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Case Report

The Exercise Intervention as Part of Rehabilitation in Intracranial Myxoid Chondrosarcoma: A Case Report

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Abstract: Malignant tumors after surgical trauma are frequently presented with unavoidable complications, such as physical dysfunction, decreased motor endurance, bowel disorders and cognitive impairment, and other symptoms. Due to the presence of malignant tumors, patients suffer from not only physical discomfort but also the presence of psychological and mental stress. Trauma often leads to poor emotional control and cannot cooperate with treatment. Exercise can not only change the function of the limbs but also have a positive effect on emotions. This case reports a 28-year-old male who experienced a decline in cognitive function and activities of daily living after undergoing tumor resection and radiotherapy. A year later, he was hospitalized and completed a four-week activity of daily living and exercise rehabilitation training. What's more, his mood was managed along with the reintegration therapy. As the patient's mood improved, training coordination increased, quality of life and daily living ability gradually improved, and he recovered well during the follow-up period. Given this single case, multi-modal exercise rehabilitation can maintain or improve functional performance and QOL domains even during heavy treatments. When the patient is undergoing exercise rehabilitation, he also needs emotional management, and emotional intervention is required for the patient. Therefore, exercise and the emotional management of patients with malignancy are of great importance.

Keywords: Intracranial Myxoid Chondrosarcoma, Exercise Intervention, Rehabilitation

1. Introduction

In recent years, more and more evidence has shown that patients with malignant tumors after surgical trauma require rehabilitation, and patients during postoperative radiotherapy and chemotherapy are no exception [1]. Literature-based discovery, some clinical symptoms will disappear after surgery, but malignant tumors will bring some inevitable or unpredictable complications [2]. Postoperative patients with intracranial tumors often suffer from limb dysfunction, decreased exercise endurance, decreased or disappearance of sensation, feces disorders, cognitive impairment, and other symptoms [3, 4]. Some experts indicated that patients with brain tumors improved their function after comprehensive rehabilitation treatment even after several years of diagnosis and treatment [2, 5]. Furthermore, compared to benign tumors, the patients suffer more psychologically and mentally due to the malignant tumor. Trauma often leads to poor emotional control and cannot cooperate with treatment [6]. Exercise can not only change the function of the limbs but also have a positive effect on emotions [7]. A reference normative rehabilitation motion treatment is provided for patients with cognitive disorders and emotional disorders after malignant tumors. The aim is to describe the relationship between the development and exercise intervention based on basic motion and discuss the observed emotional improvement and sports intervention effect, physical function improvement, and improvement of daily life ability.

2. Case Report

This case report was designed on the case-report guidelines (CARE) [8].

2.1. Clinical Information

In March 2020, a 28-year-old male office worker was admitted to hospital with epilepsy (absence seizures), lacked fluency in speech, and decreased visual acuity. From January 2019 to March 2020, the patient experienced dizziness, fatigue, memory loss, and concentration decreasing. Computed tomography revealed an oval space-occupying lesion 3.9x3.0x3.2 cm in the saddle. "Sarella tumor resection" was performed on March 11, 2020. Surgical specimen examination and diagnosis (under the microscope): combined with immunophenotype in line with myxoid chondrosarcoma; immunohistochemistry (2#): CK (-), S-100 (+), EMA (small amount +), Ki-67 (+, about 5% of the hot spot), final diagnosed intracranial myxoid chondrosarcoma. Post-surgery, the patient was readmitted for Paroxysmal seizures was treated with sodium valproate (500mg once a day). The patient then underwent radio chemotherapy partial residual Tumors with Gamma knife. Four weeks after chemoradiation, the patient started treatment with rehabilitation while continuing antiepileptic therapy outside the university hospital.

Before 2019, the patient was a person who had regular running or basketball activities every week. When affected by the tumor, the patient gradually loses normal work and rest, avoids communicating with people, is depressed, and unwilling to engage in any sports activities. After the operation, the patient also developed cerebral infarction, cognitive impairment, mood disorder, and physical disorder, which affected the patient's daily activities. The family members and the patient themselves are willing to carry out individualized rehabilitation treatment, sign informed consent, and there is no refractory epileptic seizure, and the patient is included in the local neuro-tumor patient personal training program.

Following discharge from the hospital, his psychiatric symptoms and cognitive function improved and he was able to communicate briefly. Muscle strength of the extremities improved compared to before.

2.2. Outcome Measures

Outcome measures were assessed at baseline (T1), and at the end of the four-week intervention (T2). Table 1 gives an overview of the study course during hospitalization of the intervention. The questionnaire used was the generic EORTC-QLQ-C30, due to its comprehensively psychometric testing [9]. High scores indicate better QOL for "Global Health Status/QOL" and functioning scales, and poorer QOL for symptom scale/items [10]. Table 2 describes the EORTC-QLQ-30 scores before and after the six-week exercise intervention, indicating that patients' quality of life improved.

Table 1. *Study course during hospitalization of the intervention.*

Time	Study course
The first week	The position and the plastization of the affected limb Passive activity of the hemiplegic side. Use an ankle-foot orthosis Enhance sensory stimulation
The second week	Electric stand-up bed training Bed activities Occupational therapy
The third week	Electric stand-up bed training Bed activities Resistance muscle training; Occupational therapy
The fourth week	Electric stand-up bed training Sitting activities Resistance muscle training Occupational therapy

Table 2. *EORTC-QLQ-30 scores before and after the six-week exercise intervention.*

	T1 (baseline assessment)	T2 (six-week follow up)
Functioning scales		
Physical functioning	86.6	93.3
Emotional functioning	100	100
Role functioning	100	100
Cognitive functioning	66.6	66.6
Social functioning	100	83.
Symptom scales/items		
Fatigue	22.2	22.0
Nausea and vomiting	0	0
Pain	33.3	0
Dyspnoea	33.3	0
Appetite loss	0	0
Constipation	0	0
Financial difficulties	0	0

2.3. Exercise Modalities

A decline in functional performance or activity levels caused by diagnosis or related treatments results in patient inactivity. Lying for a long time impairs muscle strength and exercise endurance, which limits the patient's ability to perform simple daily activities. Low levels of daily life ability and malignant tumors bring a heavy psychological burden, and depression and mania will strongly affect QOL. We believe that a key factor in changing this negative energy psychology and a series of reactions after tumor surgery is exercise, because it can improve the strength, health and function of various cancer populations. In addition, exercise as part of the rehabilitation of patients with health events can improve QOL. Therefore, these benefits seem to also apply to patients with myxoid chondrosarcoma.

2.3.1. The Position and the Plastization of the Affected Limb

Turn over regularly: (starting with passive) The patient has right hemiplegia. 1) Make the patient with the right lateral position: the right upper limb should be bent forward 90° with the shoulder joint, extend elbows, fingers, palms upwards, right lower limbs hips, knees bend slightly, ankle dorsiflexion 90°, and place the left limb in a comfortable position. 2) Supine position: A thin pillow is placed under the anterior scapula and pelvis on the right hemiplegic side to prevent retraction in the

future. The upper limbs of the hemiplegic side showed slightly abducted shoulders, extended elbows, wrists, fingers, and palms upward. The lower limbs are flexed hips, knees, feet on the bed, or hips, knees, and ankle dorsiflexion 90°. These actions are completed by the patient autonomously after the therapist leads the patient to master the essentials of the action.

The electrical bed helps the patient's practice posture change, from the vertical change of the stand-up position, enhance the weight of the lower extremities and the body muscle strength, so that the patient gradually adapts to the normal human standing posture. This can effectively prevent complications caused by long-term beds, such as pulmonary infections, muscle atrophy, hypotension, and the like.

2.3.2. Passive Activity

The order of activity from the proximal joint to the remote joint, the patient's right limb tension is slightly increased, and the muscle strength is weak. Since the patient has a regular high-intensity exercise before the disease, there is intermittently rehabilitation treatment. The patient did not appear significant muscle atrophy. Generally, passive activities are given twice a day for about 30 minutes each time. At the same time, the patient's head turned to the affected side, and the patient's active participation was helpful by visual feedback and the therapeutic man.

2.3.3. Functional Training of Upper Limbs and Hands

Pay attention to the functional training of the affected arm. We use compulsory exercise therapy as appropriate to improve the practical functions of the upper limbs and hands on the hemiplegic side. Before performing the functional activity of hemiplegia, the flexor tension of the limb is reduced, and the common method is the reflective suppression mode. The patient supine, passively makes the shoulder joint exterior, stretched out elbow, the front arm, the wrist tertiary, stretch and thumb abduction. The method can significantly reduce the tension of the upper limb flexor by slowly continuous drafting and fervas muscles, but the effect is short. This method can be reused to maintain a good flexor tension. In addition, the front extension of the shoulder blade can also be achieved, and the purpose of reducing the flexor tension of the upper limbs can also be achieved. It is worth noting that Limb massage should be the extensor muscles of the upper limbs (triceps and forearm extensors) at this time. If we stimulate the biceps, the upper limb flexor tension will be strengthened. In the above-mentioned functional activity, the motion control capability training (such as a certain limb position) and coordination training can be gradually increased. The coordinated training is created for future daily live activities. When exercising exercise control, in order to prevent the occurrence of common sports or abnormal motion modes, the therapist can give certain help to guide its correct movement. In therapeutic activity of the upper limbs and hands of the hemiplegia, especially in the training of motion control capabilities, it is important to pay special attention to the law of recovery from near to far, from thick to thin. The active control ability of the proximal joint directly affects the functional recovery of the distal joint of the limb.

2.3.4. Therapeutic Activity of the Lower Extremities

Unlike the upper limbs, the lower limbs need to reduce the patient's extensor tension, especially the tibialis anterior muscle. The patient takes the supine position and passively causes the patient to abduct the hip joint, extend the knee, and extend the ankle joint back. Because of obvious foot varus, we recommend that the patient use an ankle-foot orthosis (AFO) to passively move the affected foot to the ankle dorsiflexion position to facilitate later walking and remove it at rest.

2.3.5. Active and Passive Activities

1) Hold the patient's hands crossed and lift up. Bobath shakes hands, and with the help of the upper limbs of the healthy side, stretches the elbows of both upper limbs. Shoulder flexion, upward movement.
2) Turn over: turn over to the hemiplegic side and lie on the affected side, hold hands, extend elbows, and bend the shoulders 90°. Bend the hips and knees of the healthy side, step on the bed and turn the head to the hemiplegic side. The upper limbs of the healthy side drive the upper limbs of the hemiplegic side to turn to the hemiplegic side, and drive the stem to turn to the hemiplegic side. At the same time, the uninhibited foot is forced on the bed to make the pelvis and lower limbs turn to the hemiplegic side. Turning to the healthy side, the action is the same as before, except that the starting position of the lower limbs on the hemiplegic side needs help from others. The limb position of the contralateral lying position is the same as before.
3) Bridge exercise: Maintain this position for 5-10 seconds.

Mirror therapy: Requires patients to exercise the mirror, allowing patients to perform one or a series of specific actions. The image can provide the correct visual input. When the patient moves the function of good functions, the sensation of the patient will cause the patient to move by the mirror, which may be "alternative" the body sensation input of the originally reduced or not existing. The mirror neuron system provides an "observation-execution matching mechanism" to unify action execution and action awareness, which plays an important role in the process of action observation, action imagination, action imitation, and practice re-learning. Simultaneously, as a bilateral training, the visual feedback provided by the "illusion" is used to act on the brain, activate the neurons set to have hands, and promote the reorganization of brain functions.

Occupational therapy: According to the patient's functional status, it is necessary to adapt to its personal work activities, and improve the daily live activities of interest. Occupational therapy generally includes activities of daily living. The level of daily living ability is an important indicator reflecting the rehabilitation effect and whether the patient can return to society. Basic activities of daily living, such as active movement, eating, personal hygiene, changing clothes, bathing, and walking, while applied activities of daily living, such as doing housework, using transportation, cognition and communication.

2.3.6. Auxiliary Use Training

Lower extremity robot

Sportity function activities, through corresponding functional activities, increase the patient's muscle tension, balance and coordination capabilities and joint activity range; in order to make full use and function, the amount of energy to help improve the function of the patient Activity ability.

3. Discussion

The patient had poor performance and younger, but his recovery process is slower and he was unwilling to cooperate with rehabilitation treatment. The patient's compliance was poor from the surgery to the week before admission. He was opposed to all people's exercise intervention, and prone to mood swings when the exercise intensity increased. He was unwilling to accept new or more difficult items. Retrospective studies have shown that most patients with glioma are willing to cooperate and receive physical exercise therapy [11-13]. We considered that due to long-term bed rest, the patient's back muscles, neck muscles, and limbs were reduced. Because the patient's mood swings, prone to irritability and aggressive behavior, the early rehabilitation treatment did not receive obvious cooperation. There is also evidence that excessive fatigue and pain can cause emotional resistance in patients [14]. Therefore, we choose to start with small doses and relaxation exercises to exercise patients.

3.1. The Physical Exercise Program Is Feasible After Surgery

Depending on the part of the tumor, patients may experience different dysfunction, including cognitive disorders, sensibility disorders, balance obstacles, emotional disorders, daily life compensation. Due to malignant tumor surgery, many complications will occur. Our patient has quadriplegia, cognitive impairment and emotional impairment. The patient cannot sit still and needs help from others. We recommend that patients use electric wheelchairs for transport.

3.2. Based on Damage to Therapeutic Goal Exercises, Carefully Plan a Good Exercise Program to Promote Long-Term Training in Patients

In the third year, patients did not show strong willingness to conduct physical training, and even refused to carry out rehabilitation training. He overweighs, due to illness and depression, exercise and cognitive damage recovery process slow. His cognitive condition influences the extent of collaboration. In his case, a decision factor is that he is willing to cooperate with his own guidance. However, with the increase in fitness, the patient has increased its own recovery information, and the patient's willingness is increasing. In addition, some external factors may also help his training: personal one-on-one training allows patients to exercise at their own speed. Interacting with physiotherapists helping patients have achieved trust in their ability, which encourages him to increase training intensity. Finally, training in the professional exercise environment outside the hospital, the patient is mainly patients with brain tumors and patients with stroke, and the physical function of the patient's body function also gives him a certain driving force. Although there is still a need for further research, we believe that these factors are the key to successful health and training programs.

3.3. Despite the Use of Multi-mode GBM Treatment, It Is Also Possible to Obtain Physical Health

The Physical Exercise Program did not have any adverse events. We can't rule out the results of multi-mode treatment. We also combined with drug treatment, acupuncture, traditional Chinese medicine, and other physiciatives to treat him, which may have a certain impact on patients' movement, cognition and emotion [15].

4. Conclusion

The multi-modal exercise rehabilitation may improve the patient's quality of life and ability to live during the treatment of the critically ill patient. When a severe patient is engaged in rehabilitation, appropriate emotional interventions raise the patient's willingness to recover and improve functional performance and QOL domains.

Author Contributions

Siyu Lu, Jinying Wang, Xingjin Lin wrote this manuscript and Zhuoming –Chen gather information and modified.

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Compliance with Ethical Standards

Conflict of Interest

The authors declare that they have no conflict of interest.

Consent to Participate

Not applicable.

Consent for Publication

All authors have read this manuscript and would like to have it considered exclusively for publication.

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