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Case report

Combined face-to-face and telerehabilitation physiotherapy management in a patient with chronic pain related to piriformis syndrome: A case report

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Abstract: Piriformis syndrome is characterised as being one of the possible causes of sciatic pain, as well as being a syndrome that tends to become chronic. Because of this, different types of treatments for both this syndrome and the associated pain it causes have been investigated over the years. Nowadays, the evidence increasingly favors treating chronic pain with a multimodal physiotherapy treatment based on a biobehavioral approach. This case report describes the physiotherapy intervention performed on a 44-year-old woman with chronic pain related to piriformis syndrome. The multimodal intervention lasted for 9 weeks with a total of 12 sessions and included manual therapy, therapeutic exercise, neural mobilization, and pain neuroscience education. Initially, the pain characteristics alongside somatosensory, motor-functional, and psychosocial factors were assessed. Due to the Covid-19 pandemic, only the pain characteristics and psychosocial factors could be reassessed post intervention. Improvements in both pain characteristics and psychosocial factors were achieved, resulting in a better general condition of the patient. This case report suggests that a multimodal physiotherapy intervention adapted to telerehabilitation was an effective option to improve the pain symptoms and psychosocial factors in the reported patient during the Covid-19 pandemic. Therefore,

this may be a treatment option in patients with chronic pain that are in a situation where face-to-face physiotherapy is not feasible.

Keywords: chronic pain; physiotherapy; piriformis syndrome; multimodal approach; telerehabilitation; Covid-19

1. Introduction

Sciatica is a type of musculoskeletal pain that is felt in the leg along the sciatic nerve's distribution, and it can occasionally be accompanied by lower back pain [1]. Sciatica has been found to have a lifetime prevalence of 12−27% [2].

One of the possible causes of sciatica is compression of the piriformis muscle on the sciatic nerve trunk, which Robinson named as the basis for piriformis syndrome (PS) [3].

In the literature on PS, we can find different proposed causes, among which hypertrophy of the pyramidal muscle (PM) [4,5], spasm or contracture of the PM after a traumatic event [3], and the existence of different congenital variations in the path of the sciatic nerve that facilitate nerve compression [6,7] were highlighted.

Several procedures, including the Pace test [8], the Beatty test [9], and the flexion adduction internal rotation (FAIR) test [10], were claimed to replicate sciatica by increasing the PM tension through either passive muscular stretching or resistant muscle contraction.

In terms of the treatment of PS, both pharmacology and physiotherapy should be mentioned. The most common pharmacological treatment is based on the administration of local anesthetics, corticosteroids, or botulinum toxin [11]. Regarding physiotherapeutic management, manual therapy (MT) and neural mobilization are two interesting treatment options [12].

It is important to mention that it has been shown that PS can tend to become chronic, which can increase the severity of the patient's condition, as the transition from acute to chronic PS also means the onset of chronification in symptoms such as pain [13].

As for chronic pain related to PS, there is practically not much evidence on how to manage it through physiotherapy. Despite this, there is more general research on possible interesting approaches for patients with chronic pain, some of which highlight the positive effects of the biobehavioral approach that includes patient-centered care and is based on the use of treatment tools such as therapeutic exercise (TE) and pain neuroscience education (PNE) [14−16].

In this clinical case, a patient with chronic pain associated with PS is treated with a multimodal physiotherapy program centered around a biobehavioral strategy. This is one of the first case reports to describe multimodal physiotherapy management in a patient with chronic pain diagnosed with PS. Moreover, this clinical case has the added peculiarity of adapting the treatment to the telerehabilitation modality due to the Covid-19 pandemic. The primary reasons for using this multimodal treatment are the available data and the patient's prior experience with standard care, which did not result in a noticeable medium-term improvement. For these reasons, the study's objective is to assess and manage a patient with PS-related chronic pain using the patient-centered biobehavioral model.

2. Materials and methods

2.1. Case history

The patient was a 43-year-old woman with chronic pain for 1 year and 2 months. Due to the pain, the patient had been out of work for more than a year, with hardly any social activities and a sedentary lifestyle. Consequently, the patient had to start taking antidepressants and tramadol. In addition, the patient told us that she went to the osteopath and that "it went well".

Regarding the onset of pain, the patient commented that after an aqua gym session, pain appeared in the gluteal area. After some time, the pain did not disappear and she decided to go to the doctor, where she was diagnosed with PS. A month after the onset, the initial pain was followed by pain in the hip, sacroiliac, and lumbar areas. Finally, 5 months later, she began to experience cramps and pinching in the front of the right thigh.

2.2. Clinical findings

The primary symptomatology presented by the patient during the first interview was the existence of 5 different pains: pain in the hip area (P1), pain in the gluteal area (P2), sacroiliac pain (P3), anterior thigh pain (P4), and lower back pain (P5).

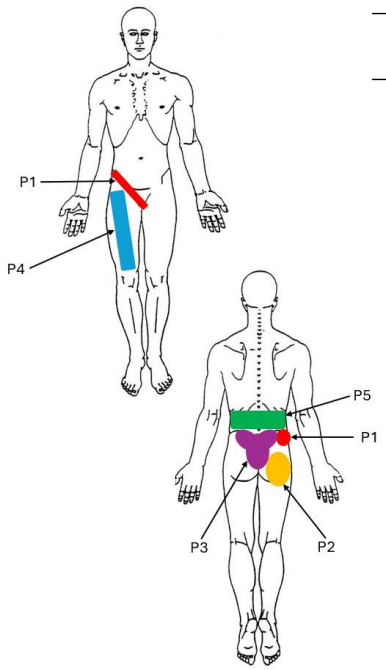
The pain intensity was measured using a Visual Analogue Scale (VAS). The VAS has been demonstrated to have a strong retest reliability ($r = 0.94$). It uses a 10-cm line with two endpoints that represent the extreme states ("no pain" and "pain as intense as it could be") [17]. P1 had a VAS score of 6/10, which improved with stretching and worsened with walking. P2 had a VAS intensity of 3/10, which worsened with sitting and, similar to P1, improved with stretching. P3 improved with the slump position, worsened in the supine position, and had a VAS intensity of 4/10. P4 had a VAS score of 5/10, and it was unknown which factors made it better or worse. Finally, P5 had a VAS intensity of 5/10, which worsened with trunk flexion and getting out of bed and improved as the day went on. The baseline body chart with the symptom distribution together with pre-intervention measurements of the pain characteristics can be found in Figure 1.

Following the medical interview, a physical assessment was performed. First, it was noted that the movements that reproduced the symptoms were hip flexion, hip adduction, and all physiological lumbar movements, with the exception that there was no limitation of the range of motion at that level.

Second, the somatosensory factors were assessed. Using an esthesiometer, the two-point discrimination test (2-PD Test) was the first test administered. As per Nollan's procedure [18], the calipers were initially set to 70 mm, and then the distance between each point was decreased by 10 mm until the patient reported feeling just one point instead of two. The test was performed on both the right and left hip. To determine the 2-PD Test value, three measurements were made, and the average was calculated. Subsequently, using a digital algometer, the second test aimed to determine the pressure pain threshold (PPT). Pressure was given to the right and left hip and to the right and left sacroiliac joints until discomfort was felt. The PPT value represented the amount of pressure measured in kilograms that the algometer applied up until pain provocation [19]. All pre-intervention values for the somatosensory factors are listed in Table 1.

Third, the motor-functional status was evaluated by assessing the patient's motor control of both sides using the Stabilizer Pressure Biofeedback unite [20]. All baseline measures of the motor-functional status can be found in Table 1.

Finally, the psychosocial variables were assessed using different questionnaires. First, anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS), which is a questionnaire with two subscales that is available in Spanish. Each subscale had a maximum score of 21 points; the greater the score, the more depressed or anxious the individual was [21]. Second, the Roland-Morris Questionnaire (RMQ), which is a questionnaire with a maximum score of 24 points, was used to assess the level of lower back disability [22]. Third, the patient's level of chronic pain self-efficacy was determined using the Spanish version of the Chronic Pain Self-Efficacy Scale (CPSS) questionnaire. The CPSS has a maximum score of 190 points: the higher the patient's level of pain self-efficacy, the higher the score [23]. Subsequently, the 11-item Spanish version of the Tampa Scale of Kinesiophobia (TSK-11) was utilized to measure kinesiophobia. The TSK-11 is scored from 11 to 44, with a higher score indicating a higher degree of kinesiophobia. A change in the TSK-11 that is greater than 5.6 points can be considered as important [24]. Lastly, the Spanish version of the Pain Catastrophizing Scale was utilized to evaluate pain catastrophism. It has 13 questions, with a total of 52-points. The level of catastrophism increases with the PCS score. A major change is defined as one when the difference in the PCS score is more than 9.1 points [25,26]. The baseline values of all psychosocial factors assessed are described in Table 1.



PAIN	REGION	INTENSITY (VAS)	DESCRIPTORS	COLOUR (Body Chart)
P1	Hip area	6/10	Deep and constant.	
P2	Gluteal area	3/10	Superficial and intermittent.	
P3	Sacroiliac	4/10	Superficial, constant, and pinching.	
P4	Anterior thigh	5/10	Superficial, pinching, and crampy.	
P5	Low back	4/10	Superficial and mechanical.	

Figure 1. Baseline body chart with symptom distribution together with pre-intervention measurements of pain characteristics.

Table 1. Pre-intervention measurements of somatosensory, motor-functional and psychosocial factors.

Measure		Pre-intervention
Somatosensory factors	PPT	Right hip: 1.8 kg/cm^2
		Left hip: 4 kg/cm^2
		Right SJ: 1 kg/cm^2
		Left SJ: 3 kg/cm^2
	2-PDT	Right hip: 6.5 cm
		Left hip: 4 cm
Motor-functional factors	MC	Right: 70 mmHg
		Left: 76 mmHg
Psychosocial factors	Anxiety (HADS)	10/21
	Depression (HADS)	16/21
	Disability (RMQ)	12/24
	Pain self-efficacy (CPSS)	37/190
	Kinesiophobia (TSK-11)	28/44
	Pain catastrophizing (PCS)	45/52

*Note: PPT: Pain Pressure threshold; SJ: Sacroiliac joint; 2-PDT: Two-Point Discrimination Test; MC: Motor control; HADS: Hospital Anxiety and Depression Scale; RMQ: Roland-Morris Questionnaire; CPSS: Chronic Pain Self-Efficacy Scale; TSK-11: 11-item Tampa Scale of Kinesiophobia; PCS: Pain Catastrophizing Scale.

2.3. Therapeutic intervention

The therapeutic intervention had a total of 12 sessions that were carried out over 9 weeks. The multimodal physiotherapy intervention included MT, neural mobilization, TE, and PNE. This intervention had the peculiarity that it was affected by the Covid-19 pandemic. Consequently, the sessions were held in person only during the first 3 weeks, while the rest of the intervention was carried out by telerehabilitation. Table 2 shows the details of the intervention.

Table 2. Therapeutic intervention in detail.

Phase (sessions)	Weeks (times per week)	Session duration	Treatment performed
Before Covid-19 (1^{st}–3^{rd})	1^{st}–3^{rd} (2)	60 min≈	-PNE: A total of 3 sessions were held in the first phase. PNE aimed to teach the patient coping mechanisms and pain management techniques, as well as provide information about pain, in order to try to change the way the patient experienced pain by getting rid of false beliefs and enhancing self-efficacy. -TE: i. Motor control training ii. Strength training: The exercises included were sumo squats, standard squats, and monster walk. iii. Aerobic training: Started with 3 minutes on the elliptical bike, progressing to 1 minute per week. iv. Balance training: Joint position recognition exercises (progress was made using a BOSU). -MT: Coxofemoral traction was performed. -Neural mobilization: It was applied to the lumbosacral plexus and the femoral and sciatic nerves.
During Covid-19 (6)	4^{th}–9^{th} (1)	60 min≈	-PNE: A total of 3 sessions were held on alternate weeks in the second phase with a duration of 30 minutes each. PNE aimed to teach the patient coping mechanisms and pain management techniques, as well as provide information about pain, in order to try to change the way the patient experienced pain by getting rid of false beliefs and enhancing self-efficacy. -TE: If PNE was performed in the same session then the duration of the TE was 30 minutes, while if only TE was performed then it lasted 60 minutes. i. Motor control training ii. Strength training: The exercises included were sumo squats, standard squats, and monster walk. iii. Aerobic training: Started with 3 minutes on the elliptical bike, progressing to 1 minute per week. iv. Balance training: Joint position recognition exercises (progress was made using a BOSU).

*Note: PNE: Pain neuroscience education; TE: Therapeutic exercise; MT: Manual therapy.

3. Results

During the 9 weeks of intervention, the patient underwent a total of 12 sessions. Two measurements were obtained: the first was a basal measurement and the second was after the intervention was over. As for the general results of the treatment, a significant improvement in the patient's condition was obtained.

Regarding the pain intensity, there was an improvement in post-intervention over the baseline in all 5 different types of pains. In terms of their scores on the VAS scale, P1 and P4 decreased by two points, P2 and P5 decreased by one and a half points, and P3 only decreases by 0.5 points. Table 3 shows the post-intervention measurements of the different levels of pains.

On the one hand, with reference to the factors that were measured at the baseline, the somatosensory and motor-functional factors could not be measured post-intervention due to the pandemic, as they needed to be measured in person. On the other hand, the psychosocial factors were the only ones that could be measured post-intervention because they could be obtained remotely. In relation to these factors, all were found to significantly improve. Table 3 shows the post-intervention measurements of the psychological factors.

Table 3. Post-intervention measurements of different pains and psychosocial factors.

Measure		Pre-intervention
Pain	P1 intensity (VAS)	4/10
	P2 intensity (VAS)	1.5/10
	P3 intensity (VAS)	3.5/10
	P4 intensity (VAS)	3/10
	P5 intensity (VAS)	2.5/10
Psychosocial factors	Anxiety (HADS)	4/21
	Depression (HADS)	8/21
	Disability (RMQ)	10/24
	Pain self-efficacy (CPSS)	51/190
	Kinesiophobia (TSK-11)	24/44
	Pain catastrophizing (PCS)	19/52

*Note: VAS: Visual Analogue Scale; HADS: Hospital Anxiety and Depression Scale; RMQ: Roland-Morris Questionnaire; CPSS: Chronic Pain Self-Efficacy Scale; TSK-11: 11-item Tampa Scale of Kinesiophobia; PCS: Pain Catastrophizing Scale.

4. Discussion and conclusions

This case report presents a detailed description of a multimodal physiotherapy intervention, which had to be adapted to telerehabilitation due to the Covid-19 pandemic, that was used in an adult patient with chronic pain related to PS. Improvements in both the pain and psychosocial factors were obtained. However, because the treatment was affected by the Covid-19 pandemic, both the motor-functional and the somatosensory status could not be assessed post-intervention.

This clinical case is one of the first in which a biobehavioral approach that included at least TE, PNE, and MT obtained positive effects in a patient with long-term pain related to PS. However, it is

not one of the first times in which this type of physiotherapy management caused significant improvements in a patient with chronic pain. For example, Marcos-Martín et al. [27] observed that a similar intervention obtained significant results in patients with chronic cervico-craniofacial pain. In addition, López-de Uralde et al. [28] found positive effects when applying a biobehavioral treatment that included TE, PNE, and MT in patients with chronic non-specific neck pain compared to treatments that only included either MT alone or PNE with MT.

The only treatment performed in this clinical case that is not normally included in biobehavioral approaches is neural mobilization. In this case, we believe that its inclusion was key since it has been shown that it is one of the physiotherapeutic interventions that has better effects on the symptoms caused by PS [12]. Therefore, it be concluded that neural mobilization may have played a very important role in reducing the intensity of pain, and therefore indirectly in improving the psychosocial status.

The Covid-19 pandemic caused most governments to decide to implement a state of alert that included measures such as isolation. The pandemic was a major challenge at all levels of health care [29]. For physiotherapy, the Covid-19 pandemic meant that face-to-face sessions in many cases had to be adapted to online sessions. In this case report, the situation of compulsory isolation imposed by the Spanish government [30] meant that the intervention became telerehabilitation. This clinical case is not the only one in which the positive results of using telerehabilitation during the Covid-19 pandemic in a patient with pain is described. García-Salgado et al. [31] obtained significant improvements by applying a biobehavioral approach through a remote intervention in a patient with lower back pain.

There are several limitations in the present case study that require consideration. First, there was a lack of information on medium- and long-term effects because only the post-intervention evaluation was carried out without any follow-up measures. Therefore, we believe that a follow-up would have been necessary at one month, 3 months, 6 months, and 12 months since this was a patient with chronic pain and the monitoring of her condition over time is a fundamental aspect. Second, the Covid-19 pandemic was a situation of constant uncertainty that complicated the optimization of the intervention. Primarily, the pandemic caused two major problems. On the one hand, the Covid-19 pandemic forced a change from face-to-face sessions to online sessions after treatment had already begun. On the other hand, the pandemic made it impossible to assess the somatosensory and motor-functional factors post-intervention because they could only be assessed in person. We believe that the latter caused an important limitation due to the large amount of valuable information that these aspects offered about the patient's condition and the effects of the intervention. Finally, as it is a case report design, it does not allow for comparisons or generalization of the results. Nonetheless, it can be concluded that multimodal physiotherapy management based on a biobehavioral approach and adapted through telerehabilitation to a situation where face-to-face sessions could not be carried out, obtained significant improvements in the patient's condition. Therefore, this case study can be an interesting option in the management of patients with chronic pain, especially those whose pain is related to PS.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Author contributions

Ferran Cuenca-Martínez, Mónica Grande-Alonso: conceptualization, supervision; all authors: methodology, validation, data curation, writing—original draft preparation, writing—review and editing, visualization; Mónica Grande-Alonso: investigation, project administration. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

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