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### Title

SURG-18. THE IMPACT OF NEUROLOGIC IMPAIRMENTS ON THE RELATIVE BENEFIT OF MAXIMAL EXTENT OF RESECTION IN NEWLY DIAGNOSED IDH-WILD TYPE GLIOBLASTOMA

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of local control at 6 months. Preoperative Karnofsky performance status (KPS) of 100 (RR 2.04, 1.13-3.69,  $p=0.019$ ) was associated with a higher likelihood of local control. Extent of ablation (EOA) demonstrated a direct relationship with local control; when EOA=100% local control was 59%, with this rate dropping down to 21% when EOA=90%. Tumor location, lesion volume, gender, BMI, ethnicity, or whether there existed multiple foci of disease at the time of ablation had no strong association with local control. CONCLUSION: Our series demonstrates that preoperative performance status and age were strong predictors of local disease control following LITT. Incomplete ablation and histology of high-grade glioma portended a higher risk of local recurrence.

#### SURG-17. EFFICACY AND SAFETY OF LASER INTERSTITIAL THERMAL ABLATION IN ELDERLY BRAIN TUMOR PATIENTS

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**INTRODUCTION:** Open craniotomy for tumor carries notable peri-operative risks as well as associated prolonged ICU stays. Risks of surgery are increased in elderly patients. In addition, many tumors are not amenable to resection due to their deep or eloquent location. Magnetic resonance-guided laser interstitial thermal ablation (LITT) offers an alternative, minimal-access procedure. **OBJECTIVE:** To examine the safety and efficacy of LITT procedures in elderly brain tumor patients. **METHODS:** Data was gathered on patients over the age of 65 who underwent MRI-guided LITT for ablation of tumor at our institution between 2014-2019. These cases were analyzed retrospectively and data was collected on patient demographics, tumor characteristics, procedural details, and post-operative complications and outcomes. **RESULTS:** 19 patients over the age of 65 underwent LITT during the study time period and were included in the analysis. The average age was 70 years (range 65-81), with a median follow up of 7 months. Patients had an average of 3.5 pre-existing medical comorbidities with a mean pre-operative Karnofsky Performance Score (KPS) of 87 (SD = 10.4). 13 patients underwent LITT for primary CNS tumor and 6 for metastatic lesions. The average lesion volume was 3.44 cm<sup>3</sup> with approximately one-third in eloquent areas. An average extent of ablation of 98% was achieved (90-100%). 5/19 patients experience at least one post-op complication including 2 venous thromboembolic events and 1 stroke within 30 days. The average length of stay was 2.3 days, and 13/19 patients were discharged home. No patients experienced new permanent neurological deficits and the average post-operative KPS was 83 (SD = 12.4). 9 patients experienced progression of disease after an average of 155 days, and 11 patients were deceased (average survival = 504 days). **CONCLUSION:** LITT is well tolerated in appropriately selected elderly patients with short post-operative length of stay and minimal surgical morbidity.

#### SURG-18. THE IMPACT OF NEUROLOGIC IMPAIRMENTS ON THE RELATIVE BENEFIT OF MAXIMAL EXTENT OF RESECTION IN NEWLY DIAGNOSED IDH-WILD TYPE GLIOBLASTOMA

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**BACKGROUND:** The prognostic importance of maximal resection of contrast enhancing and non-contrast enhancing disease has been established. Nonetheless, glioblastomas exist within the framework of complex neural circuitry serving cognition, movement, and behavior consequential leading to neurological impairments. The prognostic importance of neurological impairments on survival remains poorly understood. **METHODS:** This is a retrospective, single cohort study from UCSF including 316 eligible patients diagnosed over 20 years with 9.6 years of follow-up. All patients underwent surgical resection for newly diagnosed glioblastoma for whom survival, molecular, preoperative and postoperative MRI images, and clinical data were available. All patients had chemoradiation treated IDH-wild-type glioblastoma with available preoperative and 1-month post-surgical resection neurological outcomes. We employed survival models and recursive partitioning (RPA) to investigate multivariate relationships of overall survival (OS). **RESULTS:** Preoperative neurological impairments were present in 75.6% (n= 239) and new post resection impairments were identified in 37.3% (n=117). Univariate analysis confirmed that new postoperative cog-

nitive impairment [HR 7.91, 95% CI 2.47-25.33] and hemiplegia [HR 3.38, 95% CI 0.83-13.67] (not hemiparesis) impact OS. Risk stratified grouping by RPA demonstrated that gross total resection of contrast enhancing tumor in patients with no new postoperative neurological impairments confers the longest OS (median OS 27.1 months 95%CI 21.5-33.7). Patients with any residual tumor volume after surgery but no new neurological deficits experience a similar survival to younger patients (under 65) with 1 or more new postoperative neurological deficits (median OS 16.6 months 95%CI 15.2-19.2). Shortest OS is identified in patients with any volume of residual tumor plus 1 or more new postoperative neurological deficits and age over 65 (median OS 11.4 months, 95%CI 9.3-13.5). **CONCLUSIONS:** This study confirms that new postoperative neurological impairments impact overall survival in patients with chemoradiation treated IDH-wild-type glioblastoma.

#### SURG-19. EVALUATION OF SERUM NEURON SPECIFIC ENOLASE, INTERFERON-ALPHA, AND INTERFERON-GAMMA IN RESPONSE TO LASER ABLATION OF HIGH GRADE GLIOMAS

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**BACKGROUND:** The blood-brain barrier (BBB) is a formidable obstacle in the treatment of gliomas. It has been speculated that the BBB may be temporarily disrupted in laser ablation, a relatively new treatment used for newly diagnosed and recurrent high grade gliomas (HGG). BBB disruption can be measured non-invasively through serum neuron specific enolase (NSE) levels. In addition to disrupting the BBB, laser ablation could trigger an immune response in brain that has yet to be studied. Interferon-alpha (IFN- $\alpha$ ) and interferon-gamma (IFN- $\gamma$ ) are cytokines used as serum markers for an immune response. **OBJECTIVE:** To measure NSE and IFN- $\alpha$  and IFN- $\gamma$  as serum markers for BBB disruption and brain immune response activation, respectively, in patients undergoing laser ablation for recurrent high grade gliomas. **METHODS:** Sixteen patients with recurrent HGG underwent laser ablation from 2/2017 to 12/2019. All 16 patients had gross total ablation of the contrast enhancing mass. Serum levels of NSE, IFN- $\alpha$ , IFN- $\gamma$  were measured pre-operatively and at 24 hours, 2 weeks, and 8-16 weeks post-operatively, depending on adjuvant treatment received post-operatively. **RESULTS:** Levels of NSE consistently increased 24 hours post-operatively (2.28 $\pm$ 0.37 ng/ml) compared to pre-operative levels (1.62 $\pm$ 0.29 ng/ml),  $p=0.032$ . Afterwards, NSE decreased and reached baseline by 2 weeks postoperatively (2 weeks- 1.67 $\pm$ 0.29 ng/ml, 8 weeks- 1.85 $\pm$ 0.91 ng/ml, 12 weeks- 0.81 $\pm$ 0.33 ng/ml, 16 weeks- 1.23 $\pm$ 0.93 ng/ml). Compared to their pre-operative levels, IFN- $\alpha$  and IFN- $\gamma$  (85.46 $\pm$ 35.29 and 1.62 $\pm$ 0.47 pg/ml, respectively) did not display a significant difference in their serum levels ( $p=0.26-0.72$  and 0.14-0.60, respectively, for IFN- $\alpha$  and IFN- $\gamma$ ) at any post-operative measurement time. **Conclusions:** Elevated NSE levels following laser ablation in HGG indicate a temporary disruption of the BBB that persists for approximately 2 weeks without eliciting an accompanying immune reaction in brain. Correlation studies with DCE-MRI are on-going.

#### SURG-20. USE OF NICO MYRIAD NOVUS DEVICE WITH LIGHT SOURCE AND REAL-TIME STEREOTACTIC NAVIGATION TO OPTIMIZE SURGICAL RESECTION OF DEEP-SEATED TUMORS

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Maximal and safe surgical resection remains a critical component of the standard of care for patients with brain tumors. Stereotactic navigation tools are often incorporated into the surgical planning and implementation. The NICO Myriad NOVUS device couples a light source with the resecting tip to allow enhanced visualization of the surgical cavity and surrounding anatomical structures. At the Cleveland Clinic, we were the first group in the U.S. to start utilizing this augmented technology to maximize the resection of particularly deep-seated brain tumors, using the xenon light and real-time stereotactic navigation of the tool tip with the BrainLAB cranial setting. The navigated tip allows us to reach the deep corners of tumors with or without a tubular retracting device by sparing large corticotomies. Furthermore, the light source within the handheld device is easier to handle and manipulate than a large microscope to illuminate the surgical cavity. In addition, this new tool allows for automated tumor and peri-tumoral tissue harvesting, annotating each sample by location intraoperatively, as well as biological preservation of the harvested tissue for post-surgical molecular analysis. We describe the techniques and advantages of using this novel technology in patients while following and preliminarily reporting their surgical outcomes. With the emergence of novel technological advances, we must adapt as neurosurgeons and develop innovative methods to optimize the surgical resection of brain tumors.