

Application of therapeutic massage in the case of piriformis syndrome: A case study

Zastosowanie masażu leczniczego w przypadku zespołu mięśnia gruszkowatego – opis przypadku

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Pielęgniarstwo i Zdrowie Publiczne, ISSN 2082-9876 (print), ISSN 2451-1870 (online)

Piel Zdr Publ. 2020;10(2):139–144

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Funding sources

None declared

Conflict of interest

None declared

Received on July 30, 2019

Reviewed on November 8, 2019

Accepted on December 4, 2019

This is a translated article.

Please cite the original Polish-language version as

Tchorowska E, Wilk I. Zastosowanie masażu leczniczego w przypadku zespołu mięśnia gruszkowatego – opis przypadku. *Piel Zdr Publ.* 2020;10(2):139–144. doi:10.17219/pzp/115069

DOI

10.17219/pzp/115069

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Abstract

The symptoms of piriformis syndrome result from the compression and irritation of the sciatic nerve by the piriformis muscle. A typical symptom is a severe pain in the buttocks area, which intensifies most often in the sitting position. Diagnostics include, first of all, exclusion of neurological and orthopedic causes as well as functional tests, and in most cases, conservative methods are implemented in the treatment process. When the therapies do not bring the desired results, injections and surgical treatment are applied. In the case of a 38-year-old patient who was diagnosed with piriformis syndrome, massage was applied. The therapy included 8 treatment sessions, at a frequency of twice a week, each lasting 45 min. Prior to and immediately following the therapy, pressure sensitivity was measured with an algometer, palpation examination was performed and pain severity was assessed using the visual analogue scale (VAS). Roland–Morris Disability Questionnaire (RMDQ) and Oswestry Disability Index (ODI) were also used. The massage included manipulation of the pelvic girdle area, lumbar spine and selective tissues of the lower limb in the right order. The therapy resulted in a reduction of pain; in consequence, the patient's return to the full professional and family life and recreational activities became possible. The patient changed her lifestyle; she continued to rest in pressure-relieving positions; the frequency and type of physical activity were specially selected for her. Massage can therefore be an effective method of alleviating pain occurring in piriformis syndrome. It may constitute an alternative form of conservative treatment.

Key words: piriformis syndrome, therapeutic massage, piriformis muscle

Streszczenie

Objawy zespołu mięśnia gruszkowatego wynikają z kompresji i podrażnienia nerwu kulszowego przez mięsień gruszkowaty. Typowym symptomem omawianego zespołu jest silny ból w okolicy pośladków, nasilający się głównie w pozycji siedzącej. Diagnostyka obejmuje w pierwszej kolejności wykluczenie przyczyn neurologicznych i ortopedycznych oraz testy funkcjonalne, a w procesie leczenia w większości przypadków wdraża się metody zachowawcze. Gdy terapie nie przynoszą pożądanych efektów, stosuje się iniekcje i leczenie chirurgiczne. W przypadku 38-letniej pacjentki, u której zdiagnozowano zespół mięśnia gruszkowatego, zastosowano masaż. Terapia obejmowała 8 zabiegów, z częstotliwością 2 razy w tygodniu, każdorazowo po 45 minut. Przed terapią i bezpośrednio po jej zakończeniu dokonano pomiaru wrażliwości uciskowej z użyciem algometru, oceny palpacyjnej, oceny nasilenia bólu za pomocą wizualnej skali analogowej (ang. *visual analogue scale* – VAS) oraz wykorzystano kwestionariusze: Kwestionariusz Niepełnosprawności Bólu Krzyża Rolanda–Morrisa (Roland–Morris Disability Questionnaire – RMDQ) oraz Kwestionariusz Oswestry (Oswestry Disability Index – ODI). Masaż obejmował opracowanie obszaru obręczy biodrowej, odcinka lędźwiowego kręgosłupa i wybiórczych tkanek kończyny dolnej w odpowiedniej kolejności. W efekcie terapii dolegliwości bólowe zmniejszyły się, a powrót do pełnego funkcjonowania w życiu zawodowym, rodzinnym i rekreacyjnym stał się możliwy. Pacjentka zmieniła styl życia, kontynuowała odpoczywanie w pozycjach odciążających oraz dobrano dla niej częstość oraz rodzaj aktywności fizycznej. Masaż może więc stanowić skuteczną metodę zmniejszania dolegliwości bólowych występujących w przypadku zespołu mięśnia gruszkowatego. Może być alternatywną formą leczenia zachowawczego.

Słowa kluczowe: zespół mięśnia gruszkowatego, masaż leczniczy, mięsień gruszkowaty

Introduction

The symptoms of piriformis syndrome result from the compression and irritation of the sciatic nerve by the piriformis muscle.^{1–3} A typical symptom of the condition is pain in the buttocks area, which intensifies in the sitting position. It is often felt in the lumbar region as well, and sometimes radiates to the lower limb. In imaging diagnostics, magnetic resonance imaging (MRI) is used, as neurological and orthopedic causes of sciatica must be first excluded.^{4–6} Functional tests aimed at diagnosing of piriformis syndrome are subsequently performed, involving, for example, the Freiberg test, the Pace test and the FAIR test (FAIR – flexion, adduction, internal rotation), which measure the lower limb flexion, adduction and internal rotation at the hip joint, which will provoke pain in the case of piriformis syndrome.^{2,4,6,7} It must be noted that in the discussed disease, the Laseque test, which involves elevation of a straight lower limb, does not cause or increase pain.⁴ In therapies, the assessment of pain is most often conducted using the visual analogue scale (VAS), the numeric rating scale (NRS) or Oswestry Disability Index (ODI).^{1,2,8} It is also advisable to perform palpation examination of the soft tissues located within the pelvic girdle, including the piriformis, which will react with pain to tactile and pressure stimuli.⁴

One of the descriptions of the disease pathomechanisms, based on functional diagnostics, states that if an increased resting muscle tone of the piriformis (spastic muscle) occurs over an extended period of time, the sciatic nerve is compressed, and this leads to constant and permanent sciatic pain (SP).^{9,10} The pelvic girdle soft tissue massage as well as stretching exercises may be applied in such a case to normalize the resting muscle tone and create the correct spatial arrangement for the sciatic nerve rami located in this area.^{8,11} Accurate diagnosis, identified source in the muscular system and individu-

ally adjusted tissue therapy make it possible to achieve an analgesic effect and eliminate both the symptoms and the source of the problem.

In diagnosed piriformis syndrome, physical procedures, such as shockwave or ultrasound, and selected kinesiotherapy methods, such as stretching, neural therapy, mobilization, and soft tissue massage, are also used.^{1,8,11} When physiotherapy treatment does not bring the desired results, pharmacological treatment is initiated.^{1,2} In some cases, botulinum toxin treatments and steroid injections, including corticosteroids, are used.^{1,4,9} Patients who still experience pain after conservative treatment undergo surgical decompression of the pinched nerve.¹

Case study

In January 2019, a 38-year-old patient presented to a massage studio with a GP referral. She was diagnosed with “soft tissue disease associated with the use, overload and compression of the tissue, and with spinal root and nerve plexus disorders”. The GP referral was supplemented with the information that the patient experienced strong pain in the buttock and lumbar spine area as well as the right subcostal area. According to the woman, the first episode of pain in the right subcostal area, radiating to the thoracolumbar spine, appeared in early March 2018. The patient gave a detailed description of the event she associated with the appearance of her pain symptoms. After 8 h of work in the office in the sitting position, she went on a car trip. She was the driver, and the journey lasted for 5 h without major interruptions. Immediately after the journey she felt pain, which was gripping and enveloping in the thoracolumbar section, and piercing and radiating in the area of the buttock and the back of the thigh. She associated the discomfort with fatigue caused by travelling and staying in the sitting position for a long time. She

decided of her own accord to see a physiotherapist specializing in osteopathy. She attended treatment sessions every day for 2 weeks, excluding weekends. According to the patient's description, the therapist focused on the diaphragm mobilization and manipulation of the piriformis. During the therapy, the pain intensified after each session; it was strong, continuous and constant. After 2 weeks, the patient, not experiencing any improvement in her condition, ended the therapy on her own initiative.

On the basis of the GP documentation, the history of the pain and exacerbation of the symptoms experienced by the patient was reconstructed in chronological order. It was as follows: May 2018 – a GP appointment, during which the patient described the pain persisting for several months in the abdominal and pelvic area, in particular in the right subcostal area and the lumbar region as well as in the buttock on the left. The doctor prescribed oral pharmacotherapy. In June, the doctor ordered pharmacotherapy in the form of intramuscular injections (Ketonal) and referred the patient to an orthopedist and for an ultrasound examination of the abdominal cavity (suspected appendix or nephrolithiasis). The orthopedist recommended the continuation of conservative treatment, the use of analgesic pharmacotherapy in the form of intramuscular injection (Milgamma) and rehabilitation. In July, the patient had an ultrasound examination, which did not reveal appendicitis, nephrolithiasis or any other changes in the abdominal integument that could manifest themselves as pain symptoms experienced by the patient. At the same time, the woman had a gynecological consultation in order to exclude, among others, inflammation of the ovaries. Gynecological examination did not reveal any disturbing changes that could be the source of the pain. During another appointment in November, the patient reported alleviation of pain due to the pharmacotherapy. However, the persistent feeling of tension in the buttocks and paraspinal muscles, especially after staying in the sitting position for a long time, pain in the lumbar spine, as well as abdominal tension and tenderness, especially in the lower ribs area, made the doctor refer the patient to a neurologist. In December, the woman had an MRI scan of the lumbar spine. The examination showed the following abnormalities:

- decreased lumbar lordosis;
- moderate degenerative changes at the anterior and posterolateral edges of the lumbar vertebral bodies and intervertebral joints at levels L3/L4, L4/L5 and L5/S1;
- at the L4/L5 level, the presence of the medial intervertebral disc hernia compressing the dural sac, adjacent to the nerve roots with a slight left predominance, discretely narrowing the intervertebral foramina;
- at the L5/S1 level, the presence of the medial intervertebral disc protrusion, compressing the dural sack;
- the intervertebral discs at L4/L5 and L5/S1 levels showing a slight height reduction;
- in the back of the L4/L5 intervertebral disc, an elevated signal zone, indicating the anulus fibrosus rupture.

In January 2019, the attending physician referred the patient for rehabilitation. The patient underwent therapeutic massage lasting 4 weeks, performed twice a week.

Therapeutic treatment

Prior to the therapy (January 2019), the patient had her history taken, during which the Roland–Morris Disability Questionnaire (RMDQ) and ODI were used. For the purposes of the therapy, the tone of selected muscles and muscle attachments were assessed on the basis of the medical report, and VAS was applied. The pressure sensitivity of specific tissues was measured using an algometer. As the patient maintained an active lifestyle, additional information about the patient's physical fitness was obtained, using the International Physical Activity Questionnaire (IPAQ).

All the measuring instruments were used both prior to and immediately after the therapy. The therapy consisted of 8 treatment sessions of therapeutic massage, twice a week, each lasting 45 min. During the massage, the alignment position was used – lying on the left side with appropriately positioned wedges to ensure proper outflow of venous blood and lymph, relieve pressure on the joints and relax the muscles (Fig. 1).

Tissues located within the lumbar spine area, pelvic girdle, lower limb, and abdominal integument were manipulated. The structural relationships described in tensegrity massage were used; first, the focus was placed on the structures distal to the most painful area, with the purpose of gradual relaxation of the tissues, then on the muscles that were most sensitive to pain.¹² Each time, attention was paid to the tissues that in palpation examination were the centers of pain appearing on pressure to the attachment. The massage included manipulation of the tissues on the right side, where the patient experienced the most severe pain. The treatment sessions included manipulation of selective structures in direct and indirect contact with the site that was the most painful. Massages were performed according to the arrangement of the latissimus dorsi, the pectoralis major and the serratus anterior, with particular attention paid to the tissues in the greater trochanter of the femur, including the piriformis, as well as the sacrotuberous ligament system. During the procedures, the crosswise stroking, rubbing and kneading techniques were used on the tissue trajectory, and point rubbing was performed on muscle attachments (muscle relaxation through its tendinous part).

Therapy outcomes

According to the patient's history, the woman is married, with 2 teenage sons. She has a university degree and works in a library. She does not suffer from any chronic



Fig. 1. Position for sage

Ryc. 1. Pozycja ułożeniowa

disease and does not take any medication regularly. In the past, she underwent right knee arthroscopy; a few years after the procedure, she suffered a right ankle sprain. The patient regularly practiced yoga (ashtanga style), initially 4 times and then 6 times a week. In addition, she regularly jogged. She described the pain in its initial stage as severe, deep and sharp; following rehabilitation, which included manual procedures by an osteopathy specialist, the pain turned into moderate but steady. At the time, the stretching and relaxation exercises and the pressure-relieving positions she tried were not helpful.

Prior to the therapy, the woman completed the RMDQ questionnaire and marked 3 out of 24 items in the questionnaire. These referred to the need for more frequent repositioning and a greater number of rest periods during the day as well as the fact that the backache continued for most of the time. After the therapy, the patient marked only 1 item in the same questionnaire – she needed to lie down to rest more frequently.

Prior to the therapy, the patient described the pain as steady, of moderate intensity in the ODI questionnaire. She confirmed that in the next question about changes in pain intensity, indicating that the pain did not increase or decrease. The patient emphasized that the pain did not allow her to sit or stand for more than 1 h; she also felt it when she was lying in bed, but it did not disrupt her sleep. She confirmed that while travelling, she felt additional pain and she changed her position frequently; however, she did not have to change anything in her personal care routine. She added that her social life did not change either. She could also lift heavy objects, but she needed to be careful as it triggered pain in the area of the buttock

and the right lower limb. Immediately after the therapy, the patient indicated that the pain was weak and intermittent, changing and rather mild. None of the forms of travel intensified the pain. While lying in bed, the woman no longer felt any pain, she could also sit for as long as she wanted, and the standing position did not cause a slight increase in pain. One important issue was noted – before and after the therapy the patient did not feel any pain while walking; this activity brought her relief.

Prior to the therapy, the following symptoms were recorded in the patient medical report: all the tissues within the anterior serratus (5 anatomical points from the card) and sacrotuberous ligament system (7 anatomical points from the card) were painful and sensitive to pressure; additionally, selected structures of the pectoralis major, such as the pectoralis major, inguinal ligament, the dorsal trapezius, and the deltoid muscle, showed similar symptoms. Immediately after the therapy, the number of tissues that were sensitive and reacted with pain on pressure decreased. First, the increased resting tone of superficial tissues located in the upper trunk, in the cervical and thoracic spine was normalized (after 3 treatment sessions). The resting tone and muscle pain in the area of the pelvic girdle (the piriformis), the lumbar spine (the iliolumbar muscle, the dorsal extensor, and the lumbar quadratus muscle), as well as in selected tissues of the right lower limb decreased only towards the end of the therapy.

The pain experienced before the therapy was rated 7 on the 10-point VAS scale, and 4 after the 4th massage session. Immediately after the end of the therapy, the patient rated it 2.

In algometry performed before the therapy, the results at individual points (at the muscle attachment sites) of the manipulated tissues oscillated between 1.75 kg/cm² and 2.45 kg/cm². After a series of treatment sessions, the pressure sensitivity decreased and the measured pressure pain threshold (PPT) was 4.82–7.16 kg/cm². The PPT value of 2–3 kg/cm² shows the pain symptom of the examined tissue,¹³ which confirms that the patient had a high tactile sensitivity prior to the initiation of the therapy. After a series of massages was applied, a significant change in the measured values was observed, indicating a decrease in the tactile and pressure sensitivity of the manipulated tissues (Table 1).

The information obtained from IPAQ makes it possible to characterize the level of the patient's physical activity. It was intensive before the pain occurred; however, after the onset of the pain, which was connected with the osteopathic therapy, the patient decided to completely give up all forms of physical activity, as stretching exercises or selected ashtanga yoga poses aggravated the pain. Before the therapy described in this article, the patient enjoyed going for long walks; walking did not cause pain in the buttock and the pain did not radiate to the lower limb. During the therapy, the woman gradually increased the frequency of physical activity, began swimming in a pool and cycling as part of her routine. After the therapy, she also increased the distance of her regular, fast walks, resembling marching, and continued cycling.

During the therapy, after each session, the patient noted changes in her pain. In her subjective evaluation, after 2 sessions, she did not feel any pain or muscle tension in the nape area. In the middle of the therapy, the pain in the buttock no longer radiated to the lower limb, and she did not have any pulling sensation along the lower limb when bending her body forward and after prolonged sitting. At the end of the therapy, she experienced the feeling of a relaxed, warm buttock muscle; she could also relax her abdomen freely; previously, she had reported constant tension in the abdomen (isometric tension). The sitting position did not cause any pain. When at home, the patient more often used the alignment positions, relieving the pressure while lying on the side, which reflected the position used during the massage.

Discussion

In piriformis syndrome, the standard therapeutic management, characterized by the dominance of one particular type of treatment, can be supplemented by combined therapies. In 1 case, the use of therapy based on muscle stretching with gait re-education (avoidance of excessive hip joint adduction and internal rotation) has been described.¹¹ This type of intervention was applied when weaker external rotators and abductors on the side of the painful leg were observed in the patient. The therapy brought the desired analgesic effect.¹¹ In another case, acupuncture was used, which was performed in an innovative way, i.e., with various needlework methods: at the superficial and deep level, in the most painful area and in the area distal to the pain site. The conducted studies confirmed that the effectiveness of the applied therapy was higher than of that involving standard needlework.¹⁴

In the presented patient, a massage based on the principle of tensegrity was planned and performed, in which tissues located in the area of the pelvic girdle, lumbar spine as well as selected tissues of the whole lower limb were manipulated. The primary goal was to normalize the resting muscle tone, improve the trophic properties of the manipulated area, especially the piriformis muscle, by decompression of the upper and lower gluteal artery (compression and local rubbing at half the length of the lower and upper edge of the piriformis muscle).¹² The applied therapy was effective; it contributed to the reduction of pain and allowed the patient to return to full functioning in everyday life. The result of the therapy was also influenced by the fact that the cause concerned the muscular system. Neurological and orthopedic dysfunctions as well as the sciatica were excluded in the patient; in palpation examination, the tissues showed increased pressure sensitivity and were painful.

Accurate diagnosis determines the correct choice and the efficacy of the treatment; therefore, it is advisable to create a standard diagnostic system for piriformis syndrome. In some cases, basic physiotherapy or the use of botulinum toxin are sufficient; in others, surgical intervention is necessary.⁸ In the discussed disease, rehabilitation plays an important role in the treatment of symp-

Table 1. PPT before, during and after the therapy

Tabela 1. PPT przed terapią, w czasie jej trwania i po jej zakończeniu

Point examined	Before the therapy [kg/cm ²]	Halfway through therapy [kg/cm ²]	After the therapy [kg/cm ²]
Posterior superior iliac spine	1.80	3.03	5.75
External lip of the iliac crest ala	1.98	2.41	4.82
Lateral edge of the sacrum	2.15	3.28	7.16
Gluteal tuberosity of the femur	2.45	2.87	6.83
Adductors – 10 cm above the knee joint	1.88	2.27	5.49

Average values from 3 measurements, measured with an algometer.

toms, both as an element that supports the botulinum toxin application and as an independent therapeutic entity, individually adjusted based on the dominant symptoms.^{9,11}

Conclusions

Massage can be an effective method of alleviating pain occurring in piriformis syndrome. It may be one of the forms of conservative treatment that contributes to pain reduction and improves functioning in everyday life.

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