Physiotherapy Approach in Group Dysfunction: A Case Study

Sahar Zamani [a], **Farshad Okhovatian** [b*]

a School of Rehabilitation Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran; ***b*** Physiotherapy Research Centre, School of Rehabilitation Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Corresponding Author:** Farshad Okhovatian, Physiotherapy Research Centre, School of Rehabilitation Sciences, Shahid *Beheshti* Medical University, *Damavand St, Imam Hossein SQ*, Tehran, Iran. ***Tel: +98-21 77561407; ***E-mail:*** farshadokhovatian1965@gmail.com

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Abstract

In the current study the details of the treatment of a 25 year- old man are presented. He had an experience of a car accident 3 years ago and was suffering a lot of pain in lumbar and pelvic regions during last seven months. His case was carefully examined and evaluated in this study. A multimodal physical approach based on manual therapy, electrotherapy and exercise therapy was adopted to eliminate the pain and to correct malalignments. The patient received 15 treatment sessions and depending on the patient's status, the intervention techniques varied every session. He was re-examined to have the effectiveness of the treatment process evaluated in first, 5th, 10th and last sessions. Reassessment of the patient was done every other five sessions in order to change the treatment procedure, if there was no improvement in symptoms. This study showed that detailed assessment and re-assessment during the treatment sessions had a significant effect on improvement of the symptoms In addition, according to the patient's needs, different interventions could be used every session. However, Patient's satisfaction, Physician and limitations about medical insurance have to be considered. Improvement in daily life activity and function, and reduction of pain immediately after the treatment supported the beneficial response obtained by physiotherapy approach in group dysfunction of lumbar and pelvic.

Key words: Case Study, Group Dysfunction, Low Back Pain, Pelvic Pain

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Case report

Low back pain (LBP) is one of the most common reasons for patients to refer to physiotherapy centers (1). Many patients have self-limited episodes of acute low back pain; however, in some cases, pain and disability convert to chronic phase and remain for long time. Most of the patients suffer low back pain at least with moderate intensity, one year after an acute episode (2). It is worth mentioning that there is an interrelationship between low back pain and pelvic disorders and abnormalities which are known as a major contributor to lower back pain (3).

In this study, a case with group of dysfunctions, including pelvic and lumbar spine malalignments was examined. A 25-year-old male suffering pain in lumbar and pelvic regions for several months referred to a clinic. He also had an experience of a car accident three years ago, and his pain in lumbar and pelvic region deteriorated after a trauma in recent month. The main reason why the patient referred to the clinic was his back pain that increased while he was walking (15 minute after he started walking). He had a burning pain in lumbar when he bent forward to wash his face. The factors that aggravated the pain included: bending forward, sleeping in the supine position, prolong sitting and standing. The patient also complained about stiffness in the morning. He had normal gait and posture and there was no significant medical or surgical history.

The patient was asked to report the details of his pain by marking a line on the visual analogue scale (VAS). The VAS was a 10-cm horizontal line divided into 10 equal parts from 0 = no pain to 10=maximum pain ever felt (4). The reliability of VAS was reported in the previous research to be high (ICC=0.96-0.98)(5). The patient reported the pain at the most severe level, 8 on VAS.

Table 1. Lower extremities length measurements

region	Right side	Left side
Femur length	59.5	60
Tibia length	45	45
The numbers are in cm		

Table 2. Measurements in supine position

regions	Right side	Left side
ASIS to medial malleolus	102	102.5
Greater trochanter to lateral malleolus	94	94
ASIS to mreater trochanter	13	13
ASIS to umbilicus	16.5	15.5
The numbers are in cm		

Table 3. Measurements in standing position

	Right side	Left side
ASIS to medial malleolus	102	102
Greater trochanter to lateral malleolus	92	92.5
ASIS to mreater trochanter	13	14
The numbers are in cm		

Table 4. Manual muscle test results

Muscle	Right	Left
Lumbar extensor muscles	4+	4+
Thoracic extensor muscles	5	5
Upper abdominal muscles	4	4+
Lower abdominal muscles	4	4
Transverse abdominal muscle	4+	3+

Table 5. Muscle length test results

Muscle	Right	Left
Hamstring	+	+
Tensor facsialata	-	-
Piriformis	-	-
Rectus femoris	-	-
Iliopsoas	+	+
Gastrocnemius	+	+

On physical examination, Standing-flexion test and seated flexion test in right posterior-superior iliac spine (PSIS) were touched lower than the left side. Also Gillet test was positive on the right side. In supine and prone positions medial *malleolus* on the right side was higher than the left side but in long sitting position there was no difference between *malleolus*. Further measurements showed that the right thigh was slight longer than the left whereas legs length was equal on both sides (It should be noted that the length discrepancy between thighs was slight and Kendall *et al.* suggested that 0.5 cm length discrepancy is negligible (6) (Table 1). Also, there was particularly notable length discrepancy between ASIS and umbilicus (Table 2).

Further examination showed that the right hip in both supine and standing positions was higher than the left side (we compared iliac crests of both sides with the web of hands). Also right PSIS was lower than left in both prone and standing positions. Right anterior superior iliac spine (ASIS) was higher in both supine and standing positions compared with the left side. In standing and prone positions, sacral sulcus on the right side was deeper and more sensitive. Also the right transverse processes was touched more prominent (Tables 2, 3). The results of the further measurements are presented in the following tables:

Soft tissue tension test (STTT):

On physical examination, the hip range of motion (ROM) was normal and pain free (abduction, adduction, flexion, and extension, internal and external rotation). Assessment of lumbar movements showed that the pain appeared in end range of extension, but the other movements were pain free and intact. Manual muscle testing (MMT) was performed for patient's lumbar/thoracic extensors and abdominal muscles (7) whose results are presented in table 4. Additionally, Muscle length testing (MLT) was operated for lower extremities and lumbar muscles (6). Among these muscles, hamstring, iliopsoas and Gastrocnemius had shortness (Table 5).

To measure the hamstring length, the patient was lying in supine position with lower extremities extended and the low back and sacrum flatted on the table. The patient was asked to raise the leg with his knee extended and his foot relaxed while he had his low back and sacrum were flat on the table and the other leg was held firmly down. Since the angle of thigh from the table was lower than 80°, hamstring muscle was considered to be shorter.

To measure shortness of iliopsoas as a one-joint muscle, the patient was asked to lie in supine position near one end of the table (lower extremities was out of the treatment table). While

the low back was flat on the table, the patient was asked to pull the knee on the side not being examined toward his chest and to hold it in this position. Since the examined thigh did not touch the table, so shortness of hamstring was obvious.

To evaluate the Gastrocnemius shortness, the patient was in supine position with his hip and knee flexed. The patient was asked to do dorsi flexion. Because of the limited range of dorsi flexion (less than 20°) this muscle showed the shortness as well.

The Roland-Morris Disability Questionnaire (RDQ) which is designed to assess lumbar pain and disability was used in this study(8). In Roland-Morris Questionnaire, higher score earned by the patient revealed more physical disabilities and sever low back pain. According to the RDQ instruction, disability and pain improvement rate can be obtained through the following formula:

Improvement rate= $x = \frac{\text{primary score} - \text{secondory score}}{\text{primary score}} \times 100$

The 12 overall score was obtained in the primary evaluation of the patient prior to the treatment.

Negative single leg stance (SLR) and slump tests, reduced possibility of disk herniation. Based on the physical examination findings, it was obvious that the patient suffered group dysfunction including pelvic and lumbar spine malalignments, so the related treatment was planned aiming at the correction of these dysfunctions.

Treatment:

The order of Physiotherapy which was prescribed by the orthopedic surgeon included a common order to disk herniation based on the medical insurance guideline; therefore, prior to the treatment, we had consulted with the patient's orthopedic surgeon to get fully informed about the prescription. According to the assessment of the physiotherapist, the interventions would vary every session depending on the patient's assessment and re-assessment results.

Treatment protocol was provided based on the clinical information about the patient. Then the treatment was designed to serve two types of goals; short-term and long-term.

Short term goals were to improve the pain, decrease the morning stiffness, eliminate the muscles shortness and to correct the lumbar and pelvic dysfunctions.

Long term goals were supposed to lead to increase in the lumbar stabilization and improvement in patient's ADL

The patient was treated 15 sessions as following; eight sessions during the first two weeks and seven sessions in the next four weeks. The treatment lasted for six weeks all together.

In the first sessions, the main objective was to reduce the pain, so TENS, Hot pack and Ultrasound were used as electrotherapy modalities.

Conventional TENS was used for 20 minutes (frequency of 150 Hz, pulse width of 20 μs and the intensity was exclusively set at the subject's sensorial threshold) along with hot pack. It was also accompanied with 8-minute Ultrasound treatment (frequency of 1MHz, wave length of 1.5mm and pulsed mode).

Gentle exercises were applied from the first days and progressed to strengthening exercises, coordination and agility activities. Training included the following exercises: abdominal hollowing ,posterior pelvic tilt, knee to chest, bridge exercise, multifidus activation & training, limb loading in the quadruped/prone/supine position, Strength, balance, and coordination training on a gym ball, maintaining the balance on a foam roll with the extremities moving in various directions, side-propping (weight bearing on the elbow and knee which progressed to weight bearing on the hand and foot) .Moreover, Stretching exercises for short muscles (hamstring, gastrocnemius and iliopsoas) were taught to be applied.

Manual techniques were conducted to correct lumbar and pelvic malalignments. MET exercise was performed on affected muscles based on the following procedure:

1) The patient was lying prone with a pillow under the abdomen to reduce the lumbar curve. The therapist stood contralateral to the side of psoas which was to be treated. Therapist's hand was supporting the thigh when the patient flexed his knee. The other hand was placed so that the heel of the hand was placed on the sacrum and was applying a pressure towards the floor to maintain pelvic stability. The patient was asked to bring the thigh towards the table against resistance, using 15-25% of his maximal voluntary contraction potential for 7 seconds. Then the patient was asked to gently push his foot towards the ceiling (9).
2) The patient was lying prone, at the very end of the table. The hip and knee of the side being treated was extended so that lower extremity was off the table. Other knee was extended on the treatment table. Then the therapist stood opposite to the side being treated. The therapist place his hand on the patient's tight and held the patient's ankle with the other hand in order to apply resistance. The patient was asked to bring the thigh towards the ceiling against the resistance, using 15-25% of his maximal voluntary contraction potential, the contraction lasted for 7 seconds and this action was repeated 5 times. Then the patient was asked to gently push his foot towards the floor (9).

Figure 1. Manipulation technique on lumbar spine

Figure 2. Mobilization technique on lumbar spine

3) The patient was side lying, the therapist stood in a position that he can see the patient's anterior trunk. Therapist placed fingers between the L5 and the S1 spinous processes and palpated the L5-S1 motion while flexing the patient's trunk down to L4 from above. Then, the therapist flexed the lower extremities up to L5 while monitoring the movement in L4-L5 level. In this position, trunk rotation was performed by rotating the patient's shoulder posterior and side bending was performed by lifting both lower extremities upward while the therapist was holding both ankles with one hand and monitoring the movement in L4-L5 with other hand. The patient was asked to pull his feet on the table while a resistance to the movement was conducted by the therapist. The contraction lasted for 7 seconds then the therapist increased therang of forward flexion, rotation and side bending with the help of the shoulder, hip and knee movements. (10).

Manipulation and mobilization techniques were operated in order to increase the restricted motions, to improve periarticular muscle performance and to decrees pain in the following procedures:

1) The patient was lying on the side which was not affected by the pain with the arms resting over the therapist' arm. The lumbar spine was placed in midrange. The therapist stood at one end of the of the treatment table in front of the patient's anterior trunk, then the therapist locked the inferior vertebras by bringing the patient's upper knees toward the chest and locked the superior vertebrae by rotating the upper trunk posteriorly the therapist positioned the middle finger of one on the lower lateral surface of the spinous process of the L5 vertebra and the forearm on the patient's pelvis. The thumb of the other hand was positioned on the upper lateral surface of the spinous process anterior and medial finger on the patient's shoulder. In this position rotation mobilization (trust technique) on the lumbar spine was conducted (10) (Figure 1).
2) The patient was prone with both knees bent to 90 degrees. The therapist stood at patient's trunk side and held the patient's ankles. The therapist palpated the L5-S1 motion segment by placing the palpating finger between the LS and the S1 spinous processes while moving the patient's ankles away from midline (11).
3) Patient was prone and the therapist stood at one end of the table. The therapist placed the heel of the hand on the spinous process of vertebrae to be mobilized. The oscillating movement of the vertebrae was performed when the therapist moved his body downward (Figure 2).

The patient received 15 treatment sessions and during first, 5th, 10th and last sessions was re-examined to have the accuracy of the treatment process evaluated. On the last visit, a complete evaluation was performed again.

Discussion

The high incidence rates of low back pain and harmful effects on one's social performance which could lead to work disability and influence all aspects of quality of life indicates the importance of accurate diagnosis and treatment. Chou *et al.* classified the low back pain into 3 categories:1) nonspecific low back pain 2) back pain associated with radiculopathy or spinal stenosis 3) back pain associates with another specific spinal cause (12).

Regarding the interrelationship between lumbar and pelvic region, the LBP can be associated with sacroiliac dysfunctions. Impairments in lumbar region can also affect the surrounding tissues like pelvic region. Pelvic can provoke or generate lumbar pain. On the other hand, lumbar dysfunctions can cause pelvic pain or impairments. The LBP caused by pelvic impairments can be placed in Chou's third category.

In cases that LBP is provoked following the trauma, the examination of pelvic, sacroiliac joint and lower extremities is necessary. Focus on lumbar treatment without considering the associated pelvic impairments can lead to a failure in the treatment, so precise examination of the involved area and adjacent regions is required.

In this study, the treatment was conducted both in the pelvic and in the lumbar region. Following the application of the combined treatment including electrotherapy, manual therapy and exercise therapy, the symptoms of patient were eliminated significantly. Standing-flexion test, seated flexion test and Gillet test were negative and there was no length discrepancy between ASIS to umbilicus, ASIS to medial malleolus, ASIS to Greater trochanter and greater trochanter to lateral malleolus. The patient reported a significant improvement in pain scale. Pain intensity was reduced to 2 in Visual Analogue Scale. Furthermore, the score obtained in the Roland–Morris questionnaire represented a significant improvement. The obtained score in questionnaire was 2.The improvement rate was calculated by using the following formula:

$$\text{Improvement rate}=\frac{12-2}{12}\times 100 = 83\%$$

The patient was asked to continue the instructed exercises in order to prevent the relapses of the symptoms. Unfortunately, we failed to follow up the patient, so long term effects of the treatment remained unclear.

Conclusion

This case report showed that detailed examination and assessment in patients with low back pain are very important. Depending on the patient's status, different intervention techniques can be used during the treatment period every session. Moreover, appropriate techniques can be performed based on the results of the frequent re- assessment by physiotherapist.

It should be taken into account that re-assessment during the treatment should be conducted to evaluate the effectiveness of the treatment process or even to change the treatment procedure and in some cases pelvic impairments can aggravate the lumbar symptoms and the focus of the treatment should not be only on the lumbar area.

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Authors' contributions:
All authors made substantial contributions to conception, design, acquisition, analysis and interpretation of data.

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