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Clinical Study

Emotional and personality changes following brain tumour resection

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ABSTRACT

Psychological distress has a high prevalence in brain tumour patients, and understanding the emotional and personality changes that may follow neurosurgery is important for clinical management of these patients. We aimed to characterise these emotional and personality changes using subjective, observer-rated and clinical measures. We examined subjective changes in emotional experience and observer-rated changes to personality disturbances following neurosurgery for brain tumours (n = 44), compared to a control group that had undergone spinal surgery (n = 26). Participants completed the Hospital Anxiety and Depression Scale and a Subjective Emotional Change Questionnaire. Observers who knew the patients well also completed the Iowa Rating Scale of Personality Change. Compared to controls, patients with tumours reported significantly more changes to their subjective experience of emotions following neurosurgery, particularly anger, disgust and sadness. For the observer-ratings, tumour patients were described as having significant changes in the personality disturbances of irritability, impulsivity, moodiness, inflexibility, and being easily overwhelmed. Anxiety and depression were not significantly different between groups. Neurosurgical resection of a brain tumour is a major life event that changes patients' subjective experiences of different emotions, and leads to observer-rated changes in personality. In this study, these changes were not accompanied by increases in anxiety or depression. We conclude with a discussion of biological and psychosocial mechanisms that can impact emotional functioning and personality in patients with brain tumours.

1. Introduction

Psychological distress has a high prevalence in brain cancer patients, and has been found to be second only to that in lung cancer patients [1]. However, brain cancer provides a more complex model of dysfunction than systemic cancers, as symptoms experienced may be due to both the emotional reaction to a life-threatening disease and associated neurological and neuropsychological dysfunction due to the position of the lesion in the brain and the neurological effects of treatments such as surgery, radiotherapy and chemotherapy. Predicting which patients are likely to experience significant psychological distress and neuropsychological dysfunction will allow early intervention for at-risk patients and appropriate allocation of scarce supportive care resources. Most studies of emotion in patients with brain cancer have focused on mood changes such as depression [2], which have a large impact on quality of life [3]. While these changes are often considered to be an understandable reaction to diagnosis, reports of personality changes and psychiatric disturbances following brain neoplasms may also be due to the putative role of organic mechanisms such as location of the lesion, or effects of treatment [4–9]. We aimed to characterise emotional and personality changes following neurosurgery for brain tumour using a combination of subjective and observer-rated measures and a clinical measure designed to assess the mood of hospitalised patients.

2. Method

2.1. Participants

Participants in this study were 70 post-operative neurosurgery patients recruited from the Royal Melbourne and St Vincent's Hospital, Australia. Forty-four patients had undergone surgery for a solitary supratentorial brain tumour, of which 30 were malignant, and 26 control patients had undergone surgery for benign spinal degenerative disorders. The tumour types were astrocytic (n = 18), meningothelial (n = 12), oligoastrocytic (n = 4), metastatic (n = 4), oligodendroglial (n = 3), osteoma (n = 1), meningeal haemangiopericytoma (n = 1), mixed neuronal-glial (n = 1). The most

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commonly affected lobe was the frontal lobe (n = 25), followed by the temporal (n = 13) and parietal (n = 6) lobes. None of the controls had received chemotherapy or radiotherapy, however six tumour patients had undergone radiotherapy and nine tumour patients had undergone both radiotherapy and chemotherapy. All participants were between 1 and 12 months post-surgery. Exclusion criteria were neurological disease other than the reason for surgery, multiple brain lesions, surgery for head trauma, previous brain haemorrhage, hydrocephalus, nerve sheath tumour, posterior fossa lesion, inability to give informed consent, and poor English comprehension [10]. There were no group differences in age, education, or days since surgery (Table 1).

2.2. Experimental measures

The Subjective Emotional Change Questionnaire (SECQ) [11] was used to measure subjective perception of change in experience of amusement, anger, disgust, fear, happiness and sadness since surgery. An additional question measured alexithymia, the ability to express, describe, or distinguish between emotions.

The Iowa Rating Scales of Personality Change (IRSPC) [12,28] is an observer-rated questionnaire that assesses severity and degree of change in 30 behavioural disturbances observed in neurological patients.

The Hospital Anxiety and Depression Scale (HADS) [13] is a self-report questionnaire designed for use with physically ill patients without considering the effect of somatic symptoms.

2.3. Procedure

All research was conducted in accordance with the Human Research Ethics Committees of the University of Melbourne, the Royal Melbourne Hospital and St Vincent's Hospital, Melbourne. After informed consent was obtained from the participant, the questions of the SECQ were read aloud by the researcher who recorded the responses verbatim. The HADS was completed by the participant alone. The IRSPC was completed by a person who knew the patient well both before and after their surgery, independently of the patient. If such a person was not present, patients were given the questionnaire and consent form in a stamped, self-addressed envelope to take home for a person who knew them well.

2.4. Data analysis

For the SECQ, we quantified changes in subjective emotion as small, medium or large increases or decreases. Mann–Whitney *U* tests compared groups on the SECQ and the HADS, with effect size *r*. For the IRSPC, we defined a personality change as a characteristic given a level rating of 5 or higher (either before or now) and a change of at least 1 point. Fisher's exact tests determined whether the proportions of patients with personality changes differed between groups.

Table 1
Demographic and clinical characteristics of the tumour and surgical control groups

	Tumour	Control group
Age (years)	45.75 (13.57)	45.69 (13.95)
Days since surgery	134.63 (111.65)	98.81 (77.15)
Education (years)	12.49 (2.92)	12.69 (3.88)

Data are presented as mean (standard deviation).

3. Results

3.1. SECQ

The tumour group reported a significantly greater increase in anger ($U = 743.00$, $p = .023$, $r = -.30$), disgust ($U = 708.00$, $p = .018$, $r = -.24$), and sadness ($U = 777.00$, $p = .007$, $r = -.36$) than the control group (Fig. 1), and significantly more total change (mean = 2.82, standard deviation = 1.96) than controls (mean = 1.62, standard deviation = 1.53), ($U = 774.00$, $p = .014$, $r = -.35$).

3.2. IRSPC

Return rates of the IRSPC were 75% (tumour) and 73% (controls). Proportions of patients with personality disturbances are shown in Table 2. For each disturbance that differed significantly between groups, about half of tumour patients were rated as showing increases, and half decreases. Because the Type A behaviour scale was intended as a measure of possible response bias, these results should be interpreted with caution. A Mann–Whitney *U* test found a significant effect of group for the mean number of changes to personality disturbances ($U = 448.00$, $p = .010$, $r = -.429$), with the tumour group having more changes.

3.3. HADS

There were no significant group differences for the HADS Anxiety ($U = 539.00$, $p = .687$, $r = .060$) or Depression scale ($U = 584.00$, $p = .883$, $r = -.020$). Figure 2 shows that the means of these scales are below the suggested cut-off of 8 for identifying cases of anxiety and depression, with sensitivities and specificities for the Anxiety and Depression scales of about 0.80 [14].

4. Discussion

Mood changes in patients with brain tumours may be considered to be an understandable reaction to tumour or cancer diagnosis, impaired cognitive functions, or focal neurological changes such as motor weakness or aphasia, which may occur as a result of disease or surgery. We found that patients with brain tumours experience significantly more subjective emotional changes compared to a control group of post-spinal surgical patients. The tumour group were also rated as having more changes to a number of personality disturbances following surgery, including irritability, impulsivity, moodiness, inflexibility and being easily overwhelmed. These findings were variable in direction for both observer and self-report. Thus, while some patients reported experiencing increased negative and reduced positive emotions, others were more positive and, for example, expressed appreciation that they could be treated, their deficits were relatively minimal, and they had the opportunity to re-evaluate their life priorities.

There were no group differences in reported anxiety or depression. This supports previous findings that anxiety and depression, measured by the HADS, did not differ between a group of patients following surgery for intracranial neoplasm, and a control group of spinal surgery patients [15]. It also supports another study that reported low levels of anxiety and depression, measured by the HADS, following surgery for primary intracranial tumour [2], despite the relatively poor prognosis of these patients. However, some research has found a high burden of depressive symptoms in these patients [3]. The mean scores in the present study are similar to those obtained in an Australian study [16] that compared women with early onset breast cancer (mean anxiety score = 7.5, depression score = 3.3) with population-based reference women (mean anxiety = 8.2, depression = 4.2). Variations in prevalence