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In-Hospital Intensive Motor Physical Therapy in Spinal Cord Infection – Case Report

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Abstract

Spinal epidural abscess is a rare condition that can have different outcomes, from minimal involvement without sequela, to major motor impairments, limiting the patient's functional independence and, therefore, causing a strong negative impact on the quality of life. This study describes the evolution of a patient throughout his hospital stay. The subject underwent intensive motor physiotherapeutic treatment, where his initial functional clinical condition was of total dependence to perform activities of daily living and motor skills. At the end of the treatment, there was a significant improvement in motor skills and functionality, highlighting the fundamental role of acutely initiated physiotherapy.

Keywords: Spinal cord; Motor physical therapy; Empyema; Infection

Introduction

Abscesses that are within the bone limits of the spine are rare and can expand and compress the spinal cord, thus causing symptoms of the most varied intensities, from minimal involvement to severe changes or permanent complications [1]. Proper diagnosis and treatment can prevent complications and achieve cure in many cases [2]. Both the diagnosis and management of epidural abscess, which often includes a surgical procedure for aspiration or drainage of the infectious process, have been greatly aided by the advent of modern imaging techniques, such as computed tomography and, especially, magnetic resonance imaging.

Spinal epidural abscesses are more common in the thoracolumbar areas, where the epidural space is larger and contains more adipose tissue, being more prone to infections [3-5]. Bacteria can gain access to the epidural space *via* the hematogenous route, by direct extension of the contiguous infected tissue or by direct inoculation into the spinal canal (for example, during spinal anesthetic procedures, epidural or cases of surgical approaches) [6].

Approximately one-third of patients with spinal epidural abscess have no identifiable source. For the two-thirds who have identified the entry point for infection, the most common sites of origin are skin and soft tissue infections and spinal surgery complications; or even other invasive procedures, including epidural catheters that are left in place, usually for pain control [6].

A large study carried out in a North American Hospital revealed that the incidence of this type of condition is very low; about 5.1 cases per 10,000 admissions [7]. The average age of onset of spinal epidural abscess is approximately 50 years and the prevalence seems to be higher between 50 and 70 years, however it can occur at any age, with some studies showing a higher incidence for males [8].

Back pain is the most common symptom and is present in 70% to 100% of cases [9]. Fever is an important diagnostic clue but is the classic finding most likely to be absent at presentation; when absent, it can lead to diagnostic delays or failures [10]. Neurological deficits have been reported in up to half of the cases and include motor weakness, radiculopathy, and bowel and bladder dysfunction [9]. Magnetic resonance imaging with contrast (gadolinium) is the imaging test of choice because it is usually positive at the beginning of the infection and provides the best visualization of the location and extent of inflammatory changes [11].

Important lesions to be considered as a differential diagnosis include: bone or intervertebral disc degeneration, herpes zoster, metastatic tumors, discitis and osteomyelitis, in addition to nonspecific mechanical overloads [12].

The ideal treatment principles for spinal epidural abscesses are reduction in size and elimination

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of the inflammatory mass and eradication of the organism causing the pathology. These goals are usually achieved by a combination of surgical drainage and antibiotic therapy [12], in addition to physical therapy work for the functional recovery of the patient.

Irreversible paraplegia occurs in 4% to 22% of patients, and is, therefore, a condition that can cause severe sequela in patients [4,12,13]. There are limited data on the long-term post-treatment outcomes of patients with neurologic deficits. A study of 29 patients admitted to a tertiary spinal center with neurological deficits due to spinal epidural abscess showed that some patients show significant to moderate, long-term improvement in their motor function after completion of rehabilitation treatment [14].

Spinal epidural abscess is a rare disease that often produces neurological and motor changes in affected patients, limiting their functional status, therefore having a great impact on the quality of life of affected patients. As the records of the rehabilitation processes of these conditions are extremely scarce, this case report aims to contribute with more data to enrich the scientific literature about what Physiotherapy can contribute to the recovery of affected individuals.

Methods

Report of the evolution of the physiotherapeutic treatment, performed in the inpatient unit of a private hospital, of a patient diagnosed with spinal epidural abscess. This work was approved by the Research Ethics Committee of Hospital Israelita Albert Einstein, number 5,475,037. The participant agreed to carry out the study and signed the informed consent form.

Two physical therapy sessions were held daily, with an average duration of 40 min each session, for a period of 20 days, totaling 40 sessions. There was an intercurrence, after the fourth session, where the patient remained for 3 days in the semi-intensive care unit due to treatment of pleural effusion, returning to the hospitalization sector and continuing the treatment.

The following instruments were used to record the evolution of the patient's clinical and functional status over the days: Medical Research Council Scale (muscular strength), Perme Scale (functional mobility), Functional Independence Measure (FIM) scale and Borg Dyspnea Scale. The subjective perception of effort is presented as an important strategy to control exercise intensity [15]. Therefore, the Borg scale was used to monitor the patient's degree of effort in each physical therapy session, aiming at the quality and safety of the treatment, where it was interrupted (when necessary - usually 1 min to 2 min) so that the patient, through the rest could recover energy and vital parameters to continue presenting favorable performance and in a safe way to motor stimuli.

Case Presentation

Characterization of the pre-intervention patient's evolution and on the day of hospital discharge

Pre-intervention: The patient presented with tetraparesis, in which the right hemibody had grade 4 (minimum resistance overcomes) of muscle strength in all joints; left hemibody with grade 1 (sketch of muscle contraction) for the ankle joint, 2 (not overcoming gravity) for the knee muscle groups and 1 for the hip. Grade 2 muscle strength for the entire upper limb, except for the elbow flexor muscles, which had grade 3 (overcomes gravity). Hypoesthesia was present from the left foot to the middle third of the left thigh, in addition to the left hand and forearm.

Perme Scale: 5

FIM Scale: Total =50. Isolating only motor/mobility aspects: 18

In the topic "Discussion" the values of the measurements performed using the scales will be explained.

Hospital discharge day: Right hemibody with full recovery of muscle strength, that is, grade 5.

Left hemibody: Global grade 4 (for all joints).

Perme Scale: 25

FIM Scale: Total= 94. Isolating only motor/mobility aspects: 76

Hypoesthesia present, but to a lesser grade (subjective sensation of the patient) and covering a lesser extent of the left lower limb (foot and knee). Table 1 allows a better visualization of the patient's mobility performance, showing the evolution of the condition before and after the physical therapy intervention.

Physiotherapy treatment

Initially, resistance exercises were performed for the right hemibody, assisted exercises for the left hemibody, electrostimulation for dorsiflexors and quadriceps of the left hemibody, strengthening of the antigravity muscles of the lower limbs and trunk, in addition to trunk control in sitting position. In the first sessions, the patient did not have trunk control, that is, he could only remain in the posture with the help of the physical therapist, for a few seconds and in a semi-flexed posture, due to extreme fatigue and weakness of the muscles responsible for maintaining this posture. No protocol was established, where the choices, volume and intensity of the exercises were based according to the evolution of the patient's condition; in this way, physiotherapy was performed according to the specific needs of the patient, where his potential could be stimulated to the fullest.

Intervention intensities were monitored by the Borg Scale, where we allowed a gradation report of 15 on the scale, meaning moderate tiredness. Above that, we temporarily interrupted the session, until he was recovered to continue with the exercises in a safe and quality way.

As the sessions went by and after the puncture of the pleural effusion, the patient gradually acquired more strength, physical conditioning and postural control, allowing the sessions to progress in terms of the physical therapy procedures used and their degrees of complexity. The patient was stimulated and trained to roll over, assume the sitting position from the supine one and fully master the sitting position, aiming at functional independence.

In order for the work to be carried out safely and seeking to stimulate the orthostatic posture as soon as possible, from the seventh session onwards this work started to be done through a "stand-table". Then we started to explore the beginning of gait training (change of steps – 3 meters), first with the "stand-table" and, later, with a device that partially removes the body weight. This intervention allowed us to stimuli his organism in a precocious way, favoring an accelerated rehabilitation. Functional exercises such as sitting and

Table 1: Comparison of the functional evolution of the patient before and after the physical therapy intervention.

Pre-intervention			Post-intervention		
Perme	FIM Total	FIM Motor	Perme	FIM Total	FIM Motor
5	50	18	25	94	76

standing training were also explored in order to develop strength and endurance of the lower limb muscles so that the ability to walk was enhanced. In addition, balance training was also emphasized. The motor evolution had been obtained at each session and the last 4 physical therapy interventions were marked by gait training with full load (the patient could trained supporting 100% of his weight without the lifting device) but with the aid of a 4-wheel walker for more than 200 meters, when he was discharged from the hospital.

Discussion

Neurological recovery is dependent on multiple factors such as: Time of onset of symptoms and diagnosis, extension of the lesion, initiation of adequate treatment in an "early" way, physical therapy from the acute moment of the clinical condition, among other factors. All this interferes both in the restoration of the normal physiology of the organism, the plastic capacity of the nervous system and the locomotor system to respond to the treatments instituted.

About 5 to 7 percent of patients with spinal epidural abscess die due to uncontrolled sepsis or other complications [4,7], showing the need for adequate and always monitored transdisciplinary intervention.

There are extremely limited data on the long-term post-treatment outcomes of patients with neurologic deficits under this diagnosis. A long-term outcome report of 29 patients admitted to a tertiary spinal center with neurological deficits due to spinal epidural abscess showed that some patients had significant to moderate long-term improvement in their motor function after completion of rehabilitation treatment [14].

There are numerous studies on the significant and positive impact of physical therapy when started early in the hospital environment [16,17] (intensive care unit). Obviously, these studies are more limited from the point of view of the patients' motor skills, since they are in a clinical situation that prevents more aggressive motor interventions.

However, there are no data in the literature regarding in-hospital physical therapy interventions (outside the intensive care unit environment) in cases of spinal abscesses, making the characterization of this case evolution a starting point to analyze the impact of motor physical therapy at a time acute and sub-acute of this nature and within the hospital environment (ward/rooms sector).

The Functional Independence Measure (FIM) records the severity of disability in rehabilitation patients; 13 items define impairments in motor functions and 5 items define impairments in cognitive functions. Separate analyzes of the items representing these two indicators show that the two distinct measures provide more useful information from the scale than a combined measure, therefore justifying their use separately in this study (as described in "Results"), which showed improvement of the patient's functional status superior to its use as a whole. Combining FIM items into motor and cognitive groups is practical and offers good measurement characteristics. Table 1 describes the evolution of scores from 5 to 25 on the Perme Scale. The score 5 means a clinical condition of restriction to the bed, and 25 characterizes the need for little help to perform functional activities, evidencing a significant evolution of the motor and functional condition of the patient studied. Such evolution was corroborated by the capture of data demonstrated by the FIM scale, where, initially, the patient had a score of 50 (Total FIM) and reached 94 on the day of hospital discharge. These data also mean moving from a position of maximum dependence to perform activities of daily living to a situation of little dependence at the time of discharge.

This evolution becomes even clearer when we isolate the comparison of beginning and end of hospital physical therapy interventions taking into account only the motor part of the FIM scale, where the evolution was from 18 to 76. The maximum score that the FIM scale is of 126, when it is applied in its entirety and 91, when only the motor part is taken into account. Thus, the evolution of the patient in terms of percentage was from 40% to 74% of the total score that can be achieved when the total FIM is applied; and from 19% to 83% of the maximum score that can be obtained when the motor FIM is applied.

Study Limitations

The present study has some limitations as it is a case report, thus not allowing the generalization of the results to other patients with the same diagnosis. The ideal would be to carry out a randomized clinical trial with long-term follow-up; however, the low incidence of these cases makes this type of study unfeasible.

Conclusion

Motor physiotherapy applied intensively to the hospitalized patient with spinal epidural abscess proved to be highly effective, showing a motor and functional condition of total dependence at the initial of the physiotherapy treatment to little dependence for the performance of basic activities of daily living, at the time of hospital discharge.

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