

THE INFLUENCE OF SPECIALIST KINESITHERAPY ON THE SPINAL FUNCTION AFTER FENESTRATION SURGERIES

Halina Protasiewicz-Fałdowska¹, Teresa Wiśniewska¹,
Katarzyna Zaborowska-Sapeta¹, Ireneusz M. Kowalski¹, Wojciech Kiebzak²

¹ Department of Rehabilitation, Faculty of Medical Sciences, University of Warmia and Mazury in Olsztyn, Poland

² Department of Physiotherapy, Faculty of Health Science University in Kielce, Poland

ABSTRACT

Introduction. Back pain is a significant social problem. Etiology of back pain is multifactor. The majority of pathologies resulting in neurological symptoms lead to a surgical procedure. One of the most frequently used surgical procedures for the lumbar region of the spine is fenestration. A surgery resolves a mechanical problem, but often does not improve the functional one. A large group of patients, if not treated with specialist rehabilitation, continue to feel pain in the lumbar region or in the lower extremity.

Aim. The aim of this work was to point to the necessity of applying modern kinesiotherapy for relieving pain after fenestration surgeries performed on the spine.

Materials and methods. Group of 18 patients, including 15 women and 3 men, with ages ranging from 25–59 (mean age 39.1) were qualified for individual therapies. The patients came to the Rehabilitation Outpatient Clinic complaining of pain after fenestration surgeries performed at the University Hospital in Olsztyn. All patients underwent spine surgery and the interval period between the procedure and coming to the Clinic was from 0.5 to 1 year. The procedure was performed at L4–L5 level in 13 patients, and at L5–S1 level in 5 cases. Lasègue's sign, numerical pain rating scale (NRS), finger-to-floor test (spinal flexion) were analyzed.

Discussion. Our study indicates that surgery should be followed by specialist therapy focused on regaining stability of the lumbar region via involving deep muscles: transversus abdominis muscle and multifidus muscle and stimulating nerve and muscle fibers to be mobilized in the ailing extremity in order to improve motor control of the lower back.

Results. On release from hospital, in terms of neurosurgical and orthopedic recommendations, the patients were advised to exercise in the gym and go to the swimming pool 2–3 times a week, whereas no specialist rehabilitation was recommended. As a result, 3 months following their surgeries, all studied patients reported lower extremity weakness, pain when walking down stairs, numb sensation in toes, pain in the L–S area when seated longer than one hour. The performed examinations revealed that before the therapy, Lasègue’s sign was 30–60° (mean 51.9°), whereas after a 3-month long therapy, the range of motion was about 45–90° (mean 68.6°). According to the NRS, patients evaluated their pain levels before the therapy as 4–8 points (mean 6.11 points), whereas after therapy as 2–6 (mean 3.44). Before the therapy, a finger-to-floor test yielded the floor distance of 26–54 cm (mean 37.8 cm), after therapy the distance decreased to 17–48 cm (mean 28.6 cm). Due to the employed specialist therapy, in 17 patients pain ailments relief was observed. The patients did not report problems when moving about on uneven ground. They observed a functional improvement concerning everyday life activities. Functioning at work was easier in a sitting position and the efficiency of performed activities less burdensome than before specialist kinesitherapy.

Conclusions. The 3-month long specialist kinesitherapy relieves pain and improves the range of motion in the lower extremity. The suggested program of kinesitherapy improves spinal flexion and static efficiency in a sitting position. Recommending specialist rehabilitation after neurosurgical procedures is essential.

Key words: spine, fenestration, kinesitherapy, pain.

INTRODUCTION

Back pain is a significant social problem. Etiology of back pain is multi-factor. Some authors claim that the reason involves overloading changes leading to muscle and ligament insufficiency [2]. Others believe that the development of pain is closely correlated with the intervertebral disc pathology [8, 9]. Advanced pathologies of the intervertebral disc or anulus fibrosus lead to functional disorders of the neuromuscular system in the damaged area, to neurological pain radiating to a particular dermatome, as well as to dermatomal exteroceptive sensibility disorders, and deep reflex weakening or loss [7]. The majority of pathologies resulting in neurological symptoms lead to a surgical procedure. One of the most frequently used surgical procedures for the lumbar region of the spine is fenestration. This surgery resolves a mechanical problem, but often does not improve the functional one. A large group of patients, if not treated with specialist rehabilitation, continue to feel pain in the lumbar region or in the lower extremity [7, 13].

AIM

The aim of this work is to point to the necessity of applying modern kinesitherapy for relieving pain after fenestration surgeries performed on the spine.

MATERIALS AND METHODS

Group of 18 patients, including 15 women and 3 men, within ages ranging from 25–59 years (mean age 39.1) were qualified for individual therapies. These patients came to the Rehabilitation Outpatient Clinic complaining of pain after fenestration surgeries performed at the University Hospital in Olsztyn. All patients underwent spine surgery and the interval period between the procedure and coming to the Clinic was 0.5–1 year. The procedure was performed at L4–L5 level in 13 patients, and at L5–S1 level in 5 cases. Patients complained of pain involving the spine and lower extremity.

Medical histories indicated that before surgeries all patients suffered from neurological pain radiating to the lower extremities combined with neurological symptoms and strong pain assessed to be 7–9 in the numerical rating scale (NRS). Before surgical treatment no neurological deficits, such as foot drop, were noted. Immediately following the surgeries, patients noticed pain relief in the lower extremities and back. On release from hospital, in terms of neurosurgical and orthopedic recommendations, the patients were advised to exercise in the gym and go to the swimming pool 2–3 times a week, whereas no specialist rehabilitation was recommended. As a result, three months following their surgeries, all studied patients reported lower extremity weakness, pain when walking down stairs and moving about on uneven ground, numb sensation in toes, pain in the L–S area when seated longer than 1 hour. Pain ailments significantly intensified after the return to professional work. Because of the reported symptoms, patients were qualified for specialist kinesitherapy.

During their first visit before undertaking therapy, patients were tested with Lasègue's test to assess their range of mobility and the sensitivity of nervous structures in the lumbar and sacrum regions of the spine. Patients were lying on their backs, while their lower healthy extremities were lifted by the examiner, followed by a lifting of the ailing ones, while the knee was straight. The lower extremity was lifted until the first pain sensation or excessive symptoms of stretching in the entire limb were felt. The range of mobility was evaluated by a goniometer and noted on the examination form in degrees. After noting the Lasègue's sign for all patients, we performed the flexion of the knee and hip in order to detect problems signaling hip joint pathology. In all the studied patients, after the flexion of the ailing extremity in the knee and hip joints, ailments decreased or were entirely relieved. In the study group deficits in the ailing lower extremity were noticed. The range of pain was evaluated via the NRS, in which self-assessment of pain was rated from 0 to 10 points. In this scale, lack of pain is rated as 0, whereas 10 refers to pain of the highest intensity. The finger-to-floor test was also applied to measure spinal mobility and mobility in the hip joints, as well as functional

possibilities for patients in the flexed position. Patients were told to bend forward as far as they could or until they felt the first pain sensation. While bending, the distance between the middle finger and floor was measured in centimeters. All the parameters were taken again after the completed therapy.

After the examinations, the patients were offered a 3-month long specialist therapy. They were to practice personally customized exercises at home every 3 hours (Fig. 1). Twice a week, therapeutic progress was consulted at a specialist outpatient clinic, and functional improvement was controlled.



1



2



3

Fig. 4. Personally customized exercises consisted of: 1. Sensomotor exercises with a corrective cushion; 2. Mobilization of the pelvis on the Pezzi ball; 3. Strengthening the lower extremity with Thera bands

The 3-month long specialist therapy involved:

- patient's education;
- internal stabilization via transversus abdominis muscle and multifidus muscle training, introduced as one of the first and key elements of the therapy;
- exercises mobilizing the ischiadic nerve;
- postisometric relaxation exercises of the biceps femoris muscles, semimembranosus muscles, semitendinosus muscles, piriformis muscle and iliopsoas muscle;
- exercises improving spinal mobility, initially directed at the scar, i.e. hyperextension movement, followed by an opposite direction movement, i.e. flexion movement;
- external stabilization via postural muscles training, from low positions to middle and erect;
- sensomotoric training on mobile ground (corrective cushions, balls);
- functional training with erect positions to prepare for professional work.

RESULTS

The performed examinations indicated that before the therapy, Lasègue's sign was 30–60° (mean 51.9°), whereas after a 3-month long therapy, the range of motion was about 45–90° (mean 68.6°) (Fig. 2).

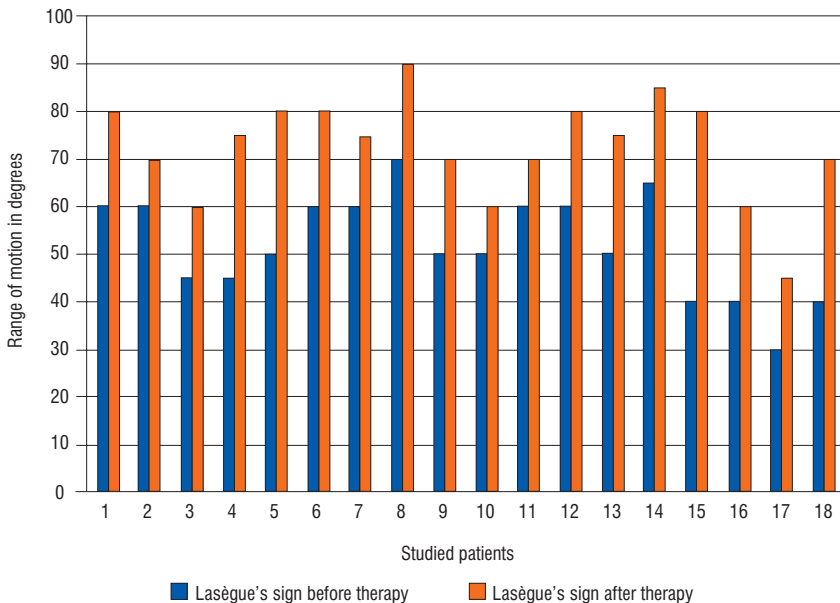


Fig. 2. Lasègue's sign before and after therapy

According to the NRS, patients evaluated their pain levels before the therapy as 4–8 points (mean 6.11 points), whereas after therapy as 2–6 (mean 3.44) (Fig. 3).

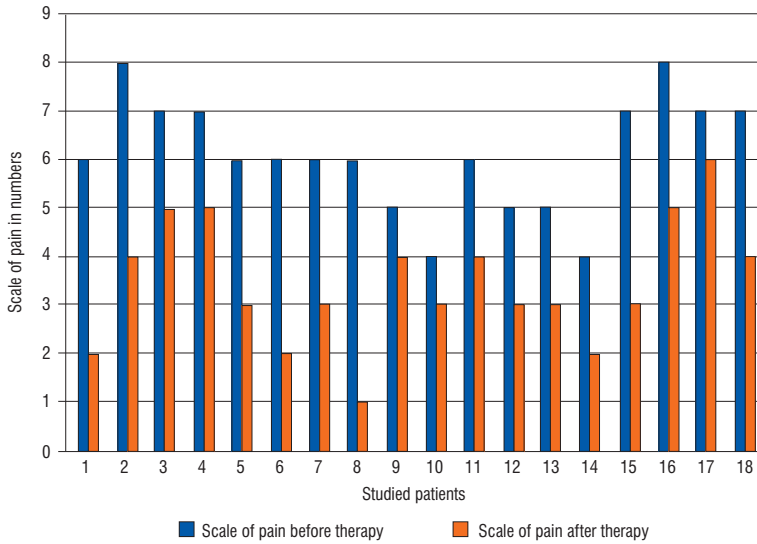


Fig. 3. Numerical rating scale of pain before and after therapy.

Functional possibilities in the flexed position were measured by a finger-to-floor test. The first pain sensations were observed when the floor distance was 26–54 cm (mean 37.8 cm), after therapy this distance decreased to 17–48 cm (mean 28.6 cm) (Fig 4).

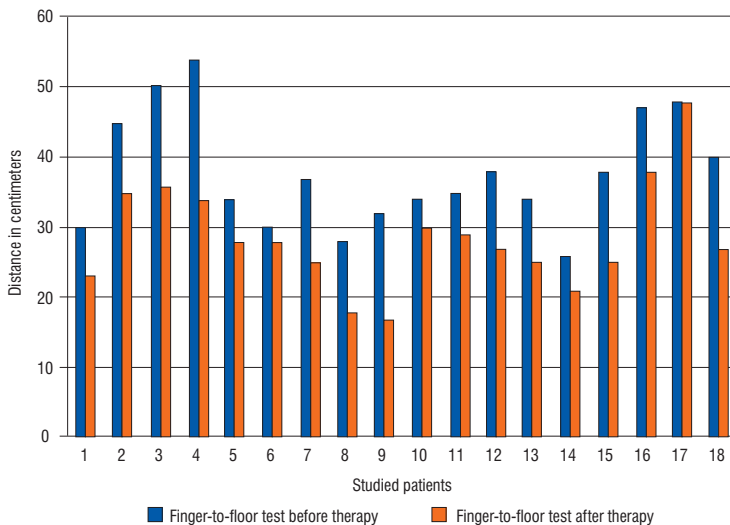


Fig. 4. Finger-to-floor test before and after therapy.

Due to the employed specialist therapy, in 17 patients pain ailments relief was observed. The patients did not report problems with moving about on uneven ground.

They observed a functional improvement concerning everyday life activities. Functioning at work was easier in a sitting position and the efficiency of performed activities less burdensome than before specialist kinesitherapy.

DISCUSSION

Due to a more thorough diagnostics and availability of imaging examinations a large number of patients are operated on in an early stage of discopathy [4, 7]. Many patients, while deciding upon a surgery, believe that pain ailments will disappear directly as a result of a surgical procedure. Frequently, rehabilitation ordered by neurologists and orthopedists in hospital is limited to tilting a patient to an erect position or providing some advice to educate a patient concerning everyday life functioning [5]. The most frequently advised activities involve swimming and general conditioning exercises. Many authors believe [2, 3, 6, 10], that the transversus abdominis muscle is very important in stabilizing the lower region of the back. The transverse plane picture of this muscle changes as soon as the first pain sensations appear. The mechanism of this muscle atrophy begins much earlier. Before a surgery, pain leads to the weakening of low back motor control, delayed activation or weakening of the transversus abdominis muscle, and, consequently, an ineffective muscular stability of the spine. As a result of these pathological changes, spinal cord reflexes are also weakened [3, 4].

Our study indicates that surgery should be followed by specialist therapy focused on regaining stability of the lumbar region via, in the first place, involving deep muscles: transversus abdominis muscle and multifidus muscle. It is also important to stimulate nerve and muscle fibers to be mobilized in the ailing extremity in order to improve motor control of the lower back. The inclusion of exercises which force the stability of deep muscles and improve lower extremity muscles strength enhances the sensation of lumbar region stability as felt by patients. Striving for movement symmetry and activating sensomotor functions make it possible to integrate the neuromuscular system faster and more efficiently, and consequently, to improve the everyday functioning of patients who have undergone fenestration surgeries. Sensomotor exercises improve back stability, coordination and movement efficiency. Sensomotorics is an important element of kinesitherapy because it forces additional work on a body in movement to account for gravitation [10].

The analysis of our study results indicates that an adequate kinesitherapy program improves patients' static efficiency in a sitting position. Before therapy, patients could adopt a sitting position without intensifying pain ailments on average for about 1 hour. After a 3-month specialist kinesitherapy this period was prolonged to 3 hours. After the therapy 5 patients did not feel any pain in everyday functioning. Periodically, a pulling pain in the lumbar region appeared in three patients. In 4 cases, a pulling pain was reported in the calf area, along the peroneus muscles, and in 2 patients there appeared, sometimes, short-time pulling in the hallux; 1 patient in the study group complained of

frequent calf cramps at night. Night cramps intensified at the time when more difficult exercises were introduced. 1 patient in the study group did not make almost any visible therapeutic progress and did not wish to continue the therapy.

CONCLUSIONS

1. The 3-month long specialist kinesitherapy relieves pain and improves the range of motion in the lower extremity.
2. The suggested program of kinesitherapy improves spinal flexion and static efficiency in a sitting position.
3. Recommending specialist rehabilitation after neurosurgical procedures is essential.

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