Diffusion tensor tractography: Two methods comparative evaluation for gliomas presurgical workup

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Abstract:

BACKGROUND Glioma is the most common primary brain tumour, characterized by invasive growth along white matter (WM) fiber tracts. Tractography provides an important anatomic guidance in the preoperative planning process, which aims at maximizing resection whilst minimising morbidity. This study aimed at determining the agreement between two different software packages for delineating corticospinal tract (CST), arcuate fasciculus (AF) and optic radiation (OR). METHODS Forty-six histopathologically proven glioma patients subdivided into group A with tracts passing at the tumour margin; and group B with tracts passing through tumour and/or in the peritumoural oedema. FSL and MRtrix software were used for tracking, in each patient, CST (hand, foot and lips component), AF and OR using the same regions of interest. Qualitative evaluation of the agreement between the two methods was performed by two experienced observers in consensus. RESULTS The tracts identified: Were comparable for: CST-foot in 8(5) out of 11(8) cases in group A (B); CST-hand in 6 out of 8 cases in group B; Had less false positives in MRtrix for: CST-hand in 7 out of 11 cases in group A; CST-lips in 5(6) out of 8(8) cases in group A (B); AF in 4(8) out of 7(9) cases in group A (B); Were more accurate in FSL for: OR in 6(6) out of 6(7) cases in group A (B). CONCLUSIONS The accuracy of the tracts is comparable for most fascicle identification, with the exception of MRtrix presenting less false positives for AF in group B, CST-hand in group A and CST-lips in groups A and B; and FSL identifying more accurately the OR in both groups.

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