

Pediatric Brain Tumor Surgery Acute Neurological Complications

Carolyn Lai, MD; Zachary Luke Tataryn, MD, Michael Vassilyadi, MD

Children's Hospital of Eastern Ontario, Canada

University of Ottawa

BACKGROUND

- Improving surgical care by monitoring and recording complications is becoming increasingly important for quality assurance
- Every treatment decision requires careful weighing of the anticipated benefits and both foreseeable potential complications, as well as, unforeseeable risks
- In particular, there is a void in the pediatric neurosurgical literature looking at acute neurological complications (ANC) as a result of brain tumor surgery

LITERATURE REVIEW

Journal of Neurosurgery: Pediatrics

Aug 2012; Vol. 101 No. 2 | Pages 88-95

ARTICLE
Consensus definitions of complications for accurate recording and comparisons of surgical outcomes in pediatric neurosurgery
Clinical article

James M. Drake, M.D., Ph.D., Ash Singh, M.D., Ashraf V. Kulkarni, M.D., Ph.D., Gabriella Deliber, M.D., D. Douglas Cochrane, M.D., and The Canadian Pediatric Neurosurgery Study Group

- Defines neurologic deficit as...
 - “a loss of function of a cranial nerve, motor function, sensory function, autonomic function including bladder and bowel control, coordination, cognitive function. A new tremor or movement disorder is also a neurological deficit.”

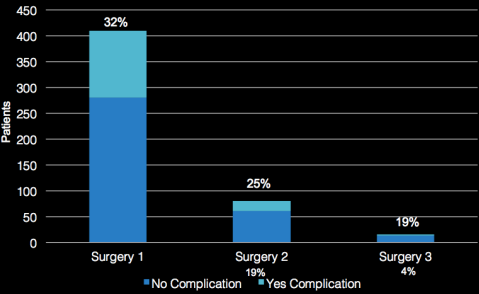
STUDY DESIGN

- Consecutive chart review of all children who underwent brain tumor surgery at CHEO from 1970-2014 (including neuroimaging and neuropathology)
- Data entered into REDCap Database
- REB approval

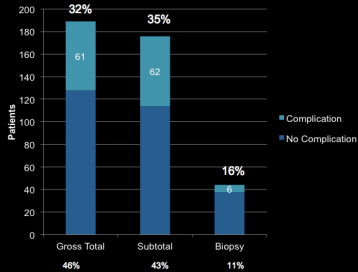
RESULTS

- Between 1970-2014, 409 children had brain tumor surgery at CHEO
 - 238 males (58%), 171 females (42%)
- 32% had ANC that were either transient or permanent and ranged from mild, moderate to severe after the first surgery
- 80 (20%) children had a second surgery with 25% ANC
- 16 (4%) had a third surgery with 19% ANC

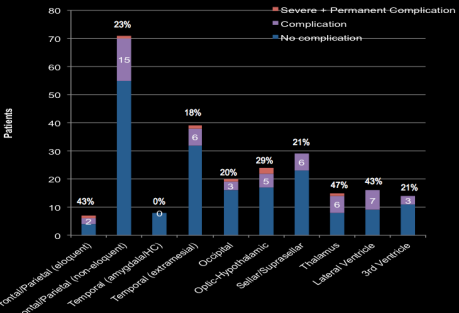
COMPLICATION RATE AFTER EACH SURGERY



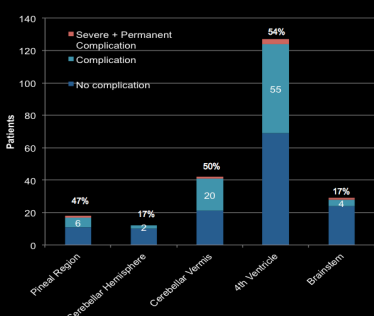
COMPLICATION RATE & EXTENT OF RESECTION



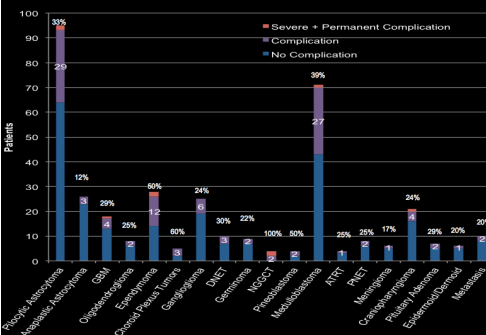
SUPRATENTORIAL LOCATION & COMPLICATION RATE



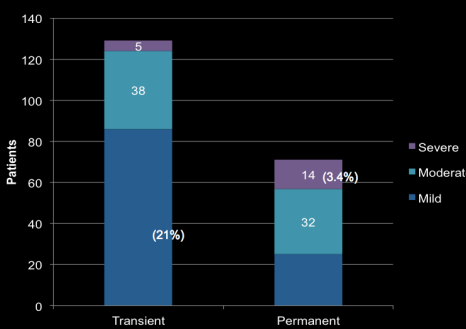
INFRATENTORIAL LOCATION & COMPLICATION RATE



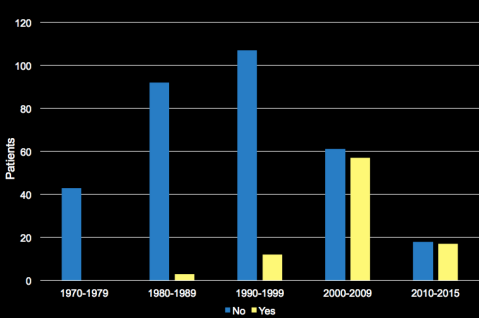
DIAGNOSIS & COMPLICATION RATE



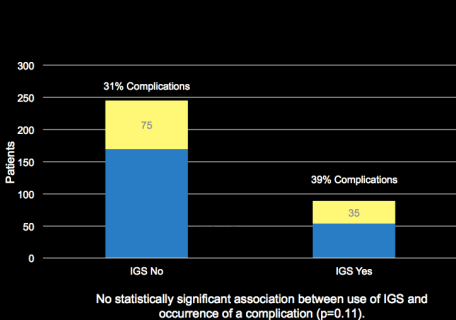
COMPLICATION SEVERITY



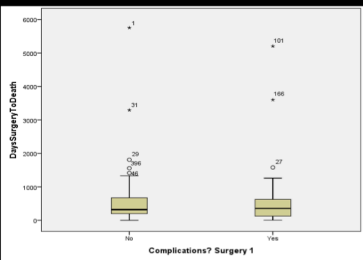
IGS - FIRST SURGERY



COMPLICATIONS & IGS



DEATH WITHIN 30 DAYS



Number of deaths within 30 days of surgery – 9/411
Rate of death was not increased if a patient had a complication to surgery or not.

SUMMARY

- The majority of complications were mild and transient, while the minority were severe and permanent
- The ANC rate did not differ according to age group, gender or extent of resection (gross total versus subtotal)
- ANC were highest with lesions located supratentorially in the thalamus (47%); infratentorially in the fourth ventricle (54%), cerebellar vermis (50%) and pineal region (47%). They were lowest in the temporal location (0-18%)

SUMMARY

- ANC varied depending on tumor type; the highest being choroid plexus tumors (60%), ependymoma (50%), medulloblastoma (39%) and pineal region tumors
- Intraoperative guidance using a navigation system did not change the degree of tumor excision, and resulted in ANC rate which was not statistically significant (p=0.11) (39% versus 30% when the navigation system was used)
- It is possible that the slightly higher complication rate associated with intraoperative guidance may be because of the more complex cases that the navigation system was attempted or utilized in

CONCLUSIONS

- The surveillance and auditing of complications is essential to their reduction and to improving surgical outcomes
- At CHEO, one third of all children who underwent brain tumor surgery had some degree of ANC that were primarily associated with the site of surgery and the tumor histopathology
- Effective surveillance of surgical complications provides timely feedback to surgeons, substantiates informed consent to patients and can potentiate a reduction in patient morbidity