

Fluorescein-assisted Awake Stereotactic Needle Biopsy of Contrast-enhancing Brain Tumors: Safety, Feasibility and Review of the Literature.

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Introduction

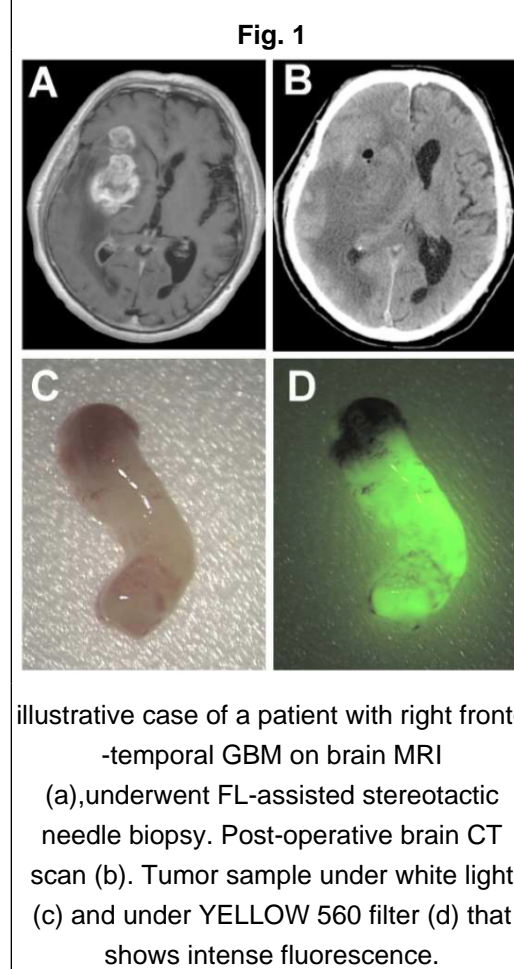
Diagnostic yield and procedure-related risks are crucial points of the stereotactic needle biopsy. The attempt to increase the first, by multiple samplings, can often increase the second. In this balance, intraoperative adjuncts that could optimize the diagnosis are spreading in the course of time. The evidence that the fluorescein (FL) works as a marker of blood-brain barrier damage have led to consider it for diagnostic confirmation in stereotactic biopsies of contrast-enhancing brain tumors. The aim of this study is to contribute to validate this methods and the safety and feasibility of the procedure in awake patient.

Results

In group 1 all fluorescent specimens were diagnostic for tumor tissue, with a limited number of samplings. Non-use of intraoperative neuropathological examination allowed to significantly reduce the time of the procedure (41.67 vs 69.72 minutes of group 2). No complications occurred and the average hospitalization time after procedure was 1 day (vs 2.33 of group 2). Literature supports the usefulness of fluorescence-based technology, even if, to date, studies about FL-application are very limited. Furthermore case-control studies and concomitant awake procedures are not yet reported.

Methods

We retrospectively analyzed 6 cases of patients with contrast-enhancing brain tumors (1 lymphoma, 1 WHO III glioma and 4 glioblastomas) underwent awake stereotactic needle biopsy (frameless pinless electromagnetic in 2 cases and frame-based in 4 cases) at our Unit by intraoperative FL-assistance (group 1), verifying fluorescence status under the YELLOW 560 filter integrated into operative microscope. Group 1 was matched with a control group of 9 patients with contrast-enhancing brain tumors underwent awake stereotactic biopsy during the last year without FL-assistance (group 2). In addition, concerning literature was reviewed in PubMed/Medline database.



Table

Characteristics	FL-assisted biopsy (group 1)	Control group (group 2)	P-value
Number of patients	6	18	
Gender			
female	1	8	0.25
male	5	10	
Age (years)			
mean	59.8	62.6	0.59
range	42-77	47-79	
s.d.	12.32	9.63	
Histology			
lymphoma	1	2	0.45
high grade glioma (WHO III)	1	1	
high grade glioma (WHO IV)	4	15	
Stereotactic technique			
frame-based	4	16	0.24
frameless	2	2	
Operation time (minutes)			
mean	41.67	69.72	0.039
range	30-60	30-145	
s.d.	13.67	34.91	
Intraoperative frozen section analysis	0 (0%)	4 (22.2%)	0.24
Number of sampling			
mean	1.17	2.89	0.0003
range	1-2	2-4	
s.d.	0.41	0.68	
Postoperative complications			
minor bleeding	0 (0%)	4 (22.2%)	0.24
hemorrhage	0 (0%)	1 (5.6%)	0.63
Hospitalization time after procedure (days)			
mean	1	2.33	0.041
range	1-1	1-11	
s.d.	0	2.45	

Characteristics of patients with contrast-enhancing brain tumors underwent awake stereotactic needle biopsy with FL-assistance (group 1) and of control group (group 2).

Conclusions

FL-assistance during stereotactic needle biopsy of contrast-enhancing brain tumors can give a real-time confirmation of tumor tissue, improving the diagnostic yield and reducing morbidity, time of procedure and hospitalization.