«Cognitive rehabilitation in epilepsy surgery patients: implications for preoperative neurocognitive interventions»

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Cognitive rehabilitation has been widely applied in patients who have sustained traumatic brain injury (TBI), as well as in other neurological conditions such as stroke and neurodevelopmental disorders. However, only few studies have addressed neurorehabilitation issues in epilepsy patients, most of them focusing on either non-surgical or on postoperative cases. Ever since, little is known on the preoperative neurocognitive interventions and still less on their putative prognostic and therapeutic value.

In the context of neurorehabilitation the concept of cognitive reserve, i.e., the inherent potential of the brain in order to cope with damage, represents a key concept. In the domain of MTLE surgery, the concept of cognitive reserve has been applied in two different models of hippocampal functioning, i.e. functional reserve vs. hippocampal adequacy, in relation to the risk for memory decrements following temporal lobectomy (TL).

There is strong evidence of an inverse relation between the risk of postoperative memory impairments and the functional adequacy of the surgical temporal lobe, mostly seen with respect to verbal memory and left MTLE patients, rather than the functional reserve of the contralateral hemisphere. A weak point of the functional adequacy model, however, is that it does not predict mild material-specific memory deficits following TL. Although the contralateral temporal lobe alone does not determine the probability of memory loss following TL, this is not to say that its functional capacity should be ignored, especially if we consider ample clinical evidence documenting the devastating consequences for memory following bilateral hippocampal damage.

The relatively limited literature in the domain of cognitive rehabilitation for epilepsy surgical patients has mainly focused on postoperative memory training, while there is only one group study dealing with preoperative memory rehabilitation in patients with indication for surgery, which failed to find better memory outcomes as compared to postoperative interventions. However, our recent recent case study design of preoperative cognitive rehabilitation of a patient with refractory left MTLE and hippocampal sclerosis, who participated in a 32 weeks neuro-optimization program and improved memory performance of his healthy hemisphere as demonstrated in a following up IAT, enabling us to consider surgery.

Insights to our rehabilitation program formulation were given by the proved ability of the right hemisphere to process lexical-semantic information and mediate verbal memory through its ability to process highly imageable words. This later notion is known as of imagery mediated verbal recall and constituted the basis for our right hemisphere training program aimed at enhancing verbal mediation to support verbal memory after surgery. Jones, confirming Patten et al., reported that both healthy individuals and left TLE patients improve their performance in a verbal paired-

associate task by using the strategy of imagery mediated verbal recall, while right TLE patients do not. Accordingly, further evidence suggested the critical role of the right temporal lobe in processing verbal material with high imageability, such as recalling concrete words. This is further corroborated by evidence that right TLE patients may face verbal memory difficulties when to be remembered material presents a strong imagery component.