Volume of Postoperative Gliosis on Neurocognitive, Psychological, and Seizure Outcomes after Anterior Temporal Lobectomy

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Introduction

This study evaluates the effect of postoperative gliosis volume from anterior temporal lobectomy (ATL) on neurocognitive and psychological outcomes in patients with medically refractory mesial temporal lobe epilepsy (MTLE).

Methods

The data of 322 consecutive patients who underwent ATL for MTLE were retrospectively evaluated. 52 patients (24 L-ATL; 29 R-ATL) had complete follow-ups including seizure outcome, neuropsychological assessments, and = 3mo follow-up MRIs. Volumetric analysis of postoperative gliosis and resection cavities were carried out in the follow-up MRIs. Patients were categorized into high gliosis group (26) and low gliosis group (27). Changes in comprehensive neuropsychological test battery between preoperative and 1 year after surgery were compared between the side of surgery and gliosis volume groups.

Results

At 1-year follow-up, overall IQ scores showed improvement, except verbal IQ in L-ATL with high gliosis group had significant decline (p=0.001) (Fig 1). Verbal memory impairment was seen more in L-ATL than R-ATL group regardless of gliosis volume but these batteries did not reach statistical significance among the groups (Fig 2). Non-verbal memory decreased significantly after R-ATL regardless of gliosis while L-ATL with low gliosis group produced some improvement

(VR1 p=0.001; VR2 p=0.005) (Fig 3). In language domain, L-ATL with high gliosis had significant decline in BNT (p=0.003) alone but no significant changes were observed in other language parameters (Fig 4). There was a suggestive trend in worsening of BAI (a psychological domain) in R-ATL with high gliosis (p=0.08), while BAI in L-ATL and R-ATL with low gliosis showed some improvements (Fig 5). There was no statistically significant difference between the volume of gliosis or volume of resection with respect to seizure outcomes (Engel I vs. Engel =II) (Fig 6).

Conclusions

Postoperative ATL gliosis may predict changes in IQ, memory, language, and psychological outcomes. It was not predictive of seizure outcome class. Surgical technique minimizing the damage/ischemia to resection bed could benefit patients' quality of life from neurocognitive perspectives.
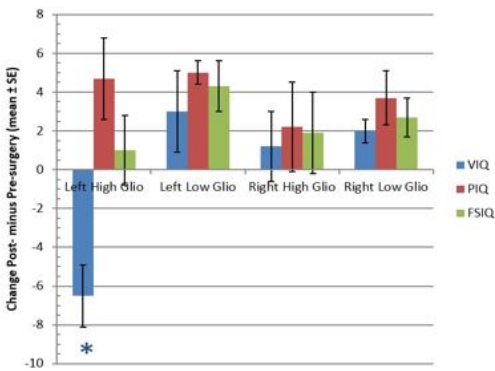

Fig 1. Changes in IQ based on side of resection and amount of gliosis. L-ATL with high gliosis had significant decline compared with baseline while others had overall improvement. *p<0.05, Kruskal Wallist test.
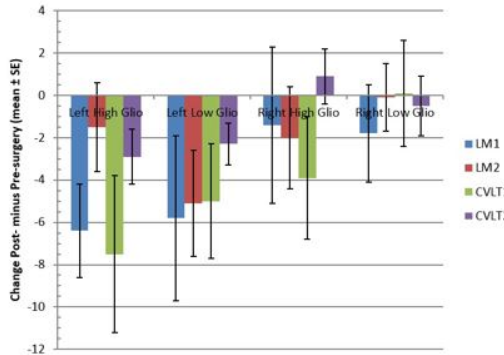

Fig 2. Changes in verbal memory demonstrating overall decline especially significant in L-ATL regardless of gliosis volume but this did not reach significance. LM: logical memory; CVLT: California verbal learning test
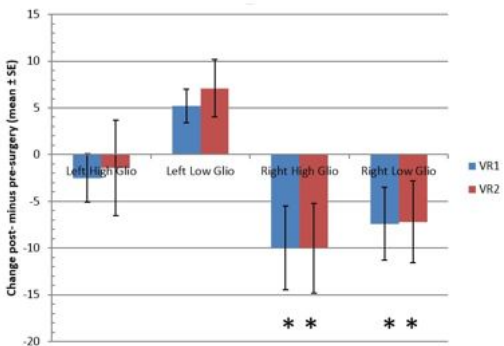

Fig 3. Changes in non-verbal memory using simple geometric drawing. Decline in R-ATL was significant especially in the high gliosis R-ATL group. *<0.05 Kruskal Wallist
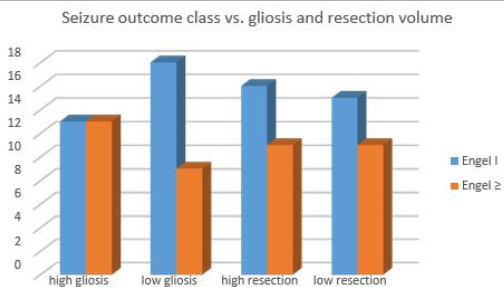

Fig 6. No difference in seizure control based on amount of post-op gliosis
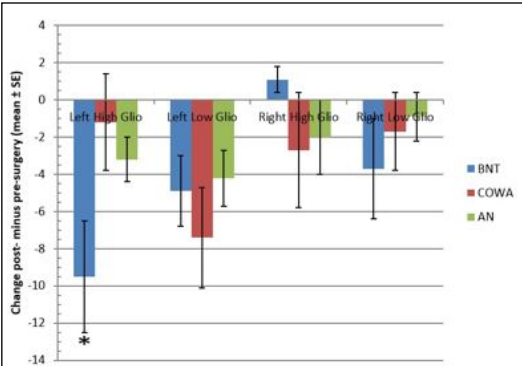

Fig 4. Changes in language domain. L-ATL with high gliosis had significant decline in Boston naming test (BNT). While L-ATL in general had more significant decline than R ATL. Overall language scores declined post-operatively.
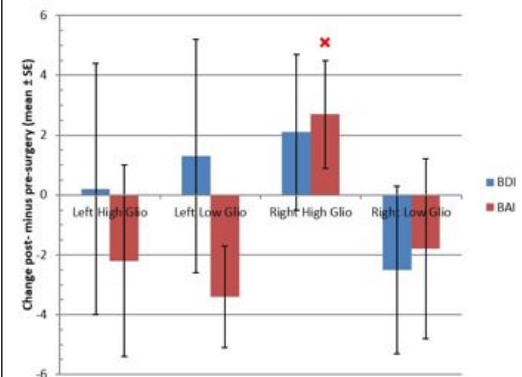

Fig 5. Changes in psychological domain. R-ATL with high gliosis had trend in worsening of BAI. Here increased number means worse result. BDI: Beck depression index; BAI: Beck anxiety index