PREOPERATIVE DTI FRACTIONAL ANISOTROPY STD PREDICTS MOTOR RECOVERY IN PATIENTS WITH BRAIN TUMORS LOCATED NEAR CORTICAL SPINAL TRACT

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Background

Diffuse Tensor Imaging (DTI)
✓ noninvasive method of preoperatively studying eloquent-located brain tumors, planning resections and saving functional areas.

Objective

This study aims to investigate preoperative DTI parameters as predictors of late motor outcome after resection of brain tumors located near Cortical Spinal Tract (CST).
Methods

ONGOING PROSPECTIVE STUDY - 34 patients, diagnosed with a single glioma (WHO grade II-IV) located near CST.

FOLLOW-UP: 90 days after surgery.

PRIMARY OUTCOME: motor score (upper + lower limb strengths of each hemibody). KPS and ECOG scales were assessed, as well.

Preoperative DTI parameters:
- Fractional Anisotropy (FA);
- relative FA (rFA);
- FA asymmetry index;
- Voxel count.

A unique examiner explored both affected and unaffected CSTs, on cerebral peduncles.

Statistical analysis: General Linear Model for repeated measures. SPSS 24.0 (IBM Statistics, Armonk, NY, USA).
Results

➢ Lower FA Standard Deviation (STD) of affected CST was found associated with improvement of muscle strength seen in 90-day postop motor score ($p=0.004$).

➢ No significance was observed for FA absolute value ($p=0.886$).

➢ DTI parameters rFA, FA asymmetry index and Voxel count seemed not to be related with motor outcome.

➢ DTI had no association with KPS or ECOG evolution.
Figure 1: A,B. Axial T2-weighted MRI showing a right hyperintense frontoinsular lesion suggestive of low-grade glioma with hypointense in T1-weighted image. C,D,E. DTI processing using the DSI studio software and measure of fraction anisotropy at the level of pons with dense concentration of "bluish" descending corticospinal tract.
Discussion

DTI is a valuable tool for surgical planning.
✓ association with better outcomes;
✓ prediction of outcome.

Sollmann N et al. (2019) - nTMS language mapping and nTMS-based DTI FT:
➢ Risk stratification of surgery-related permanent aphasia in patients with language-eloquent brain tumors.¹

Li D et al. (2018) (patients with brain stem cavernous malformations) - randomized clinical trial:
➢ DTI/DTT group: lower frequency of patients with worsened motor deficits at 12 months.
➢ Multivariate logistic regression: absence of preoperative DTI/DTT is an independent adverse factor for a worsened motor deficit.

Summary points

✓ Diffuse Tensor Imaging (DTI) is a preoperative study which has been associated with more accurate surgical resections and better outcomes for patients with different neurosurgical disorders.

✓ Preoperative DTI FA STD seems to have a potential predictive value of late motor recovery in patients with brain tumors on eloquent areas.

✓ In our study, DTI had no association with performance outcome.

THANKS!

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