

Neuropsychiatric disorders after awake craniotomy for brain tumour

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Abstract

Awake-craniotomy (AC) allows maximum tumour resection while reducing the risk of permanent postoperative neurological deficits without compromising the outcomes of the treatment. AC is a potentially stressful procedure for the patients, which may lead to long-term effects on patients' psychology, and may lead to post-traumatic stress. However, there is a scarcity of data suggesting actual association of any neuropsychiatric conditions after AC. Therefore, we sought to review the neuropsychiatric conditions post awake craniotomy.

Keywords: Brain tumours, Awake Craniotomy, Quality of Life.

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Introduction

There has been an increasing focus on improving quality of life (QoL) during and after brain tumour treatment.¹ This has led to the exploration of various approaches to improve intraoperative neurological assessment and reducing postoperative neurological deficits.² Consequently, the use of awake craniotomy (AC) for brain tumour resection is gaining popularity. AC allows for maximum tumour resection while reducing the risk of postoperative neurological deficits without compromising the outcome of the treatment.³ This is achieved by intraoperative brain mapping, particularly when the tumour is located within or adjacent to eloquent brain regions.³ Although AC is a relatively safe procedure, literature suggests that experiencing a cranial procedure in awake setting might cause significant psychological stress that may lead to development of new psychiatric conditions such as major depressive disorder, PTSD, atypical depression or situational depression.^{4,5}

AC involves thorough planning with active involvement of anaesthesiologist, neuropsychologist, neurologist and neurosurgeon. Patient is usually evaluated by different

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neuropsychological tools before awake surgery and quite often, a patient is not rendered suitable for an awake procedure. During AC, the patient has to cooperate while certain psychological, motor, speech, cognitive and memory tests are performed. This additional stress and anxiety to a hitherto distressed patient suffering from a brain tumour may have prolonged psychological effects. Recently AC has become a common procedure for variety of oncological and epilepsy surgeries but very little data is available to measure the long-term neuro-psychological effects of AC. Therefore, we sought to review the neuropsychiatric disorders in brain tumour patients post-AC.

Review of Evidence

Neuropsychiatric and neurocognitive disorders are common manifestations in brain tumour patients.¹ The neuropsychiatric symptoms after AC could also be a consequence of the patient-related and tumour-related factors and not merely the AC.¹ Rahmani et al., assessed the level of anxiety and depression in 28 patients one month before, and 6 months after AC using the Hospital Anxiety and Depression Scale (HADS) questionnaire. Patients were diagnosed with depression and anxiety if they scored ≥ 8 on the HADS and the mean preoperative depression and anxiety scores were 4.89 ± 5.03 and 7.71 ± 5.85 respectively. Preoperatively depressive and anxiety symptoms were diagnosed in 50% and 25% of patients respectively. One month after surgery the scores were 6 ± 4.96 and 7.39 ± 16 and at 6 months follow-up they were 5.54 ± 5.16 and 5.38 ± 4.23 respectively. It was concluded that with time the depressive symptoms and anxiety gets better and there is no significant difference between the pre and postoperative HADS scores.⁶

Bakhshi et al., compared depression and functional status in patients undergoing AC and conventional craniotomy in 96 patients. Two separate questionnaires, the Patient Health Questionnaire-9 (PHQ-9) Scale and the Karnofsky Performance Score (KPS) were used to screen depression and to assess functional status. Postoperative functional status was significantly better in patients who underwent AC ($p < 0.03$). Patients suffering from postoperative clinical depression, according to the PHQ-9 Scale, were 41 (42.7%), of which 12 (12.5%) were in the awake craniotomy group and 29 (30.2%) were in the conventional craniotomy group. It was concluded that resection of brain tumours under AC is not likely

associated with any additional incidence of postoperative depression when compared to conventional craniotomy.⁷

Hejrati et al., investigated the psychological sequelae following AC for brain tumours in 20 patients. Pain and fear were evaluated on the day prior to surgery, intraoperatively, and on the third postoperative day using the Numeric Rating Scale (NRS). Stress and anxiety were assessed on the day prior to surgery, on the third postoperative day, and during the 3-month postoperative clinic visit using the Hospital Anxiety and Depression Scale (HADS-D [German version]) and the Patient Health Questionnaire (PHQ-D [German version]) whereas pain and its interference with daily activities was calculated using the Brief Pain Inventory (BPI). Change in psychological symptoms were measured by Wilcoxon matched-pairs signed-ranks tests and also Spearman rank correlations were calculated to assess their association over time. Median fear (NRS) decreased over time, whereas pain (NRS) increased. The maximum range for fear (NRS) was observed on the day before and 3 days after surgery. Anxiety and depression were moderately to strongly associated over time (all $p < 0.05$). Stress symptoms also correlated positively over all timepoints of the study period. Stress at 3 days after surgery was strongly associated with stress at 3 months after surgery, whereas the correlation between preoperative and immediate postoperative stress showed a statistical trend ($p > 0.07$). However, a series of tests of all medians of differences of anxiety, depression, and stress over time suggested that the procedure did not induce any shift in the median levels of symptoms already present prior to the procedure (all $p > 0.12$). It was therefore concluded that patients with relevant psychological distress generally already displayed their symptoms before surgery and the AC experience did not adversely affect

mental health.⁵

Conclusion

Published literature does not suggest that AC significantly affects neuropsychiatric condition of the patients. It may lead to transient psychological distress, fear, and can be a minor mediator of anxiety and depression. The short-term outcomes of AC are promising because data shows that it does not result in any long-term neuropsychiatric disorder and the initial deterioration of cognition due to psychological distress improves with subsequent follow-ups. However, there is a need for large-scale long-term studies on different psychological outcomes of AC for a better understanding.

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