we confirmed the complete loss of fluorescence on the tumor resected bed. We check the MRI within 48 hour after operation and assess the extent of resection. RESULTS: Among the 26 patients, 22 patients were confirmed glioblastoma and 3 anaplastic astrocytoma and 1 anaplastic oligoastrocytoma. We confirmed all enhancing lesion was completely removed, however, 4 patients show residual non-enhancing lesion in post-operative MRI. Two patients suffered temporary hemiparesis and 2 patients show permanent visual field defect. CONCLUSION: 5-ALA is useful tool for glioma surgery. Resection extent could be increased, however, non-enhancing lesion in the high grade gliomas, might be missed under 5-ALA guidance.

SURG-40. SURGICAL RESECTIONS IN BROCA'S AREA DO NOT LEAD TO BROCA'S APHASIA

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Brodmann's areas 44/45 of the inferior frontal gyrus (IFG), are the seat of Broca's area. The Western Aphasia Battery is a commonly used language battery that diagnoses aphasias based on fluency, comprehension, naming and repetition. Broca's aphasia is defined as low fluency (0-4/10), retained comprehension (4-10/10), and variable deficits in repetition (0-7.9/10) and naming (0-8/10). The purpose of this study was to find anatomic areas associated with Broca's aphasia. Patients who underwent resective brain surgery in the dominant hemisphere were evaluated with standardized language batteries pre-op, POD 2, and 1-month post-op. The resection cavities were outlined to construct 3D-volumes of interest. These were aligned using an affine transformation to MNI brain space. A voxel-based lesion-symptom mapping (VLSM) algorithm determined areas associated with Broca's aphasia when incorporated into a resection. Post-op MRIs were reviewed blindly and percent involvement of pars orbitalis, triangularis and opercularis was recorded. 287 patients had pre-op and POD 2 language evaluations and 178 had 1 month post-op language evaluation. 82/287 patients had IFG involvement in resections. Only 5/82 IFG resections led to Broca's aphasia. 11/16 patients with Broca's aphasia at POD 2 had no involvement of IFG in resection. 35% of IFG resections were associated with non-specific dysnomia and 36% were normal. By one-month, 76% of patients had normal speech. 80% of patients with Broca's aphasia at POD 2 improved to normal speech at 1-month, with 20% improved to non-specific dysnomia. The most highly correlated ($P < 0.005$) anatomic areas with Broca's aphasia were juxtasylvian pre- and post-central gyrus extending to supramarginal gyrus. While Broca's area resections were rarely associated with Broca's aphasia, juxtasylvian pre- and post-central gyri extending to the supramarginal gyrus were statistically associated with Broca's type aphasia when resected. These results have implications for planning resective brain surgery in these presumed eloquent brain areas.

SURG-41. BLOOD-BRAIN BARRIER DISRUPTION WITH HIGH-FREQUENCY ELECTROPORATION IN VIVO: A PRELIMINARY INVESTIGATION DEMONSTRATING THE EFFECTS OF VARIED PULSE WIDTHS AND INTRA-PHASE DELAYS

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OBJECTIVE: Treatment of CNS disorders suffer from the inability to deliver large therapeutic agents to the brain parenchyma due to protection from the blood-brain barrier (BBB). High-frequency electroporation (HFE) employs a series of high voltage pulsed electric fields to disrupt the BBB and/or ablate tumor tissue while sparring proteinaceous structures. Pulsing parameters pulse width and intra-phase delay can be modulated to reduce excitation of muscle and nervous tissues, though this is inherently accompanied by an increase in thresholds for ablation in non-CNS tissues. Here, we investigate the effects of pulse width and intra-phase delay on intracranial tissue for BBB disruption (BBBD) in an in vivo healthy rodent model. METHODS: 18 male Fisher rats underwent craniectomy procedure and two blunt tipped monopolar electrodes were advanced into the brain for HFE therapy. 200 bursts of HFE were delivered at a voltage-to-distance ratio 600 V/cm. BBBD was verified with contrast enhanced T1W MRI (gadopentetate dimeglumine) and pathologically (Evans blue dye). RESULTS: Gross pathological sections and contrast enhanced T1W scans demonstrated BBBD for 2-2-2 µs (n = 4, 36.6 ± 9.4 mm^3, 36.7 ± 13.0 mm^3), 2-5-2 µs (n = 4, 74.1 ± 7.7 mm^3, 74.7 ± 9.8 mm^3), 5-2-5 µs (n = 4, 53.9 ± 8.1 mm^3, 59.2 ± 10.8 mm^3), 5-5-5 µs (n = 4, 81.2 ± 7.9 mm^3, 84.1 ± 8.7 mm^3), and 10-1-10 µs (n = 2, 61.0 ± 2.8 mm^3, 60.0 ± 4.2 mm^3) HFE. Histologically, tissue damage was restricted to electrode insertion tracks. BBBD was induced with minimal muscle contractions and minimal cell death attributed to HFE. Numerical modeling indicated the threshold for HFE-mediated BBBD as low magnitude electric fields (< 201 V/cm). These data suggest HFE-mediated BBBD is only modestly affected by changes in pulse width and intra-phase delay.

SURG-42. SAFETY OF INTRA-ARTERIAL CHEMOTHERAPY WITH OR WITHOUT OSMOTIC BLOOD BRAIN BARRIER DISRUPTION IN TREATMENT OF BRAIN TUMORS

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BACKGROUND: Intra-arterial route of drug delivery (IA) without or with osmotic blood brain barrier disruption (IA/BBBD) is one of the available techniques to overcome the blood-brain barrier and enhance drug delivery to brain tumors. We present a large single institution safety data of IA or IA/BBBD. METHODS: This is a retrospective review of the electronic records, imaging and complications in patients who underwent IA or IA/BBBD in OHSU between December, 1997 and November, 2018. Procedural complications were documented prospectively and reviewed in the electronic medical records. Toxicities, attributed to chemotherapy, were reported when grade is either II or higher by Common Terminology Criteria for Adverse Events (CTCAE). RESULTS: Complications related to chemotherapy and procedure were reported separately. Total of 4940 procedures (1102 IAC and 3838 oBBBD) were performed on 436 patients (190 female and 246 male). Pathologies were primary central nervous system lymphoma (PCNSL) (n=115, 26%), secondary central nervous system involvement (SCNSL) (n=37, 8%), glioblastoma (n=79, 18%), astrocytoma (grade II/III) (n=34, 7%), oligodendroglioma (n=64, 14%), pilocytic astrocytoma (n=10, 2%), metastatic (n=38, 8%), embryologic (n=37, 8%), others (n=22, 5%). Procedural complications: groin related (n=16, 0.32%), transient neurological decline (n=57, 1.15%), subintimal arterial injury (n=13, 0.26%), asymptomatic imaging changes (T2 or DWI) (n=60, 1.21%), symptomatic stroke (n=21, 0.43%), myocardial infarction (n=3, 0.37%), cervical cord injury (n=6, 0.12%), death within 3 days (n=6, 0.12%). Minor complications are 2.86%, major complications are 1.12%. Eighty-four percent (n=369) of the patients experienced grade 2 or higher toxicities attributed to chemotherapy. CONCLUSION: We present the largest safety data set to date from a single institution experience using IA and IA/BBBD for brain tumors. Our results suggest that IA and IA/BBBD is safe and can be performed multiple times in the same patients with acceptable procedure related complications. Efficacy of this approach is being evaluated in prospective clinical trials.

SURG-43. APPLICATIONS AND RESTRICTION OF 980NM DIODE LASER FOR BRAIN TUMOR MICROSURGERY - A PIONEER CASE SERIES AND A CRITICAL REVIEW

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BACKGROUND: Quality of life is essential for oncological patients. There are several tools that help surgery become more precise with less morbidity. Diode laser can cut and coagulate through thermal effect being helpful during surgery. It is a precise and useful technology that improves outcomes in neurooncology. OBJECTIVES: To describe a pioneer case series of oncological use of diode laser and main applications of several types of laser in neurooncology. METHODS: Detailed description of a pioneer case series of oncological patients that undergone to neurosurgical laser assisted procedures. An interventional longitudinal prospective study was conducted. Patients that had as mainly hypothesis the diagnosis of glioma or meningioma were selected. Also it was performed an extensive literature review about lasers in neurosurgery with special focus in diode laser. RESULTS: There was not any paper describing the use of diode laser in neurooncology. The 980nm diode laser was used in 15 patients. The device had an easy handling. Decreased intra-operative time for hemostasis, lesser blood loss requiring less blood transfusion was observed. No post-operative complications occurred. CONCLUSIONS: Diode laser is a useful tool for brain tumor surgery especially concerning hemostasis, providing decreased blood loss with lesser intra-operative duration. Surgical site coagulation is more effective causing less damage to adjacent structures specially in gliomas near eloquent regions. We consider this technique as a suitable adjuvant therapy for brain tumor surgeries providing an excellent hemostasis and helping cutting and vaporize lesion. This device makes surgery safer and decrease oncological morbidity.

TUMOR MICROENVIRONMENT/ANGIOGENESIS/ METABOLISM/INVASION

TAMI-01. NEOADJUVANT PD-1 ANTIBODY BLOCKADE REMODELS THE IMMUNE MICROENVIRONMENT OF METASTATIC BRAIN TUMORS

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