NSRG-17. GAMMA KNIFE RADIOSURGERY FOR THE TREATMENT OF GRADE I AND II ASTROCYTOMAS IN THE PEDIATRIC POPULATION

Ashley S. Plant[1], Jody Pathare[1], Darcy Engelhart[2], Venita Williams[1], Ivan Kirov[1], and William G. Loudon[1]; [1]Children's Hospital Orange County, Orange, CA, USA, [2]University of California, San Diego, La Jolla, CA, USA

In this series, we report our experience with 24 pediatric patients (<18yo) with biopsy proven grade I-II astrocytomas who received adjuvant gamma knife (GK) radiosurgery. All patients had previously undergone maximal surgical resection of their brain tumors with subsequent radiographic documentation of residual or recurrent disease. 8.3% of patients had received prior standard chemotherapy with vincrisitine and carboplatin. Patients received a single, outpatient treatment wiht a median 50% isodose of 12 Gy (range 4-18Gy). Median tumor volumes was 1.29cm^3 (range 0.04-14.98cm^3) No patient experienced post-GK acute toxicity requiring admission or subsequent re-operation. At median follow-up of 3 years (range 1-13yrs), overall survival for the cohort was 100% with 3 and 5 year EFS of 100%. Post-GK new neurologic deficits or subsequent neurologic decline was not identified in any of these patients. Fractionated external beam radiation therapy remains the standard for pediatric brain tumor radiation therapy. Median survival for grade I-II astrocytomas at 5yrs is generally reported around 86-90%. However, EFS post radiation is ≤70% and carries a risk of permanent short and long-term sequelae including neurocognitive deficits, endocrine dysfunction, and development of secondary malignancies. In adults, there are reports of decreased adverse sequelae and increased quality of life measures with GK compared to conventional radiation. The physics of GK stereotactic radiosurgery predict advantages of SRS conformality and specificity relative to conventional external beam radiation. Although longer follow-up is needed, our results extend these conclusions to pediatric brain tumor patients, supporting GK SRS as effective, well tolerated, and safe in the pediatric population.

NSRG-18. IMPACT OF MOLECULAR SUBGROUP ON SURGICAL MANAGEMENT OF MEDULLOBLASTOMA

Andrea Carai[1], Alessandra Marongiu[2], Andrea Trezza[1], Alessandro De Benedictis[1], Silvia Cossu[1], Franco Randi[1], Evelina Miele[5], Antonella Cacchione[5], Giovanna Stefania Colafati[3], Francesca Diomedi Camassei[4], Angela Mastronuzzi[5], and Carlo Efisio Marras[1]; [1]Neurosurgery Unit, Neurosciences and Neurorehabilitation Department, Bambino Gesù Children's Hospital, Rome, Italy, [2]Neurosurgery Unit, NESMOS Department, Sant'Andrea Hospital, Sapienza University of Rome, Rome, Italy, [3]Neuroradiology Unit, Imaging Department, Bambino Gesù Children's Hospital, Rome, Italy, [4]Pathology Department, Bambino Gesù Children's Hospital, Rome, Italy, [5]Neuro-oncology Unit, Onco-Hemathology and Cell Therapy Department, Bambino Gesù Children's Hospital, Rome, Italy

We present 47 consecutive patients operated at our Center for medulloblastoma in the last 5 years. Twenty five were males and mean age was 7 years. Eleven patients were infants. Surgery aimed at maximal safe resection in all cases. Molecular subgroup showed 7 WNT, 11 SHH, 14 Group 3, 15 Group 4. We tested a possible correlation between clinical variables relevant for surgery and molecular subgroup (Chi square test, significance = $p<0.05$). MRI suggested infiltration of the IV ventricle floor mainly in WNT (5/7) and SHH (7/11) tumors. In fact, Group 4 (11/15) and WNT (5/7) tumors were more frequently found to infiltrate brainstem at surgery. Overall, MRI showed low sensitivity (74%) and specificity (70%) in predicting brainstem infiltration. Clinical picture at onset showed a high frequency of hydrocephalus (40/47) independently of subgroup while cranial nerve deficit was more frequent in WNT (4/7) and significantly less frequent in Group 3 (3/14). Post-operative cranial nerve impairment consisted mainly in strabism (24/47) with a single case of facial weakness and were more frequently associated to Group 4 (12/25). Post-operative hydrocephalus requiring shunting was rare (5/47) and independent from molecular subgroup. Brainstem infiltration appeared to be the most relevant feature contributing to surgical complexity and neurological morbidity in medulloblastoma in our series, mostly in Group 4 and WNT tumors. Conversely, Group 3 showed a better neurological post-operative outcome. Further studies are warranted to better define the role of aggressive surgical resection in less aggressive molecular subgroups.

NSRG-19. CSF DISTURBANCES AFTER TRANSCALLOSAL RESECTION: ARE THERE PREDICTING FACTORS?

Christian Dorfer[1], Julia Vendl[1], Gregor Kasprian[2], Andreas Peyrl[4], Christine Haberler[3], Irene Slavc[4], and Thomas Czech[1]; [1]Medical University of Vienna, Department of Neurosurgery, Vienna, Austria, [2]Medical University of Vienna, Department of Radiology and Nuclear Medicine, Vienna, Austria, [3]Medical University of Vienna; Institute of Neurology, Vienna, Austria, [4]Medical University of Vienna, Department of Pediatrics and Adolescence Medicine, Vienna, Austria

OBJECTIVE: To evaluate the frequency and potential predicting factors for CSF disturbances in a series of patients operated through a transcallosal approach. METHODS: We retrospectively reviewed the medical charts of all patients operated at our institution via a transcallosal approach between January 2002 and December 2016. The following radiological parameters were assessed on pre- and multiple postoperative MR/CT images: ventricular size, as well as subdural space and interhemispheric fissure width. Statistical analyses were performed to identify clinical and radiological predicting factors for shunt dependent hydrocephalus within three months after surgery. RESULTS: We identified 74 patients (female n=40, male n=34; median age 17.6yrs, range from 6 mos - 76 yrs). An EVD was placed preoperatively in 18 patients (24.3%). Histology revealed a colloid cyst in 15 (20.3%), pilocytic astrocytoma in 14 (18.9%), diffuse astrocytoma WHO II in 5 (6.8%), diffuse astrocytoma WHO III+IV in 7 (9.5%), subependymal giant cell astrocytoma in 5 (6.8%), craniopharyngioma in 5 (6.8%) and other in 23 (31.0%). After a median time of 24 days (range from 10 days - 3 mos) since transcallosal resection implantation of a VP-shunt was necessary in 9 patients (12.2%) and a subduro-peritoneal shunt in 5 (6.6%). The mean age at shunt implantation was 14.3 yrs. The necessity for postoperative shunt implantation was significantly associated with younger age. CONCLUSION: The incidence of early shunt dependent hydrocephalus after transcallosal resection is high (18.8%), especially in younger children. The reason for shunt dependency is multifactorial.

NSRG-20. LONG-TERM SUPRATENTORIAL WHITE MATTER CHANGES AND COGNITIVE FUNCTION FOLLOWING CEREBELLAR TUMOUR RESECTIONS IN CHILDHOOD

Christian Dorfer[1], Monika Chocholous[2], Thomas Pletschko[2], Gregor Kasprian[3], Christian Widmann[3], Irene Slavc[2], and Thomas Czech[1]; [1]Medical University of Vienna, Department of Neurosurgery, Vienna, Austria, [2]Medical University of Vienna; Department of Pediatrics And Adolescence Medicine, Vienna, Austria, [3]Medical University of Vienna; Department of Radiology and Nuclear Medicine, Vienna, Austria

INTRODUCTION: The cerebellum is connected to extensive regions of the cerebrum, and cognitive deficits following surgically treated cerebellar pilocytic astrocytomas (CPA) may thus be explained by distant cerebral white matter changes. Moreover, early cerebellar lesions could affect distal brain development, thereby influencing long term changes in brain structure and cognitive function. METHODS: We characterized supratentorial white matter changes and cognitive functions in 13 adult patients (f:6; m:7) (median age at time of testing 22.0 years) operated on a CPA in childhood (median age at surgery 7.4 years) and 13 matched controls. Cerebral white matter changes were evaluated using voxelwise statistical analysis of the FA data, which was carried out using TBSS (Tract-Based Spatial Statistics). TBSS projects all subjects' FA data onto a mean FA tract skeleton, before applying voxelwise cross-subject statistics. Neurocognitive functioning was tested regarding overall cognitive functioning, attentional performance, information processing speed, and cognitive flexibility. RESULTS: Neuropsychological results revealed significant group differences in overall IQ as denoted by the norm-corrected percentile ($U= 176.00$, $z=3.162$, $p< .01$, $r= .587$), with patients scoring at a mean of 48.6 +/- 29.14 versus controls at a mean of 85.25 +/- 15.45. Regarding white matter changes TBSS revealed significantly lower fractional anisotropy between subjects and controls within the corpus callosum and parts of the left frontal opercular white matter (FWE-corrected, $p< .05$). CONCLUSION: Our results show distant effects of cerebellar lesions on cerebral integrity, likely caused by a combination of neurodegenerative processes and perturbed neurodevelopment.

NSRG-21. BRAIN TUMORS OF THE FIRST YEARS OF LIFE: TEN YEARS OF IOP/GRAACC/UNIVERSIDADE FEDERAL DE SAO PAULO EXPERIENCE

Patricia Dastoli[1,2], Jardel Nicácio[1,2], Marcos Costa[1,2], Andrea Cappellano[1], Frederico Silva[3], Nasjla Silva[1], and Sergio Cavalheiro[1,2]; [1]Instituto de Oncologia Pediátrica/GRAAC/UNIFESP; Division of Neuroncology, Sao Paulo, Brazil, [2]Universidade Federal De Sao Paulo, Discipline of Neurosurgery, Division of Pediatric Neurosurgery, Sao Paulo, Brazil, [3]Instituto De Oncologia Pediátrica GRAACC/UNIFESP, Division of Neuroradiology, Sao Paulo, Brazil

INTRODUCTION: Management of brain tumors in neonates and infants is very challenging. OBJECTIVE: To analyze the several treatment strategies and outcomes of brain tumors in the first year of life in a single institution. METHODS: The authors retrospectively evaluated 63 infants with brain tumors treated between 2007 and 2017, at IOP/GRAACC/UNIFESP. Data regarding initial clinical presentation, treatment modalities and outcomes were collected. RESULTS: From 63 patients treated, 61 were eligible for evaluation and 2 were excluded for loss of follow-up. Thirty were girls and 31 boys. The mean age at treatment was 6 months (range: 1 day-12 months). Twenty-nine babies presented with signs and symptoms of intracranial hypertension, 11 babies with epileptic seizures and 8, cranial

nerves deficits. Forty-five tumors were located in the supratentorial compartment and 16 were infratentorially. Nine patients were diagnosed with tuberous sclerosis, 2 with neurofibromatosis type 1, 2 diagnosed with Li Fraumeni and 1 with Gorlin syndrome. The most common histological types were: 11 rhabdoid teratoid, 9 low grade astrocytoma, 5 choroid plexus carcinoma and 5 glioblastoma. Surgery is the treatment of choice. Ten patients underwent more than one surgery (2 to 6 resections) Eight deaths occurred. The mean follow-up was 3y10m (range: 2 days- 7y9m). CONCLUSIONS: Gross total resection is the goal of surgical treatment, but sometimes it is impossible in the first approach. To decrease the high intraoperative mortality of malignant tumors, these patients can undergo as many surgeries as necessary for total tumor resection, alternating with cycles of chemotherapy.

NSRG-22. ENDOSCOPIC APPROACH TO PINEAL REGION LESIONS WITH SPLITTING OF THE CHOROID FISSURE AND MASSA INTERMEDIA

Charlotte Burford[1], Cristina Bleil[2], Jose Lavrador[2], Ahilan Kailaya-Vasan[2], and Bassel Zebian[2]; [1]King's College London, London, UK, [2]King's College Hospital, London, UK

INTRODUCTION: In patients presenting with obstructive hydrocephalus secondary to pineal region lesions, a combined endoscopic third ventriculostomy (ETV) and tumour biopsy is an increasingly common procedure. Performing it through a monoportal approach with a rigid scope is especially challenging given the anatomy of the third ventricle. Here we report our experience of the monoportal endoscopic combined approach made possible by splitting the choroid fissure (CF) and massa intermedia (MI). METHODS: A 13-year-old male was referred to our unit having presented with a 2-day history of headache, blurred vision, diplopia and vomiting. An MRI revealed a pineal region lesion causing obstructive hydrocephalus. RESULTS: An ETV was performed. Access to the pineal region was then gained by splitting of the CF and subsequent division of a small MI. A biopsy was taken and limited debulking performed (tumour was large and hard making complete resection difficult). Histopathology confirmed an immature teratoma. Post-operatively the patient made an excellent recovery. CONCLUSION: The endoscopic transchoroidal approach with splitting of the MI allows management of hydrocephalus and access to pineal tumours for biopsy/debulking via a single burr hole and using a solid scope. In the future complete resection of pineal lesions via this approach may become commonplace with improved instrumentation and equipment.

NSRG-23. 5-AMINOLEVULINIC ACID GUIDED RESECTION OF PAEDIATRIC CENTRAL NERVOUS SYSTEM TUMOURS: THE LARGEST SINGLE CENTRE SERIES IN THE UK

Charlotte Burford[1], Nida Kalyal[2], Anand Pandit[2], Jose Pedro Lavrador[2], Cristina Bleil[2], Ahilan Kailaya-Vasan[2], and Bassel Zebian[2]; [1]King's College London, London, UK, [2]King's College Hospital, London, UK

BACKGROUND: 5-aminolevulinic acid (5-ALA, Gliolan) is widely used in adults for facilitating the resection of high-grade gliomas. However, its safety and efficacy in the paediatric population remains to be established. We present the UK's first case series of 10 patients, undergoing 11 operations with 5-ALA. METHODS: 10 consecutive patients (aged 1.6-15 years) underwent pre-operative administration of 20mg/kg of 5-ALA. The tumours were visualised intra-operatively under violet-blue light and the presence and usefulness of fluorescence was assessed. RESULTS: Strong fluorescence was observed in two WHO grade III ependymomas and a GBM (IV). Moderate fluorescence was seen in one pilocytic astrocytoma (I) and a pilomxyoid astrocytoma (II). Weak fluorescence was observed in a diffuse astrocytoma (II). The tumours types which showed no fluorescence included: a pilocytic astrocytoma, a glioneuronal tumour (II) and an anaplastic medulloblastoma (IV). No significant adverse drug reactions were recorded in any of the patients. CONCLUSIONS: Our case series adds to the evidence base supporting the safety of 5-ALA in the paediatric population. However, the diverse range of responses to 5-ALA in these tumours highlights the need for further trials into its usefulness in specific tumour types.

NSRG-24. OUTCOME OF SINGLE-TRAJECTORY ENDOSCOPIC THIRD VENTRICULOSTOMY AND BIOPSY IN THE MANAGEMENT ALGORITHM OF PINEAL REGION TUMORS: A CASE SERIES AND REVIEW OF THE LITERATURE

Mahmoud Abbassy, Khaled Aref, Ahmed Farhood, and Anwar Hekal; Alexandria University, Alexandria, Egypt

Tumors within the pineal region represent 1.5 to 8.5% of the pediatric brain tumors and 1.2% of all brain tumors. A management algorithm has been proposed in several publications. The algorithm includes endoscopic third ventriculostomy (ETV) and biopsy in cases presenting with hydrocephalus. In this series we are presenting the efficacy of a single-trajectory approach for both ETV and biopsy. METHODS: Thirteen cases were admitted to Alexandria main university hospital from 2013 to 2016 presenting with pineal region tumors and hydrocephalus. Mean age of at diagnosis 12 years (1 - 24 years). All cases had ETV and biopsy using rigid ventriculoscope through a single-trajectory from a burr-hole planned on preoperative imaging. Follow-up period was 7 - 59 months. RESULTS: All 13 cases presented with hydrocephalus and increased intracranial pressure manifestations. Histopathological diagnosis was successful in 10 out of 13 cases (76.9%). Three cases were germ-cell tumors, 2 cases were pineoblastomas, 1 parenchymal tumor with intermediate differentiation, two cases were pilocytic astrocytomas and two cases were grade 2 tectal gliomas. Five of the ETV cases (38.4%) failed and required VPS later on. Other complications of ETV included 1 case of intraventricular hemorrhage and a case with tumor disseminated to the basal cisterns. CONCLUSION: In our series we were able to achieve ETV and biopsy through a single trajectory and a rigid endoscope with results comparable to other studies in the literature.

NSRG-25. THE MOST INFLUENTIAL PAPERS IN THE NEUROSURGICAL MANAGEMENT OF PAEDIATRIC CENTRAL NERVOUS SYSTEM TUMOURS

Charlotte Burford[1], Yasmine Cherfi[1], Cristina Bleil[2], and Bassel Zebian[1]; [1]King's College London, London, UK, [2]King's College Hospital, London, UK

INTRODUCTION: Citation number can be considered a measure of a publication's academic influence. Previous studies have suggested a citation number greater than 50 and a citation rate higher than 5 per year constitute a high impact in neurosurgery. We set out to determine and categorise the most highly influential papers related to the neurosurgical management of paediatric central nervous system (CNS) tumours between 2005-2010. METHODS: Child's Nervous System, Journal of Neurosurgery: Pediatrics and Pediatric Neurosurgery were previously identified as publishing the most influential papers in paediatric neurosurgery. All papers published by these journals between 2005-2010 were collected from Web of Science. Papers describing surgical management of paediatric CNS neoplasms were identified and the 50 most cited were determined. RESULTS: Of the most highly cited papers, 54% were published in Child's Nervous System, 26% in Journal of Neurosurgery: Pediatrics and 20% in Pediatric Neurosurgery. The citation number ranged from 27-93 (mean = 43) and citations rate (per year) ranged from 2.31-8.25. Of the top 50 papers, 24% had more than 50 citations and 8 of these had a citation rate greater than 5 per year. 72% of papers were experiential studies and 24% were review articles. 42% described surgical management of craniopharyngiomas and 10% related to management of posterior fossa tumours. There were no randomised controlled trials. CONCLUSION: Between 2005-2010, 8 papers related to surgical management of paediatric CNS tumours can be considered as having high impact in the literature. The majority of papers focused on surgical management of craniopharyngiomas.

NSRG-26. ENDOSCOPIC RESECTION OF INTRAVENTRICULAR LESIONS USING AN ENDOSCOPIC ULTRASONIC ASPIRATOR

Charlotte Burford[1], Nida Kalyal[2], John Hanrahan[1], Ali Ansaripour[1], Wisam Al-Faiadh[2], Anna Oviedova[2], Prajwal Ghimire[2], Cristina Bleil[2], and Bassel Zebian[2]; [1]King's College London, London, UK, [2]King's College Hospital, London, UK

INTRODUCTION: The use of the endoscopic ultrasonic aspirator for the management of intraventricular tumours is still in its infancy. We share our early experience using the aspirator in the management of intraventricular, paraventricular and suprasellar tumours. SUBJECTS: 19 patients (10 males, 9 females) underwent 22 operations with the endoscopic ultrasonic aspirator. Ages ranged from 6 months to 86 years. Tumour types included: a choroid plexus papilloma (grade II), an infiltrative glioma (grade II), an intraventricular meningioma (grade I-II), a diffuse glioma (grade II-III), three craniopharyngiomas, an anaplastic ependymoma (grade III), two glioblastomas (grade IV), an immature teratoma, 2 gangliogliomas (grade I), a choroid plexus cyst, a central neurocytoma (grade II), a pineocytoma (grade I), a metastasis (lung primary), a subependymoma (grade I) and a pilocytic astrocytoma with pilomyxoid features (grade I). RESULTS: A monoportal approach guided by neuronavigation was used in all patients. Of the 22 procedures, 18 were carried out in patients with hydrocephalus. In 6 procedures a total or near-total resection was achieved. Tumour resection was limited by tumour location, size and consistency as well as instrumentation. CONCLUSION: The endoscopic ultrasonic aspirator is a powerful addition to our neuro-endoscopic armamentarium and with further development, endoscopic total resections may become more commonplace.