Left hander

Although 95% of right-handed people have left hemisphere dominance for language, 18.8% of left-handed people have right-hemisphere dominance for language function. Additionally, 19.8% of the left-handed have bilateral language functions.

Even within various language functions (e.g., semantics, syntax, prosody), degree (and even hemisphere) of dominance may differ. Left handers have a more bilateral language representation than right-handers. Therefore, in left-handers with a low-grade glioma (LGG) in the left hemisphere (LH), one could hypothesize that the right hemisphere (RH) might allow language compensation, at least partly, with no or only a minor persistent role of the LH in speech. However, although LGG induces language reorganization in right-handed patients, little is known in left-handers.

In ten consecutive left-handed patients who were operated for a left LGG (three frontal, four paralimbic, one parietal, one temporal, one parieto-temporal tumor) using an awake procedure with intraoperative electrical language mapping.

Intraoperative language disorders were elicited in all cases but one by electrostimulation in the LH. Cortical language sites were detected in nine cases. Subcortical electrostimulation also demonstrated the crucial role of left white matter pathways in language, including the inferior occipital-frontal fascicle, arcuate fascicle, lateral segment of the superior longitudinal fascicle and fibers from the ventral premotor cortex. Moreover, stimulation of deep gray nuclei generated language disturbances in four patients. These nine patients experienced transient postoperative language worsening, supporting the persistent critical role of LH in speech. In only one patient, no language deficit was evoked intraoperatively and postoperatively. The ten patients returned to a normal life. Total or subtotal resection was achieved in all cases but one.

This results suggest that, even though the RH may participate in language compensation, the LH in left-handers still plays a crucial role, despite a left slow-growing LGG. Thus, Matsuda et al., to routinely consider awake surgery for left LGG removal in left-handers patients, to optimize the extent of resection while preserving language [1)].

Approximately 10-13% of the population is left-handed (LH), and certain professions have varied representation of left-handers. In surgery, left-handers must overcome unique difficulties due to the right-handed (RH) operative environment. This study assesses the prevalence and impact of left-handedness on training and operative experience of neurosurgeons.

An email survey was designed and sent to 5109 US neurosurgeons and neurosurgical trainees. The survey was completed by 1482 responders (29.0% response rate).

252 (17.0%) respondents reported being LH. LH neurosurgeons were more likely than RH neurosurgeons to report ambidexterity in the operating room (36.5% vs. 13.3%, $p<0.001$). During neurosurgical training, 23.5% of RH trainers addressed LH specific issues compared to 44.7% of LH trainers. LH trainers were more likely to describe LH trainees as having greater technical ability (18.9%). Overall, most trainers reported equal comfort teaching LH and RH trainees. LH trainees reported difficulties with RH surgical tools (42.7%) and tendency to alter handedness for surgery (62.7%). The impact of these areas lessens in LH attending populations (27.8% and 39.9%, respectively). Most LH neurosurgeons denied specific training for left-handedness and access to LH

specific tools, and 24.0% of LH trainees reported feeling disadvantaged due to their handedness.

Left-handers may be over-represented in neurosurgery, yet handedness is rarely addressed in neurosurgical training. Despite this, there is evidence of some degree of adaptation through training. There may be some benefit from recognizing differences in handedness in the operating room and attempting to give access for LH specific mentorship during training [2].

1)
Matsuda R, Moritz-Gasser S, Duvaux S, Fernández Coello A, Martinoni M, Duffau H. The persistent crucial role of the left hemisphere for language in left-handers with a left low-grade glioma : a stimulation mapping study. Acta Neurochir (Wien). 2014 Jan 23. [Epub ahead of print] PubMed PMID: 24452594.
2)
Beehler B, Kochanski RB, Byrne R, Sani S. Prevalence and Impact of Left-Handedness in Neurosurgery. World Neurosurg. 2018 Mar 30. pii: S1878-8750(18)30453-4. doi: 10.1016/j.wneu.2018.02.180. [Epub ahead of print] PubMed PMID: 29609085.