PO1.18.B. STRUCTURAL ABNORMALITIES RELATED TO CHEMOTHERAPY IN CANCER SURVIVORS: AN ALE META-ANALYSIS OF NEUROIMAGING STUDIES

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BACKGROUND: Chemotherapy induced cognitive impairment (CICI) is a term used for the cognitive dysfunction reported with non-cranial nervous system cancer patients during or after chemotherapy. Recent neuroimaging studies have shown decreased activation in cancer patients during cognitive tasks post-chemotherapy. Structural changes are sought to be associated with cognitive decline in cancer survivors. Hereafter chemotherapy aim to investigate the neuroimaging findings of structural abnormalities and gray matter alterations associated with chemotherapy in cancer survivors.

MATERIAL AND METHODS: A systematic search through PubMed database was conducted for the published English-language studies yielded with the search terms (chemotherapy or post-chemotherapy or cancer survivors) compared to matched healthy controls. GingerALE (3.0.2) software from Brainmap.org (MNI or Talairach space) for voxel-based morphometric (VBM) studies was used to perform the ALE meta-analysis with threshold settings of uncorrected P-value < 0.001 for multiple comparisons. RESULTS: The study sample included 299 patients comprised of 186 cancer survivors (BCS) of childhood acute lymphocytic leukemia (ALL) survivors, ovarian cancer survivors (OCS) and lung cancer with 279 matched healthy controls from 12 studies and 21 experiments. ALE-maps for post-chemotherapy cancer survivors show decreased gray matter volume in comparison to controls in the left inferior frontal gyrus, right thalamus, right superior frontal gyrus, right medial frontal gyrus and right cerebellum (peak coordinates: [-43,40,-6], [23,-29,2], [14,30,55], [9,37,16], [9,-78,41] respectively, and cluster size of 544 mm3, 312 mm3 and 257 mm3, 296 mm3, 297 mm3 respectively). CONCLUSION: This is the first ALE meta-analysis that studied the converged areas of reduced gray matter volume in post-chemotherapy cancer survivors. Our findings of reduced gray matter volume in frontal regions and cerebellum might be responsible for the cognitive dysfunction in such cancer survivors. Hereafter chemotherapy is necessary for cancer survivors. Further studies are needed to assess the impact of different chemotherapy regimens related to CICI.


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BACKGROUND: The temporo-parieto-occipital junction (TPOJ) in the non-dominant hemisphere is a complex region intersected by multiple white matter bundles (Optic radiation, Inferior-fronto-occipital tract, inferior-longitudinalis-tract, superior-longitudinalis-tract, vertical-occipital-tract, medial-dorsal-longitudinal-tract, parietal-aslant-tract), subserving several high-level neurological functions such as spatial recognition, visual agnosia, visual field, attention and working memory. Few data are available on the optimum brain mapping strategy to be adopted for resecting tumors involving this area. Ideally it should allow surgeon to effectively identify several tracts and safely preserve all functions. MATERIAL AND METHODS: We developed a proper protocol to approach this critical area integrating, in awake condition, intraoperative visual test (iVT) to mapping visual field, semantic association test (SRAT) to prevent visual agnosia and preserve working memory, hand manipulation task (hMT) to preserve spatial abilities. We reviewed its efficacy in a series of 38 patients harboring tumors involving non-dominant TPOJ, looking to functional (neurologic-neuropsychological) and oncological (EOR) outcomes. We perform a lesion symptom map and a disconnectome analysis to evaluate what region predict a decline in neuropsychological function and which tract of white matter are correlated in the decline of performance. RESULTS: Feasibility was high and all patients were able to perform and complete the protocol, which lasted, on the average 11 min cortically and 25 min subcortically. Specificity was >95%. Immediate post-operative deficits were documented in 17.9% (visual field, working), attentive and emotional domains were those mostly affected in the neuropsychological evaluation. Lesion symptom mapping and disconnectome analysis showed that the postoperative decrease in neuropsychological performances was associated with a cluster of voxels corresponding to the anterior portion of the temporo-parietal junction. The white matter tracts mainly involved were the anterior and posterior segment of the middle longitudinal fasciculus (aMDF and pMDF) and the parietal aslant tract (PAT). CONCLUSION: Effective and safe resection of tumors involving non-dominant TPOJ is feasible. The adoption of a specific brain mapping protocol in awake setting is recommended to achieve a full functional preservation and extend tumor resection. Further analysis should be performed to assess the role of this subcortical tracts.

PO1.20.B. PEROPERATIVE COGNITIVE MONITORING IN PATIENTS WITH APHASIA

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BACKGROUND: Cognitive monitoring during awake glioma surgery provides the opportunity to increase the extent of resection while preserving cognitive functions. Preoperative language functioning often determines whether awake surgery can be performed since some form of communication is needed in the post-operative stage. However, there is not enough evidence whether intraoperative cognitive monitoring in patients with severe preoperative language disturbances, is risky to assume that language disturbances are definitely without functional perspectives. In addition, there are other cognitive functions and functions should be preserved in this kind of surgery. Therefore, the aim is to investigate what extent cognitive functions can be monitored during awake surgery in the presence of preoperative language disturbances. MATERIAL AND METHODS: Glioma data were collected in a single-centre consecutive study cohort of 186 patients who underwent awake brain surgery for either low-grade (WHO grade 1-2) glioma (40 percent) or high-grade (WHO grade 3-4) glioma (60 percent). Preoperative language disturbances were evidenced during preoperative neuropsychological assessment based on performances on the Boston Naming Test (PAT) and Token Test (N=25). Intraoperative procedures were performed as part of clinical care. RESULTS: Preliminary results on the Boston Naming Test show that intraoperative testing with the use of at least one language test (picture-naming) is feasible in 80 percent of all patients with language disturbances. In those cases, a functional boundary of language functions is found in 85 percent during awake surgery. Monitoring of other non-language functions, such as working memory, inhibition, speech, motor functions and social cognition, provided functional boundaries in 25 to 85 percent of patients with language disturbances. Postoperatively, cognitive functioning was improved in a significant number of patients. CONCLUSION: Based on these preliminary results we conclude that preoperative language disturbances do not prevent from monitoring language functions as well as other cognitive functions during awake glioma surgery. In a future cohort, more patients will be performed on additional outcome measures (Token test, survival rate, post-surgery treatment) and postoperative functioning will be compared to a control group of patients without preoperative language disturbances. By investigating the potential of awake surgery in patients who are severely cognitively affected, we aim to increase the applicability of this method to improve neuro-oncological treatments and optimally maintain quality of life.