SURG-05. INTRACELLULAR PROTOPORPHYRIN IX IN PEDIATRIC BRAIN TUMORS
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BACKGROUND: Herpes simplex virus encephalitis (HSVE) is a rare complication after neurosurgery, and its clinical picture mimics features of other more frequent infectious complications of bacterial origin. Probably, the triggering factors are manipulation and surgical stress, since most cases occur due to reactivation rather than primary infection. The main symptoms include fever and altered consciousness. DNA identification of HSV by PCR has accuracy even in postoperative specimens. Diagnosis is associated with a mortality of 30%, and potential neurologic sequelae such as cognitive and motor. CASE REPORT: An 18-year-old male patient presented with a history of altered consciousness due to an extended craniotomy. On the third postoperative day, he presented with fever and altered consciousness. Magnetic resonance imaging (MRI) showed high signal intensity on T2-weighted and FLAIR images in the left frontal and temporal lobes, diffuse gyral swelling, and corpus callosum, with mass effect. He was admitted to the intensive care unit with possible sepsis, but postoperative septic shock was ruled out. After a negative test for sepsis, cerebrospinal fluid analysis was performed, and herpes simplex virus type 1 and 2 were confirmed. The patient was treated with acyclovir. Histology and PCR confirmed HSVE type 1 and 2. He received intravenous acyclovir for two weeks and was discharged after a period of recovery and improvement. He received follow-up for at least six months, without recurrence of symptoms and with a good outcome. CONCLUSION: Clinical suspicion, CSF PCR, and imaging are of paramount importance for early diagnosis of HSVE, which should be considered in the differential diagnosis of recent postoperative neurosurgical cases in cases of unexplained postoperative fever with altered consciousness.

SURG-06. AWAKE CRANIOTOMY FOR BRAIN TUMOR IN PEDIATRIC PATIENTS
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BACKGROUND: The challenge of surgery in neurooncology is to achieve the maximum extent of resection while preserving eloquent functions. Intraoperative cortical mapping during resection of a brain tumor allows direct stimulation in eloquent areas with a reduction in postoperative deficits. This procedure has been performed in adults and children down to the age of 1 year, but there are only two cases reported of an 8-year-old, and 9-year-old child submitted to an awake craniotomy for brain tumor resection. Pediatric patients are prone to more risks than adults because they become easily agitated after pain sensation. Extensive preparation for the procedure is essential for pediatric patients in order to avoid a lack of cooperation. CASE PRESENTATION: Two patients, with 9-year-old presented with seizures due to a tumor in the left temporoparietal region. In order to identify language and motor-controlling areas during resection, we proposed an awake craniotomy. Because of their ages, they were prepared by a multidisciplinary team for the craniotomy and awake cooperation during the mapping procedure. Intraoperative and postoperative resection were exceptional. Postoperative cranial MRI confirmed partial resection of the lesion, whose remnant was located in the left motor area. No seizures occurred during the postoperative period, and both were discharged with no neurological disability on the fifth day after the surgery. Histology revealed a dysembryoplastic neuroepithelial tumor (WHO grade I). CONCLUSION: Brain mapping during resection of a tumor in awake pediatric patient is feasible and can be safely performed even in patients under 11-year-old.

SURG-07. CEREBELLAR PENDUCLE TUMORS IN PEDIATRIC NEUROSURGERY: FEW CITATIONS FOR BEING RARE OR FOR LACK OF AWARENESS
Felix Hada Sanders, and Hamilton Matsushita; USP, Sao Paulo, SP, Brazil

We present a case-series of 6 pediatric patients, with a follow-up for a minimum of 1 year, with a diagnostic, therapeutic and prognostic description. This type of disease was first mentioned by Professor Tomita in 1986, in a case-series with 4 patients, with few citations in literature, no other case series cited at the literatures, and in our oncology center of excellence it is an entity that draws attention for diverging from intrinsic tumors of the cerebellum, fourth ventricle and trunk. In this way, we created an algorithm approaching these patients and would like to present this associated to honouring the esteemed professor in neurosurgery.

SURG-08. SUPRASPINAL DERMOID CYST IN A PEDIATRIC PATIENT
Carlos Almeida Jr, Bruna Minniti Mançoano, Gisele Caravina Almeida, Cilda D’Agostino Eugui, and Carlos Beauerra Cavalcante; Barretos’s Children and Young Adults Cancer Hospital, Barretos, Sao Paulo, Brazil

BACKGROUND: Intracranial dermoid cysts (DC) are rare congenital non-epithelial lesions that account for 0.04 – 0.6% of all intracranial tumors. They are formed by a fibrous capsule composed of epidermal and dermal derivatives (hair follicles, sebaceous and sweat glands), enclosing a viscous fluid. Intradural DC often arise in the midline and are more common in men. CASE REPORT: A 14-year-old male patient presented with headache, partial motor seizures and behavioral changes. Neurological examination and endocrine workup revealed no abnormalities. Brain magnetic resonance imaging showed a lesion that was 4.4cm x 3cm x 4cm in size, located at suprasellar region and extending superiorly to the left lateral ventricle and anterolaterally to the left orbitofrontal lobe, associated with hyperintense fat droplets in the right lateral ventricle. We performed a left transventricular microsurgical approach. The tumor capsule was coagulated and opened and a subtotal resection with peacemical removal of the lesion was obtained: it had gelatinous consistency, composed of droplets of fat and hair and keratinized scamous epithelium content. A total removal of the DC capsule was not possible due to its firm adherence to optic chiasm and to hypothalamus. Histological examination revealed dermoid cyst. CONCLUSION: Surgery is the only effective treatment, and its goal should be the radical resection of the lesion to avoid recurrence. Whenever radical resection is not possible, because of the adhesions of the cyst capsule to surrounding tissues, a subtotal resection with piecemeal resection may be a satisfactory option in such cases to avoid high morbidity.

SURG-09. REACTIVATION OF HERPES SIMPLEX VIRUS AFTER NEUROLOGIC SURGERY
Carlos Almeida Jr, Bruna Minniti Mançoano, Seila Israel Prado, Gisele Caravina Almeida, Fernanda Magalhães Souza, and Lucas Dias Lourenço; Barretos’s Children and Young Adults Cancer Hospital, Barretos, Sao Paulo, Brazil

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SURG-10. SPECTROSCOPIC MEASUREMENT OF 5-ALA-INDUCED INTRACELLULAR PROTOPORPHYRIN IX IN PEDIATRIC BRAIN TUMORS
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OBJECTIVE: 5-ALA guided resection of glioma in adults enables better delineation between tumor and normal brain, allowing improved resection and improved patients’ outcome. Recently, several reports were published regarding 5-ALA for resection of pediatric brain tumors. The aim of the present study was to determine whether intraoperative fluorescence images of pediatric brain tumors by hyperspectral imaging and to compare it with visually observed intraoperative fluorescence. METHODS: 5-ALA was administered orally four hours prior to surgery. During tumor resection the surgeon assessed the fluorescence signal to be strong, weak or absent. Subsequently, fluorescence intensity of samples was measured by spectroscopy. In addition, clinical data, imaging and laboratory data were analyzed. RESULTS: Eleven children (1–16 years) were operated. Tumor entities included: three medulloblastomas, two pilocytic astrocytomas (PA), two anaplastic ependymomas and one diffuse astrocytoma, anaplastic pilomyxoid astrocytoma and anaplastic pleomorphic xanthoastrocytoma. Strong fluorescence was visible in all anaplastic tumors and one PA; one PA demonstrated weak fluorescence. Visible fluorescence was strongly associated with intraoperative fluorescence intensity and PPIX content.
Millward; Division of Neurology, National Center for Child Health and Development, Tokyo, Japan; Shin, Masahiro; The University of Tokyo Hospital, Tokyo, Japan; Ferguson, Christopher; Division of Neurosurgery, National Center for Child Health and Development, Tokyo, Japan; Tanaka, Akiyama; Division of Neurosurgery, National Center for Child Health and Development, Tokyo, Japan; Ogiwara, Takami; Kayo University, Tokyo, Japan; Hennigan, Chikako; Dawn Takami; Shimizu, Masahiro; Division of Neurosurgery National Center for Child Health and Development, Tokyo, Japan; Baarsen, Kirsten van; Medico-Pediatric Oncology, Korle Bu Teaching Hospital, Korle Bu, Ghana.

**OBJECTIVE:** Our experience shows that tumor resection can be safely achieved in children with thalamic lesions. No postoperative complication was observed in any of them.

**METHODS:** We reviewed 11 patients with thalamic gliomas (5 astrocytomas, 2 gangliogliomas, 2 pilocytic astrocytomas, 1 dysembryoplastic neuroepithelial tumor, 1 ganglioglioma, and 1 ganglion ependymoma). The ages of the patients ranged from 4 to 17 years. The lesions were located in the posteromedial thalamus (3), posterolateral thalamus (2), and in the subthalamic region (6). The surgical approaches included subfrontal (3 cases), transcortical (3 cases), and transventricular (5 cases).

**RESULTS:** Tumor resection was achieved in all the cases. One patient had a postoperative transient hemiparesis, and another had a postoperative transient elevation of liver enzymes, no 5-ALA related adverse events were observed.

**CONCLUSIONS:** 5-ALA enhanced fluorescence-guided resection of pediatric brain tumors is a useful tool for safely resecting tumors located in the thalamus. Further clinical studies with larger numbers of patients are required to confirm these findings.

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**SURG-12. PAEDIATRIC BRAIN TUMOUR SURGERY: HOW CAN WE REPORT OUR SURGICAL OUTCOMES AND OPERATIVE MORBIDITY?**

Mitchell Foster1, Dawn Hennigan1, Rebecca Greystone1, Kirsten van Baarsen2, Geraint Sunderland3, Christopher Millward1, Hanithchandran Sriwastava1, Deborah Ferguson1, Teddy Totumeh1, Barry Pizer1, and Conor Mallicci1; Alder Hey Children’s Hospital, Liverpool, Merseyside, United Kingdom; 1Korle Bu Teaching Hospital, Korle Bu, Ghana.

**OBJECTIVE:** Our objective was to quantify resection outcomes and operative morbidity in paediatric brain tumour surgery using existing scales, assessing their applicability.

**METHODS:** We investigated morbidity using the Clavien-Dindo (CD) scale and the Drake classification. All paediatric patients receiving a biopsy or craniotomy for an intracranial tumour in a single tertiary paediatric neurosurgery centre between January 2008 and December 2018 were studied. Complications up to day 30 post op were graded.

**RESULTS:** There were 669 operations; 92 biopsies and 576 craniotomies comprising 166 infratentorial and 292 supratentorial tumours. Median age was 9 years (56% male). The surgical goal was achieved or exceeded in 94% of cases. Thirty-day mortality was 1.31% with all deaths related to disease and neurological complications. The overall complication rate was 33% in 10.9% of cases, 2 in 18.9%, 3A in 1.7%, 3B in 11.8%, and 4 in 1.1%. There was no operative morbidity in 54% of cases. Using the Drake classification, meningitis was seen in 3.92% of cases, seizures in 3.92%, neurological deficit (that persisted at 30 days) in 8.5%, CSF leak in 5.01%, wound infection in 1.96%, haemorrhage 1.75%, shunt infection in 1.53%, shunt block in 0.65%, medical complications in 2.4%, and others in 3.05%.

**CONCLUSIONS:** The largest series presenting morbidity from paediatric brain tumour surgery are the first to validate the CD scale. Our morbidity on the Drake scale was comparable with other series. There is a need to develop improved tools to quantify morbidity in this high-risk specialty.

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**SURG-14. ENDOSCOPIC SURGERY FOR PEDIATRIC INTRAVENTRICULAR TUMOR WITHOUT HYDROCEPHALUS: INDICATION, SURGICAL TECHNIQUE, AVOIDANCE OF COMPLICATION, AND ITS PROSPECT**

Shumikaku Takekawa1, Hirokazu Takami2, Shota Tanaka, Masahiro Shin, and Nobuhito Satoh; The University of Tokyo Hospital, Tokyo, Japan.

**INTRODUCTION:** Neuroradiologic surgery is useful for intraventricular tumors accompanied by ventriculomegaly. However, it is often challenging for cases with small ventricles. Our institution is actively performing surgeries for pediatric intraventricular tumors without frank ventriculomegaly. METHODS: Seven cases of intraventricular tumors without ventriculomegaly (5 cases of subependymal giant cell astrocytoma (SEGA) and 2 cases of germinoma cell tumors (GCTs)) were analyzed. The age ranged between 3 and 14 years (median 5 years). The sizes of SEGA were between 10-27mm, and all the tumors showed an enlargement around the foramen of Monro, which was the indication for surgery. Biopsy and third ventriculostomy were performed for GCTs. For resection, after making a small craniotomy of 2 x 3 cm, ellipsoid cone-like sheath with a diameter of 12mm or 17mm was inserted through it to the lateral ventricle, which enabled a wide surgical view. Under a rigid endoscope of 4mm diameter, 2 types of surgical instruments were employed, making the microsurgical procedure like under a microscope, with a wider view, possible. For the cases of tumor resection, septotomy and placement of a drain in the ventricle were performed at the end of surgery. RESULTS: The lesions were safely approached in all the cases. For resection, endoscopic microsurgery was possible, and tumor was totally removed in all the cases. No postoperative complication was observed in any of them.

**CONCLUSIONS:** Our experience shows that tumor resection can be safely achieved with the aid of endoscope even for cases without ventriculomegaly.

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**SURG-15. THE SURGERY OF THALAMIC LESIONS IN PEDIATRIC BRAIN TUMORS**

Yuzaburo Shimura1, Osamu Akiyama, and Akihide Kondo; Juntendo University Hospital, Tokyo, Japan.

**BACKGROUND:** Pediatric brain tumors are occurred in the center of nervous system. Since the-line gliomas has been defined in the new classification, thalamic has attracted attention as a site that requires surgical intervention. However, the surgery for thalamic has been a challenging procedure for neurosurgeons. In this study, we studied our surgical cases of patients suffering from thalamic tumors in thalamus and/or thalic region to evaluate the safety of surgeries and the consideration of appropriate surgical approaches.

**METHODS:** We reviewed neuroradiological images, medical record, and, surgical videos for the assessment of surgical fields in patients under 15 years of age. Conclusions: 1) For resection of thalamic tumors, the Clavien-Dindo (CD) scale was in 9 cases, no postoperative complications were observed in 8 cases after 2-14 days. For the Clavien-Dindo (CD) scale, the Drake classification was in 3 cases, the surgical goal was achieved or exceeded in 100% of cases. Thirty-day mortality was 0% with all deaths related to disease and neurological complications. The overall complication rate was 0% in 3 cases, 1 in 11%, and 2 in 7%.

**CONCLUSION:** The largest series presenting morbidity from pediatric thalamic surgery are the first to validate the CD scale. Our morbidity on the Drake scale was comparable with other series. There is a need to develop improved tools to quantify morbidity in this high-risk specialty.

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**SURG-16. SURGICAL TECHNIQUES TO AVOID COMPLICATIONS DURING REPEAT RESECTIONS FOR PEDIATRIC BRAIN TUMORS Ichiro Shihabara; Kitasato University, Sagamihara, Kanagawa, Japan.

Complications due to repeat resection for recurrent pediatric brain tumors remain unclear. The present study focused on surgical techniques to avoid surgical morbidities during repeat resections for pediatric brain tumors. From 2017 to 2018, we studied 102 recurrent pediatric brain tumors in 85 patients under 15 years of age. Conclusions: 1) For resection of recurrent pediatric brain tumors, preoperative neuronavigation system and neuromonitoring to understand the anatomy radio logically and functionally, performing paverpine hydrochloride for spastic arteries, are important to avoid complications during the intracranial procedure.