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Use of intraoperative CT scanning in brain tumor surgery: 3-year experience in a single pediatric center

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Introduction: The development of image-guided neurosurgery represents a substantial improvement in the microsurgical treatment of brain tumors. Despite its wide applicability, a major drawback of this technology is they use images, mainly MRI pictures, acquired preoperatively, on which the planning of the operative procedure as well as its intraoperative performance is based. The purpose of this study is to show the technical feasibility and the potential impact of intraoperative CT scanning.

Methods: Since 2011, intraoperative CT scanning was performed in all patients undergoing brain tumor surgery, accounting for 150 procedures. Theater set up (neuronavigation system, microscope) and patient positioning were adapted to the presence of the scanner. A scan was taken at the beginning of the procedure and a contrast enhanced scan before the conclusion of surgery; other scans were obtained whenever necessary. The scans were evaluated for residual disease and intraoperative complications.

Results: In virtually all cases it was possible to obtain intraoperative CT scan, despite patient age (from 3 months to 16 years old) , and positioning (supine, lateral and prone). Surgery was interrupted for about 15-20 minutes during scanning. New information obtained from the intraoperative CT scan led to alteration in the surgical plan in 20% of patients. Intraoperative complications were diagnosed in three patients (epidural hematoma, subdural hygroma and skull fracture from pin perforation).

Conclusion: Intraoperative CT scanning can be performed with currently available technology and has the potential to improve surgical results in pediatric brain tumors.