

Neuropsychiatric Problems of Patients Undergoing Neurosurgery

Beyin Cerrahisi Uygulanan Hastaların Yaşadığı Nöropsikiyatrik Sorunlar

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ABSTRACT

Patients undergoing neurosurgery for various medical conditions often experience a range of physiological and neuropsychiatric challenges. Common complications include fear, anxiety, depression, post-traumatic stress disorder, delirium, and sleep disorders, especially prevalent among individuals treated surgically for brain tumors. These neuropsychiatric symptoms can lead to extended hospital stays, increased rates of mortality and morbidity, and a decline in overall functional outcomes. Effective management requires a comprehensive approach that includes thorough evaluation, targeted psychoeducation, and consistent counseling. By providing holistic care that integrates psychological and physiological needs, healthcare professionals can support patients in navigating the emotional and cognitive impact of their surgical experience. Telehealth practices offer a promising avenue to extend monitoring and support beyond the hospital, allowing continuous care that enhances patients' quality of life and reduces the risk of disability, while also providing valuable resources for their families.

Keywords: Neurosurgery, brain tumor, neuropsychiatric problems

ÖZ

Çeşitli nedenlerle beyin cerrahisi geçiren hastalar sıklıkla bir dizi fizyolojik ve nöropsikiyatrik zorluk yaşamaktadır. Yaygın komplikasyonlar arasında korku, anksiyete, depresyon, travma sonrası stres bozukluğu, deliryum ve uyku bozuklukları yer alır ve özellikle beyin tümörleri için cerrahi tedavi gören bireyler arasında yaygındır. Bu nöropsikiyatrik semptomlar hastanede kalış süresinin uzamasına, mortalite ve morbidite oranlarının artmasına ve genel işlevsel sonuçların azalmasına neden olabilir. Etkili yönetim, kapsamlı değerlendirme, hedefe yönelik psikoeğitim ve tutarlı danışmanlık içeren kapsamlı bir yaklaşım gerektirir. Sağlık uzmanları, psikolojik ve fizyolojik ihtiyaçları bütünlükten bütüncül bir bakım sağlayarak, hastaların cerrahi deneyimlerinin duygusal ve bilişsel etkilerini yönetmelerine destek olabilir. Tele-sağlık uygulamaları, izleme ve desteği hastanenin ötesine taşımak için umut verici bir yol sunarak hastaların yaşam kalitesini artıran ve sakatlık riskini azaltan sürekli bakıma izin verirken, aileleri için de değerli kaynaklar sağlamaktadır.

Anahtar sözcükler: Beyin cerrahisi, beyin tümörü, nöropsikiyatrik sorunlar

Introduction

Individuals may be admitted to the neurosurgery clinic for conditions such as aneurysms, subarachnoid hemorrhage, hydrocephalus, and brain tumors. Patients Brain tumors are defined by the National Brain Tumor Foundation (NBTF) as an uncontrolled proliferation of cells in the brain. Most brain tumors are malignant in nature. The American Brain Tumor Association (ABTA) defines brain tumor symptoms as local symptoms such as headache, nausea, vomiting, seizures, personality changes, cognitive changes, fatigue and paralysis, weakness, and balance problems (ABTA 2024). (REF) Diagnostic and treatment methods for brain tumors have improved as technology has advanced. These tumors are treated with a combination of chemotherapy, radiation, and surgery (Yeşilyaprak and Özbayır 2021). However, due to recent advances in surgical procedures, surgical treatments are now employed to treat practically all disorders. The primary goal of the procedure is to surgically treat brain tumors while minimizing the consequences and symptoms associated with the disease. Brain tumor surgery is a complicated procedure that carries numerous risks and complications. Any complications that may occur during the surgery can cause irreversible neurological deficits in patients, as well as death (Mussi et al 2020).

Patients experiencing brain tumor surgery encounter a range of risks and challenges, including the adverse effects of general anesthesia, the risks involved with the procedure, or the loss of self-control over the circumstances. In the postoperative period, patients may have sequelae as a result of neurologic deficits and may be unable to live independently. Postoperative problems may be irreversible and limit patients' independence.

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This negative situation can be considered a crisis or a threatening event for patients. A life-threatening and/or disabling condition can produce a crisis due to extreme mental distress, surgical difficulties, communication problems, and a lack of information about the treatment process. These negative experiences cause patients to experience neuropsychiatric problems. Neuropsychiatric issues can be diagnosed and treated to reduce patient recovery time, hospitalization, morbidity, and mortality (Goebel et al. 2018, Sürme and Çimen 2022).

We must assess individuals with neurosurgery using a comprehensive, physiological, and psychosocial approach. Patients' psychological problems may have a harmful impact on their physiology. Ensuring physiological and psychosocial balance, as well as delivering comprehensive nursing care, will improve patient satisfaction while lowering recovery time, hospitalization length, and possible adverse effects. Good preoperative preparation (patient education, physiologic, and psychological patient preparation) minimizes the likelihood of neuropsychiatric disorders manifesting (Öztürk et al. 2020). In this context, it is critical to understand the physiological effects of brain tumor surgery on the patient and to identify the neuropsychiatric problems that patients are likely to encounter. This review discusses the neuropsychiatric problems and coping methods experienced by patients undergoing brain surgery.

Effects of Brain Surgery on the Patient

Surgery patients face a variety of potential stressors, such as the physical risks posed by anesthesia and surgery or reduced control over the situation. With these stressors, neuropsychiatric problems occur in addition to physiological problems in patients (Yu et al. 2019). Brain tumor surgeries are one of the types of surgeries where complications are common. The most prevalent complications in patients following brain tumor surgery are seizures and increased intracranial pressure syndrome (IIPS) (Thakkar et al. 2020). IIPS develops as a result of causes such as hemorrhage and cerebral edema that occur in the postoperative period. IIPS is diagnosed with physiological findings such as nausea, vomiting, hemiparesis, hypertension, and respiratory irregularities (Thakkar et al. 2020). Basic nursing measures to avoid the development of IIPS include elevating the patient's head to 30-45 degrees, maintaining normothermia, preventing hyperglycemia, providing preventive seizure medication, and providing the appropriate oxygen support (Thakkar et al. 2020, Yeşilyaprak ve Özbayır 2021).

Increased intracranial pressure causes seizures. Seizures are more common (70-80%) in patients with glioma (Thakkar et al. 2020). Antiepileptic drugs are used in the treatment of seizures. However, the European Association for NeuroOncology has reported that antiepileptic drugs should not be used prophylactically in patients with brain tumors and should be used in cases of seizures after surgery (Weller et al. 2017). When a patient has a seizure, the nurse should assess the type, duration, and aura before the seizure, ensure the patient's airway patency, prevent trauma, and notify the patient's family about it (Altun Uğraş and Akyolcu 2018, Yüksel and Altun Uğraş 2019).

Another physiological problem to be considered in patients with primary brain tumors is inappropriate antidiuretic hormone (ADH) release syndrome. Inappropriate ADH syndrome occurs due to the inappropriate and continuous release of ADH hormone in patients where the tumor is in the pituitary. This syndrome is seen in 26% of patients (Cui et al. 2019, Mentrasti et al. 2020). In the early postoperative phase, patients have hyponatremia, vomiting, and confusion. Patients may have IIPS, respiratory arrest, and mortality due to an uncontrolled syndrome. Hypertonic fluid therapy should be applied in these patients (Mentrasti et al. 2020).

Dysphagia can also occur among individuals with brain tumors. Dysphagia leads to fluid and electrolyte abnormalities in patients. Patients should be instructed on swallowing exercises. Patients' nutrition should be regulated. Soft foods will help the patient swallow more readily. In patients with a reduced swallowing reflex, enabling the patient to eat while tilting his or her head forward will prevent food leaking and aspiration. If liquids such as water or coffee cause the patient to choke, they should be thickened. Patients should be offered thickening of food consistency and aspiration therapies (Lapa et al. 2020).

Cognitive dysfunctions are observed in patients with primary or metastatic brain tumors. Surgical procedures, organ dysfunction, beneficial therapies, insomnia, and fatigue all have an impact on patients' cognitive capabilities (Kapoor et al. 2019). Patients may have difficulty communicating, maintaining attention, concentrating, and learning (Thakkar et al. 2020). These have a negative impact on patients' quality of life (Marotta et al. 2020) Speech and cognitive behavioral therapy should be suggested to patients in the post-operative phase to help them regain cognitive function. Patients' homes should be well-organized, and the patient should actively participate in his or her own treatment. Family and caregivers should be trained to manage the process (Thakkar et al. 2020).

Patients undergoing brain tumor surgery may experience neuropsychiatric problems such as anxiety and fear in addition to physiological problems in the preoperative period. These problems are a risk factor for complications in the postoperative period. Neuropsychiatric problems experienced by patients increase the stress response by causing the early and excessive release of stress hormones (Sürme and Çimen 2022). An increased stress response may lead to complications such as increased blood sugar, increased protein catabolism, delayed wound healing, and hypertension (Woldegerima et al. 2018). Intense anxiety and fear experienced by the patients cause nausea, vomiting, and even more intense pain in the postoperative period. In addition, complications can lead to prolongation of the hospital stay and an increase in mortality and morbidity (Sürme and Çimen 2022).

Neuropsychiatric Problems in Neurosurgery

Neuropsychiatry is gaining great importance day by day in our age and is considered the examination of the relationship between the function of the human brain and its behavior (Nehra 2019). The majority (52-87%) of brain tumor patients, who frequently experience neuropsychiatric problems, experience significant complications arising from brain tumors and treatment (Witcraft et al. 2022). Patients reportedly experience high levels of neuropsychiatric problems due to severe functional sequelae and an unfavorable prognosis, which greatly impacts their quality of life (Liu et al. 2018). In this context, the report on the global, regional, and national burden of brain tumors offers some recommendations for action for health professionals and planners. According to the report, in order to reduce mortality, morbidity, and disability, it is aimed at reducing the neuropsychiatric symptoms of patients and their families and improving their quality of life (Patel et al. 2019).

Neuropsychiatric symptoms such as anxiety, depression, post-traumatic stress disorder (Xiao et al. 2018, Chow et al. 2019, Tibbs et al. 2020, Gibson and Graber 2021), delirium (Viderman et al. 2020, Gu et al. 2022), sleep disorder, and excessive daytime sleepiness (Crabtree et al. 2019, Witcraft et al. 2022) are very common in neurosurgery patients. It is emphasized that these symptoms may increase fatigue related to the disease and treatment, negatively affect the quality of life, and have a significant negative impact on prognosis as well as survival (Liu et al. 2018, Witcraft et al. 2022).

A study reported that patients who experienced neuropsychiatric symptoms such as anxiety and memory disorders in the perioperative period were more dissatisfied (Van Ark et al. 2018). In another study, it was found that patients reported sleep disorders during the daytime (Jeon et al. 2021). At the same time, neuropsychiatric problems such as anxiety and depression were found to be higher in patients with sleep disorders, and it seems that neuropsychiatric problems may occur in relation to each other. In addition, the findings in the same study report that not only patients but also caregivers experience neuropsychiatric problems such as sleep disorders (Jeon et al. 2021). Especially in the COVID-19 pandemic, neuropsychiatric problems such as stress and anxiety were experienced in brain tumor patients and their caregivers (Voisin et al. 2020).

Fear

Modern psychosomatic medicine has proven that physical illnesses can cause emotional problems such as anxiety and fear. These emotional problems exacerbate the physical illness through reactions in the cerebral cortex center (Xiao et al. 2018). Fear arises as an emotional response to a real or perceived threat, while anxiety arises as an emotional response to a future threat (Hamm 2020).

After the diagnosis of a brain tumor, patients may experience feelings of anxiety and fear due to the medical and surgical treatment processes and the effects of the disease. The uncertainty to be experienced with the diagnosis of a brain tumor may cause fear in patients before surgery. In addition, these patients have a higher risk of postoperative paralysis, sequelae, and dependence on others compared to other patient groups. This situation causes fear in the patients (Eberhart et al. 2020). Besides, the reasons that cause fear include waiting for the surgery, anxiety that the surgery may cause physical or mental harm, separation from family members, anxiety about losing functionality, post-operative pain, and fear of death (Stamenkovic et al. 2018).

There are some factors affecting the level of fear. In a study conducted in patients with brain tumors, it was determined that women, those with a long preoperative hospital stay, and younger patients had higher preoperative fear levels (Sürme and Çimen 2022). In a systematic review of patients with primary brain tumors, it was reported that the fear of death is high in these patients and that patients exhibit more depressive behaviors (Loughan et al. 2021).

Anxiety and Depression

Neurosurgery patients show a higher prevalence of psychosocial distress and psychiatric illness compared to other patients. These high levels of distress and psychiatric morbidity have been associated with specific features of intracranial neoplasms. A brain tumor not only threatens life but also poses a direct threat to patients and shows neuropsychiatric changes in areas such as thought and emotion (Goebel et al. 2018). It is known that brain tumor patients and their families often exhibit neuropsychiatric problems such as anxiety and depression during the diagnosis and treatment of the disease (Xiao et al. 2018, Cubis et al. 2019).

The incidence of depression and anxiety symptoms in patients with brain tumors may reach up to 90%. It has been reported that women and patients with low education levels have higher anxiety symptoms, and it is emphasized that these symptoms may affect the level of attention, decrease the quality of life, and affect the prognosis and outcome of the disease. In this context, it is important to screen for depression and anxiety symptoms in brain tumor patients and to treat them with pharmacological and non-pharmacological methods (Xiao et al. 2018, Tibbs et al. 2020). In a study conducted, it was found that prior to brain surgery, 62.5% of patients experienced state anxiety, 50% experienced trait anxiety, and 9.7% experienced current depression. (D'Angelo et al. 2008).

In a study conducted with patients with intracranial arachnoid cysts, higher levels of anxiety and depression were found compared to the general population. But more importantly, it is noteworthy that these neuropsychiatric symptoms decrease after decompressive surgery. The location of the lesion in the brain also affects the severity of neuropsychiatric symptoms. Patients with right temporal cysts show higher anxiety and depression than patients with left temporal cysts. Depression scores were found to be high in patients with frontal cysts, while depression scores were within normal limits in patients with temporal cysts (Gjerde et al. 2019). Some studies also report high levels of anxiety in patients even years after successful treatment of a brain tumor (Chow et al. 2019, Desjardins et al. 2019). The type of surgery performed is also important. A study found that surgery-related anxiety was extraordinarily high in the open skull surgery patient group and exceeded the anxiety levels of other surgical patients, and that patients made significant psychological efforts to cope with this anxiety (Goebel et al. 2018).

Post Traumatic Stress Disorder (PTSD)

PTSD is a psychiatric disorder associated with repeated traumatic experiences following exposure to trauma, avoidance of traumatic stimuli, hyperarousal, the presence of negative thoughts and a negative mood, and impaired functionality (Koenen et al. 2017, Abdallah et al. 2019). Post-traumatic stress disorder (PTSD) can develop as a result of experiencing or witnessing a trauma that threatens the individual's psychological or physical integrity. It includes cognitive, emotional, behavioral, and social disorders (İlhan and Kışlal 2023).

Evaluations within the scope of post-traumatic stress disorder in the DSM-5 focus on PTSD symptoms, not on the person's reactions to the stress factor. These symptoms are evaluated under three headings in academic sources and the DSM: (1) Re-experiencing, (2) Avoidance, and (3) Arousal (American Psychiatric Association 1994, Okcu 2016). In DSM-V, it is examined under four headings: (1) experiencing the traumatic experience repeatedly; (2) avoiding stimuli related to the trauma; (3) numbness, presence of negative thoughts and mood, (4) and overstimulation and hyperactivity (American Psychiatric Association 2014).

It is estimated that 70% of the world's population is exposed to trauma, and PTSD develops in approximately 6% of individuals exposed to trauma (Koenen et al. 2017, Abdallah et al. 2019). Posttraumatic stress disorder is one of several psychiatric disorders that can increase pain and disability in situations such as traumatic brain injury (Bombardier et al. 2006). Patients with primary and metastatic brain tumors are particularly susceptible to the direct neuropsychiatric effects of the tumor as well as psychiatric morbidities resulting from diagnosis, prognosis, or treatment. However, these morbidities are often underdiagnosed or misdiagnosed and ultimately result in inadequate treatment. Especially in individuals with brain tumors, the rates of maladjustment and post-traumatic stress disorders such as depression and anxiety are also high, and it is important to distinguish these conditions from each other in order to provide both appropriate and quality care (Gibson and Graber 2021).

Delirium

Delirium is an acute and reversible deterioration of mental processes characterized by impaired consciousness and/or cognitive dysfunction. Postoperative delirium is a common complication after surgery, with an incidence rate of 3% to 77%. (Budénas et al. 2018). It starts on the first postoperative day and can last 2-5 days. Advanced

patient age, a lower education level, preoperative functional impairment, and anemia increase the risk of postoperative delirium. Postoperative delirium is associated with undesirable outcomes such as higher morbidity and mortality, increased cost of care, and poor long-term quality of life after discharge. Recently, more attention has been paid to postoperative delirium in patients after neurosurgery, and it has been emphasized that early recognition, prevention, and appropriate management of postoperative delirium would have important clinical consequences in terms of patient recovery after surgery (Budénas et al. 2018, Chen et al. 2020, Viderman et al. 2020, Gu et al. 2022).

As patients with brain tumors live longer, neuropsychiatric problems become more important and require early diagnosis and personalized evidence-based treatments for optimal outcomes (Keng et al. 2020). According to a study, early activity in patients with brain tumor resection can reduce the incidence of postoperative delirium, shorten postoperative delirium and postoperative hospital stay, and improve the ability of patients to care for themselves after surgery (Gu et al. 2021). Besides, the literature accepts that aripiprazole is a safe and effective treatment option to prevent neurosurgery-induced delirium (Mokhtari et al. 2020).

Sleep Disorder

Sleep disorder is a disorder in which problems with sleep-wake duration or quality are experienced, resulting in excessive daytime sleepiness and functional impairment. Sleep is one of the basic physiological needs of humans. Sleep disorders, which can occur for short or long periods in the perioperative period, affect many patients who undergo surgery. Sleep disorders can negatively impact patient recovery, increase the incidence of postoperative neurological consequences and pain, and reduce hospitalization satisfaction. Despite posing a significant threat to public health, sleep disorders remain poorly understood, underdiagnosed, and poorly managed, especially in perioperative patients. There is inevitable heterogeneity between studies in terms of methodology and population characteristics. The possible negative consequences of sleep disorders indicate the need for more attention to the prevalence of these disorders in the surgical population (Crabtree et al. 2019, Jeon et al. 2021, Lin et al. 2021, Witcraft et al. 2022).

Sleep disorder is one of the most commonly reported symptoms in people with brain tumors and often presents with highly related symptoms such as fatigue, depression, anxiety, pain, or cognitive impairment. It has been reported that more than half of the patients and caregivers have sleep disorders, and it is mostly seen as difficulty falling asleep and excessive daytime sleepiness (Crabtree et al. 2019, Jeon et al. 2021, Witcraft et al. 2022). Besides, in a study, it was stated that sleep problems were seen at a high rate in patients who survived childhood brain tumors with neuropsychiatric problems (Van Kooten et al. 2019).

Coping with Neuropsychiatric Problems in Brain Surgery and Interventions

It is stated that neuropsychiatric problems cause a significant emotional burden and seriously affect patients' ability to cope with their illness and follow the treatment process (Liu et al. 2018). In order to cope with neuropsychiatric problems, the evaluation, psychoeducation, and counseling of patients play an important role in alleviating these problems (Patel et al. 2019). The high risk of emotional complications and their harm in brain tumor patients becomes a major challenge in disease management. Fatigue, pain, anxiety, and depression are among the most distressing symptoms associated with the prevalence of distress in brain tumor patients, resulting in worse overall survival and reduced health-related quality of life (Huang et al. 2017, Randazzo et al. 2017, Liu et al. 2018).

Most brain tumor patients use emotion-focused coping strategies. However, a small portion of patients report intense rumination, which negatively affects psychosocial symptoms, and all of these show that individuals cannot cope and/or do not use problem-focused coping methods (Goebel et al. 2018). In addition, although patients with primary and metastatic brain tumors are at high risk of neuropsychiatric symptoms, they are generally excluded from psychosocial intervention studies (Milbury et al. 2020). At this point, the necessity of psychiatry consultation and the importance of psychosocial care emerge (Xiao et al. 2018, Patel et al. 2019, Tibbs et al. 2020).

A study reports that patients' neuropsychiatric symptoms are reduced by providing psychological care, but such studies seem to be quite limited (Xiao et al. 2018, Cubis et al. 2019). Telehealth services also have the potential to provide people with brain tumors with remote access to supportive care. Today, with increasing digitalization, telehealth delivery of supportive care is an acceptable and applicable method for individuals with brain tumors and their caregivers (Milbury et al. 2020, Ownsworth et al. 2021).

Emotion-Focused and Problem-Focused Coping Strategies

Coping is a process that uses both cognitive and behavioral efforts to control a stressful situation and regulate related emotions. Relaxation techniques, meditation and yoga, regular sleep, breathing exercises, effective time management, prayer and worship, social support, taking up hobbies, and learning to enjoy life are individual methods of coping with stress. It consists of two main categories: problem-focused coping and emotion-focused coping. In problem-focused coping, individuals may seek social support or take action to overcome a challenge. In emotion-focused coping, individuals may seek a more positive reappraisal of their situation or engage in distracting activities. Turning to religion, positive reinterpretation, and the use of emotional social support are some of the emotion-focused coping methods. Sometimes people do not want to intervene with stressors. Denial, substance use, mental neglect, and behavioral neglect are ineffective coping methods. Awareness should be raised for individuals who cope ineffectively, and these individuals should be supported to use effective rather than ineffective coping methods (Liang et al. 2020, Duman 2023).

To effectively adapt to a neuropsychiatric experience such as a brain tumor, a patient must successfully manage her emotions and behaviors and maintain cognitive flexibility against the disease to change the stressful situation (Liang et al. 2020). In a study conducted with surgical patients with intracranial tumors, it was observed that the majority of patients used coping strategies that facilitate emotional adaptation (Goebel et al. 2018). In a study conducted with patients with brain tumors, increasing the level of emotion-focused coping showed that future uncertainty positively affected the participants' quality of life. It is also recommended to use problem-focused coping strategies (Pan et al. 2019).

Guided Imagery Technique

Guided imagery often uses visualization techniques that allow a person to imagine themselves in a place where they can feel relaxed, safe, happy, and at peace. It can be applied by a practitioner actively guiding the person or by listening to a pre-prepared audio and video recording by a practitioner (Dos Santos et al. 2019). Soft-toned background music and visualization commands and suggestions are used that allow the person to feel happy, comfortable, calm, and safe. Guided visualization often begins with breathing exercises and relaxation. It continues by allowing the person to visualize a physical environment in which they can be comfortable and peaceful (Elgit 2018, Acar 2019, Dos Santos et al. 2019, Buyukbayram and Saritas 2021, Ata 2022). Your imagination; It is known that it affects many major physiological systems, such as respiration, heart rate, blood pressure, cell metabolic rate, gastrointestinal motility and secretion, sexual function, cortisol level, blood lipids, and immune response (Prabu and Subhash 2015). The method, which is applied as a nursing intervention before invasive interventions, especially to manage symptoms such as stress, anxiety, and pain (Boehm and Tse 2013), can be applied alone, generally to aid hypnosis or meditation, or in combination with progressive muscle relaxation techniques (Roffe et al. 2005). While a meta-analysis on imagery showed that the method was effective in reducing surgical pain and anxiety (Singh and Dalmar 2014), a study conducted with cancer patients found that it positively affected the patients' stress, insomnia, depression, anxiety, and psychological discomfort (Chen et al. 2015), another study showed that preoperative anxiety level, duration of stay in the post-anesthesia recovery unit, and postoperative pain level were reduced in patients who underwent visualization (Gonzales et al. 2010, Acar 2019).

Conclusion

Neuropsychiatric problems such as anxiety, fear, depression, post-traumatic stress disorder, delirium, and sleep disorders are very common in neurosurgery patients, and these problems have a significant negative impact on quality of life and prognosis. Although it is seen that some patients use emotion-focused coping methods and some patients cannot cope, it is noteworthy that intervention studies conducted in this context are quite limited. Holistic evaluation of patients and support with psychoeducation and counseling are necessary to reduce mortality, morbidity, and disability, improve the quality of life of patients and their families, and cope with neuropsychiatric problems. It is suggested that these approaches should be reflected in qualitative and quantitative studies.

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