

**CASE REPORT**

# Patient operated for an intraparenchymal brain tumor with serious lower limb weakness. The role of in-hospital physiotherapy

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**ABSTRACT**

**BACKGROUND:** In-hospital physiotherapy is very important and may contribute significantly to the recovery of acute hospitalized patients.

**OBJECTIVE:** The aim of this paper is to present the case of a 67-year-old male patient who was operated for an intraparenchymal brain tumor and was admitted to the ITU due to serious postoperative complications.

**METHODS:** Physiotherapy commenced from the acute stage of ITU admission with the application of respiratory and early rehabilitation techniques and was continued on the neurosurgical ward with advanced mobilization and rehabilitation interventions.

**RESULTS:** On patient discharge, significant improvement was recorded in his neuromuscular and functional status and he was referred to a long stay hospital for further rehabilitation.

**CONCLUSION:** Physiotherapy played a vital role in the overall therapeutic management of this patient and this confirms its significant clinical contribution in an acute hospital setting.

**KEY WORDS:** ITU, myopathy, limb weakness, physiotherapy

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Manuscript received September 12, 2018;  
revised manuscript received January 30, 2019;  
Accepted February 27, 2019

**PATIENT HISTORY**

We present the case of a 67-year-old male patient presented with right visual disorder who was hospitalized for 121 days. His past medical history included hypertension under medication, gastro-esophageal reflux, appendectomy; inguinal hernia repair and brain shunt implantation 21 year ago (for aqueduct stenosis).

His visual fields examination revealed binasal inferior quadrantanopia.

Brain MRI scan revealed an intraparenchymal brain tumor with a size of 3×3, 5×2, 7 cm above the ethmoid bone, receiving contrast heterogeneously.

Bifrontal craniotomy and ligation of the anterior 1/3 of the superior sagittal sinus

was carried out. The brain tumor was recognized in the base of the frontal lobes above the ethmoid bone. He underwent total resection of the tumor. The surgical procedure was uneventful.

The brain tumor histology showed a primary astrocytic grade 1 tumor, with characteristics of a pilocytic astrocytoma.

Even though the immediate post-operative period was without complications the patient gradually presented deterioration of his consciousness level reaching GCS 9/15 (E 3 M 5 V 1) in 5 days.

An urgent brain CT scan displayed an acute post-operative bifrontal subdural hematoma and the patient underwent surgery for hematoma evacuation.

Following surgery the patient was intubated and admitted to the Intensive Care Unit (ITU).

After two weeks the patient underwent tracheostomy and a post-operative brain MRI was performed, with no significant findings.

Approximately a month following his admission at ITU he developed an episode of a severe chest infection and paralytic ileus with further deterioration of his consciousness level.

Despite his clinical improvement, mainly due to antibiotics administration, he developed severe weakness mainly in his lower limbs (MRC: 0/5).

A lumbar spine MRI was undertaken scan and revealed an extensive congenital spinal meningocele, however the Electro-Myography (EMG) showed severe lower limbs ITU related myopathy. Consequently, postoperative severe lower limbs weakness was not attributed to the lumbar meningocele.

An intensive physiotherapy program was applied during the patient's hospital stay with consequent gradual neurological improvement. Before discharge, the patient was referred to a rehabilitation department for further treatment.

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#### PHYSIOTHERAPY INTERVENTION

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Physiotherapy was carried out during all phases of patient care, following written medical referral as follows:

1. Patient in ICU under mechanical support.
2. Patient in ICU without mechanical support.
3. Patient transferred to the step down unit.
4. Patient on the neurosurgical ward.

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#### CLINICAL ASSESSMENT

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A detailed physiotherapy assessment of the respiratory, cardiovascular, neuromuscular, musculoskeletal and integumentary systems was carried out in order to identify the main problems, set the therapeutic goals and apply the appropriate interventions according to the literature.

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#### PHASE 1: PATIENT IN ICU

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##### 1. RESPIRATORY SYSTEM

Patient was sedated, mechanically ventilated with tracheostomy and was hemodynamically stable. He had lower limb edema and full passive range of joint motion.

##### *Aims of physiotherapy:*

- maintain clear airways
- improvement of pulmonary ventilation
- prevention and management of lung atelectasis.

##### *Physiotherapy interventions<sup>1</sup>*

- Postural drainage in alternate side lying to mobilize and clear secretions.
- Chest percussions and vibrations.
- Patient positioning.
- Nebulization.

##### 2. MUSCULOSKELETAL SYSTEM

During the acute ICU phase, the patient had full range of passive motion and lower limb edema due to fluid retainment. Active movements and muscle strength could not be assessed due to the sedative patient state.

##### *Aims of physiotherapy*

- Maintenance of passive mobility.
- Prevention of joint and musculotendinous contractions.
- Reduce lower limb swelling.

##### *Interventions*

- Passive upper and lower limb mobilization.
- Muscle stretching.
- Lower limb elevation.

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#### PHASES 2 AND 3

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During this phase the patient was not sedated and was in the process of weaning from mechanical ventilation, alternately passed from pressure support ventilation to 50% tracheostomy venturi mask.

##### *Physiotherapy Assessment findings*

- Sedation discontinued.
- Pressure support ventilation, alternately passed to 50% tracheostomy mask.
- Occasional lung atelectasis.
- Lower limb edema.
- Bilateral hip joint stiffness with intense pain in flexion and internal rotation. Radiographic images revealed ectopic ossification of both hip joints (Fig. 1).

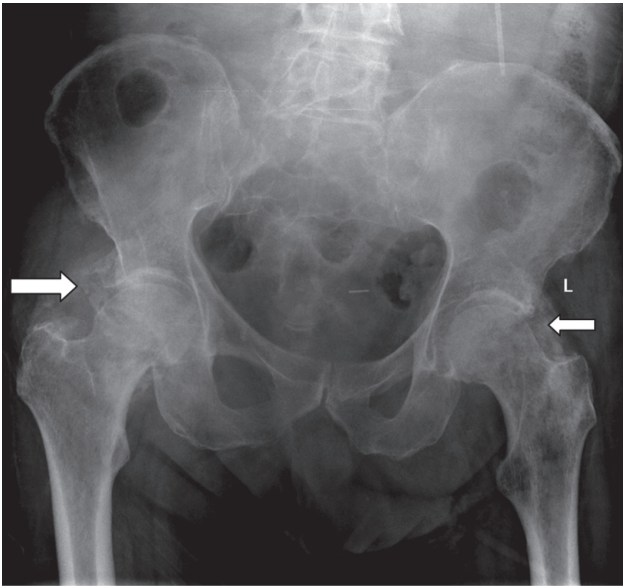


FIGURE 1. Bilateral hip heterotopic ossification.

- Bilateral foot drop.
- Cervical spine postural torticollis.
- Reduced muscle power (Medical Research Council score: 2) mainly due to the poor patient cooperation (Tab. 1).

*Aims of physiotherapy*

- Maintain clear airways.
- Diaphragmatic breathing facilitation.
- Reduction of the work of breathing in order to assist in the weaning process.
- Atelectasis prevention-management.

TABLE 1. MRC assessment scores at successive measurements

MRC assessment	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Shoulder abductors:	0	2	3	4
Elbow flexors:	0	3	4	4
Wrist extensors:	1	3	4	4
Hip flexors:	0	0	2	3
Knee extensors:	0	0	2	3
Ankle plantar flexors:	0	0	0	0
Total score (bilaterally)	2	16	30	36

**PHYSIOTHERAPY INTERVENTIONS**

- Cough education and assistance.
- Secretion clearance techniques.
- Thoracic expansion exercises.
- Diaphragmatic breathing and strengthening exercises.
- Passive upper and lower limb exercises in the pain-free range.
- Proprioceptive neuromuscular facilitation techniques, joint loading techniques, bed transfers, sitting balance exercises (Fig. 2).
- Cervical spine mobilization and stretching exercises followed by soft neck collar application.
- Ankle mobilization and calf stretching.
- Foot night splints.

Significant improvement of the patients' diaphragmatic and coughing strength (Maximum Inspiratory Pressure: -60 mmH<sup>2</sup>O and Maximum Expiratory Pressure → >60 mmH<sup>2</sup>O) and a reduction of secretions led to tracheostomy closure was recorded following intervention. There was also an improvement of the MRC score from 2 to 16 (Tab. 1).

The 3<sup>rd</sup> MRC assessment, prior to the step down unit discharge, revealed clinically significant muscle power improvement with a total score of 30.

*4<sup>th</sup> Phase: Neurosurgical ward*

During this phase the patient was, on spontaneous breathing with a 50% venturi mask and a nasal cannula. Muscle strength was further increased (Tab. 1) and sitting balance was also improved.

Physiotherapy interventions for both the respiratory and musculoskeletal systems aimed at improving inspiratory muscle strength using a breathing exerciser, as well as the musculoskeletal system with progressive resisted exercises, bed transfers and assisted standing (Fig. 2).

**DISCUSSION**

The current case study describes a patient who was hospitalized for several months following a complicated neurosurgical operation and carried out a thorough in-hospital rehabilitation programme from the acute stage until his discharge from hospital. Early physiotherapy plays a vital role as part of the multidisciplinary hospital team in the prevention of complications and the functional recovery of patients (1) despite the fact that lacks adequate scientific evidence. During the long stay in ICU the patient received intensive respiratory and musculoskeletal physiotherapy with significant clinical improvements. This is in accordance with recent scientific evidence which shows that, based on specific criteria, early physiotherapy and mobilization in ICU has been shown to



FIGURE 2. Assisted patient standing.

be safe and effective in the management of the detrimental effects of prolonged ICU stay and hospitalization (2, 3, 4, and 5). The patient was eventually discharged and continued his rehabilitation programme at a specialized rehabilitation hospital with follow up monitoring of his progress.

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