 + 165	200 + 268	P= 0.3
Mean LOS (days) \pm SD	30 \pm 21	28.2 \pm 10.6	P= 0.67
Total Complications	13 (27%)	7 (27%)	P= 0.988

Results

Complication by category	Group 1 (n=48)	Group2 (n=26)
Infection / Meningitis	3 (6%)	4 (15%)
Cerebellar Injury	6 (12%)	5 (19%)
Brain Stem injury / CNP	5 (10%)	1 (4%)

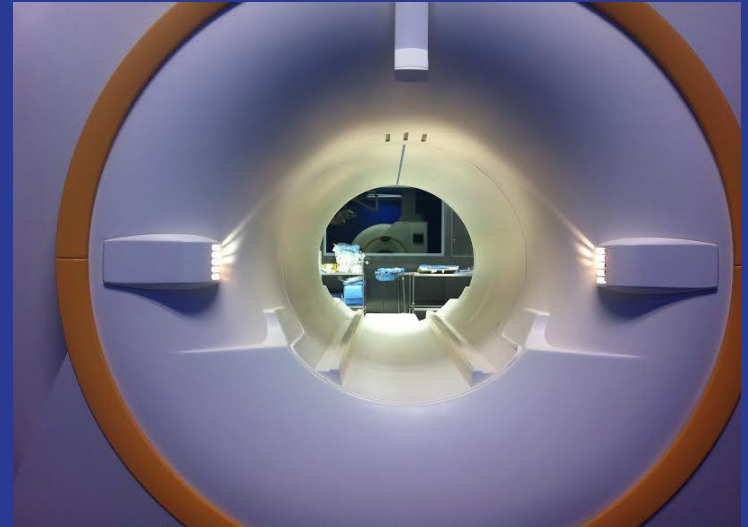
Discussion

- In our study the majority of cases in group 1 underwent further resection of their tumor after the initial intraoperative scan as the newly acquired scans were used to update the neuronavigation imaging data sets.
- This obviously reflects on prognosis, decreases the number of second time resections and decreases recurrence rates.
- Despite the increase in the length of surgery, transfer patients and multiple (iMRI) sessions, we did not find an increase in the infection rate in group 1; in fact it was less compared to group 2.



Discussion

- When these complications are further analyzed, we find that the gravity of complications are more significant in group 1 with the occurrence of more serious complications specifically higher rates of brain stem injury and cranial nerve palsies.
- This may be related to a more extensive or aggressive resection of the residual tumor that would not have been identified if not for the use of (iMRI).



Discussion

- Mutism, global developmental (cognitive) delay and ataxia which are complications that may be attributed to mechanical cerebellar injury had a higher incidence in group 2.
- We suggest that this is related to improved real time localization in group 1 therefore minimizing the need for wide invasive exposures and excessive retraction of the cerebellum thereby avoiding injury whether transient or permanent to the cerebellar nuclei and their connections.

Conclusion

- the use of (iMRI) in resection of pediatric posterior fossa tumors may not increase the overall complication rate but it may change the type and gravity of these complications.
- It is difficult to reach a definitive conclusion in that regards due to the limitations in our review namely the study design (retrospective), and the relatively small samples in both groups. Further studies addressing this point are needed in the future.

Thank you