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Original Article

The Preliminary Results of Extracorporeal Shockwave Therapy in Patients with Piriformis Syndrome

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The study was designed to evaluate the therapeutic effect of extracorporeal shockwave therapy (ESWT) on the rehabilitation of patients with piriformis syndrome. Thirty-six patients diagnosed with unilateral piriformis syndrome were included and allocated randomly into three groups, Groups A-C, with twelve patients in each group. Patients in Groups A-C all received conventional physical modalities programs, including hot packs and interferential current therapy, three times weekly for six weeks. Patients in Group B received an extra twenty minutes of stretching exercise therapy after physical modalities therapy, and Group C received the same therapy as in Group B and extra shockwave therapy weekly for six weeks. The outcome measurements included the changes in the hip range of motion (ROM), visual analogue scale (VAS), Timed Up and Go test (TUG) and latency of H reflex. Each assessment was performed before and after the treatment, and follow-up three months later. The results showed that patients in both Group B and Group C yielded more improvement than did patients in Group A. Besides, Group C presented more significant improvement ($p<0.05$) after treatment and at follow-up. Extra stretching exercise therapy had positive effects on pain reduction and functional improvement. Furthermore, extracorporeal shockwave therapy might provide additional benefit in managing the piriformis syndrome. In conclusion, conventional physical modalities therapy combined with stretching exercise therapy and ESWT will result in greater therapeutic effects. (Tw J Phys Med Rehabil 2018; 46(1): 37 - 45)

Key Words: piriformis syndrome; stretch exercise therapy; extracorporeal shockwave therapy

INTRODUCTION

Piriformis syndrome occurs when disorder of the piriformis muscle results in buttock pain, and often radiates down to the leg. This term was first introduced by Robinson, affecting 5-8% of all patients seeking for treatment of back and leg pain treatment.[1,2] It is caused by trauma to the pelvis or buttock,[3] hypertrophy of the piriformis muscle,[4,5] anatomic abnormalities of the sciatic nerve of the muscle,[6] difference in leg lengths, or piriformis myositis.[7,8] The principal symptoms of

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buttock pain are exacerbated by prolonged sitting or activity of the hip and lower extremities, either with or without leg pain, and the symptoms are also aggravated by prolonged hip flexion, adduction and internal rotation.[3,9] Usually, local tenderness over piriformis muscle was found on physical examination under hip flexion and internal rotation (FAIR) posture.

The traditional management of piriformis syndrome includes physical modalities that are focused on muscle and connective tissue relaxation, stretching exercise, or injection with a combination of local anesthetics and corticosteroids or botulinum toxin.[1,4,5,10] While the former injection techniques were done blindly,[3,9] recent approaches are guided by images or techniques to get more targeted treatment that involves the application of electromyography,[4] computed tomography, magnetic resonance imaging, ultrasound,[11-13] and peripheral nerve stimulator guidance aim to identify the piriformis muscle. However, the therapeutic results are controversial, which might be due to the further morphological changes of the piriformis muscle following chronic inflammation.

Extracorporeal shockwave therapy (ESWT) consists of a sequence of sonic pulses characterized by high peak pressure with fast pressure rise and a short life cycle. After the foremost application for lithotripsy in nephrolithiasis, the indication of ESWT has increasingly appeared for soft tissue regeneration and rehabilitation in orthopedics and sports medicine. However, few studies have focused on the effects of ESWT on piriformis syndrome; therefore, the aim of the present study is to assess the efficacy of stretching exercise therapy and to investigate the therapeutic effect of ESWT on the rehabilitation of patients with piriformis syndrome.

MATERIALS AND METHODS

Subject selection

This study was conducted in an outpatient clinic of rehabilitation of a medical center in south Taiwan, and the project was approved by the Institutional Review Board (IRB).

Subjects were eligible for inclusion in the study if diagnosed with unilateral piriformis syndrome by FAIR maneuver, H-reflex latency study, and radiologic examination and musculoskeletal ultrasound to exclude other pathologies.[10,14] Thirty-six patients were included and randomly allocated to three groups, Group A-C, with twelve patients in each group as in Figure 1. Subjects in Group A, the control group, received physical modalities therapy programs (including twenty minutes of hot packs and fifteen minutes of interferential current therapy), three times per week for six weeks. Subjects in Group B received the same programs as those in Group A with an extra twenty minutes of stretching exercise therapy. Subjects in Group C received the same as those in Group B and weekly ESWT over the affected piriformis muscle for six weeks.

The therapeutic outcome measurement included changes in the active hip range of motion (ROM), visual analogue scale (VAS), average latency of H-reflex, and Timed Up and Go test (TUG). Each assessment was arranged at the baseline, after the treatment and follow-up three months later.

Hip ROM measurement

Though the major function of the piriformis muscle is external rotation of the hip joint, hip flexion usually induces buttock pain clinically. Therefore, the ROM of hip flexion and external rotation were measured with a goniometer. The ROM of hip flexion was measured in supine position. The examiner placed the axis on the greater trochanter, while the stationary arm lined up with the trunk and the moveable arm over the lateral thigh. Subjects were asked to flex the hip slowly from full hip extension, without any compensatory spine and pelvis movements. The ROM of hip external rotation was also measured with the participants sitting on a high chair and the hip and the knee were positioned at 90 degrees. The examiner placed the axis of the goniometer on the mid patellar, while the stationary arm was placed perpendicular to the floor and the moveable arm lined up with the tibia. The participants moved the leg into external rotation without compensatory movement at the trunk.[15] The degrees were recorded for the affected extremity in triplicate, and the average of these three measures was recorded as the ROM of the hip.

Measurement of pain severity

The severity of buttock and hip joint pain while walking or climbing stairs was evaluated by the visual analogue scale (VAS).[15] The instrument consisted of a horizontal line, 100 mm in length, with anchor points of zero (no pain) and ten (very severe pain). The measurement was conducted in triplicate and the mean values were calculated and recorded.

The electrophysiologic measurement

The electrophysiologic test was performed by placing the patient in the side-lying position with tested hip on top, and the lower extremity was moved in to flexion, adduction, and internal rotation. This position is referred to as the FAIR position, which is thought to intensify the pressure that the piriformis muscle exerts on the sciatic nerve.[16-18] The posterior tibial H-reflexes were elicited and recorded.

Timed Up and Go test

Participants performed the TUG test to assess gait performance, with the participants initially positioned in the sitting position, and were then requested to stand and walk as fast as possible for a distance of three meters to a target ahead of them, and then asked to turn around and return to the starting position.[19] The time taken to complete the test was recorded. The test was performed in triplicate and the mean values were calculated and recorded.

The shockwave therapy

The ESWT was performed with the piezoelectric shockwave (F10G4 Richard Wolf GmbH, Germany). The patient was kept in the FAIR position. After sonography-guided localization and biofeedback of the participant, ultrasound gel was applied to the skin and the applicator couple was placed with an impulse energy flux density of 0.1 mJ/mm2 (intensity 12-15/20), 2000 impulses weekly for six weeks. The dose of ESWT was applied according to the general therapeutic dose for calcific tendinopathy.[20]

Statistical analysis

The paired *t*-test was used to study the changes in range of motion, VAS, and peak torques in each group immediately after treatment and at three months follow-up. The missing data were imputed using the baseline observation carried-forward approach. One-way ANOVA analysis with the Tukey test was used to examine the differences between the treated groups and the control group. A statistically significant difference was defined as p<0.05.

Table 1. Average hip ROM in each group at various time intervals (mean ± SD)

		A	B	C
Flex	Before	68±13 (12)	65 ±15 (12)	64 ±11 (12)
	After	72±17 (12)	75±15* (12)	80±15*†‡ (12)
	Follow-up	73±17* (10)	78±15*† (10)	86±15*†‡ (11)
ER	Before	18±13 (12)	17 ±14(12)	16 ±10 (12)
	After	21±11 (12)	23 ±13* (12)	28 ±14*†‡ (12)
	Follow-up	20±10 (10)	26 ±13*† (10)	33 ±12*†‡ (11)

ROM: Range of motion

(): The number of patients in each groups at various time intervals.

*: Significant difference in ROM in each group after treatment or at follow-up (p<0.05)

†: Significant difference in ROM in each group compared with the control group at various time intervals (p<0.05)

‡: Significant difference compared with other treated groups (p<0.05)

Table 2. Average VAS score for hip pain in each group at various time intervals (mean ± SD)

	A	B	C
Before	5.5±1.4(12)	5.7±1.5(12)	5.8±1.2(12)
After	3.9±0.9(12) *	3.2±1.6(12) *†	2.6±1.4(12) *†‡
Follow-up	4.0±1.4(10) *	3.0±1.5(10) *†	2.2±1.3(11) *†‡

(): The number of patients in each groups at various time intervals.

*: Significant difference in VAS score in each group after treatment or at follow-up (p<0.05)

†: Significant difference in VAS score compared with the control group at various time intervals (p<0.05)

‡: Significant difference compared with other treated groups (p<0.05)

Table 3. Average latency of H-reflex of patients in each group at various time intervals (mini-seconds, mean ± SD)

	A	B	C
Before	27.8±1.2(12)	27.9±1.6(12)	28.1±1.3(12)
After	25.6±0.9(12)	23.5±1.1(12) *†	20.1±1.6(12) *†‡
Follow-up	25.8±1.7(10)	23.0±1.6(10) *†	18.5±1.5(11) *†‡

(): The number of patients in each groups at various time intervals.

*: Significant difference in average latency of H-reflex in each group after treatment or at follow-up (p<0.05)

†: Significant difference in average latency of H-reflex compared with the control group at various time intervals (p<0.05)

‡: Significant difference compared with other treated groups (p<0.05)

Table 4. Average time of Timed Up and Go tests of patients in each group at various time intervals (second, mean ± SD)

	A	B	C
Before	35.9±6.3(12)	34.4±7.2(12)	34.6±7.0(12)
After	26.9±5.1(12) *	22.8±4.1(12) *†	20.6±2.9(12) *†
Follow-up	27.9±7.3(10) *	21.4±8.3(10) *†	18.5±7.4(11) *†‡

(): The number of patients in each groups at various time intervals.

*: Significant difference in time in each group after treatment or at follow-up (p<0.05)

†: Significant difference in time compared with the control group at various time intervals (p<0.05)

‡: Significant difference compared with other treated groups (p<0.05)

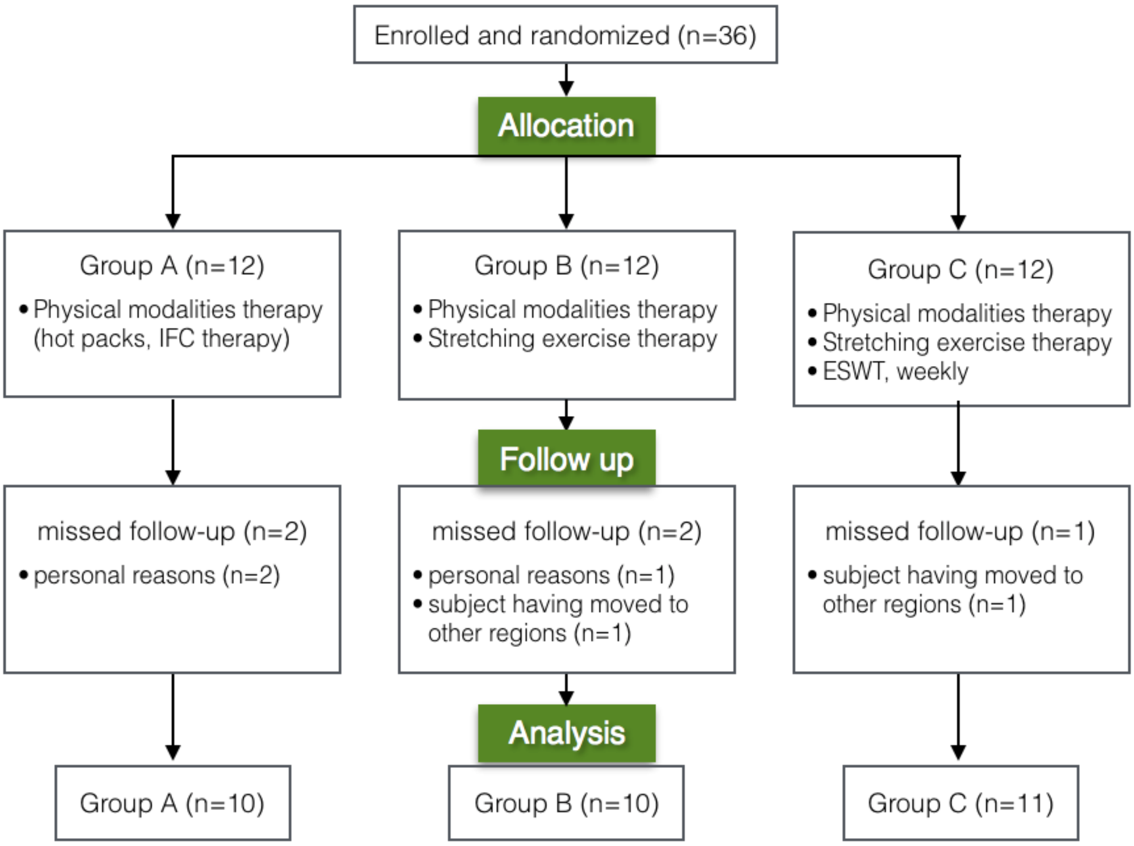

Figure 1. Flow diagram of this study

RESULTS

Thirty-six patients were enrolled in this study and allocated to Groups A-C, twelve patients in each group. All subjects received treatment for six weeks and outcome measurement was performed before, after treatment and at three months follow-up. The number of patients for whom follow-up data were available was ten (83%) in Group A, ten (83%) in Group B and eleven (92%) in Group C. The loss to follow-up was due to personal reasons(n=3) and subjects having moved to other regions(n=2).

Changes in hip range of motion

There were no significant differences of the average hip ROM between each group initially. The hip ROM improved after treatment in groups B and C only, with greater improvement in group C, and improvement in all groups at three months follow-up as shown in Table 1. However, there was more improvement of hip ROM, both flexion and external rotation in group C compared with those in groups A and B at follow-up.

Changes in pain severity

The changes in average VAS scores for buttock and hip pain in each group are shown in Table 2. There was no significant difference of pain scores among all groups initially, and these decreased significantly in each group both after treatment and at the follow-up. However, patients in Groups B and C showed more pain reduction after treatment than those in Group A. Besides, Group C showed better improvement than Group B both after treatment and at follow-up.

Changes in latency of H-reflex

The changes of average latency of H-reflex before and after treatment and follow-up in all groups are shown in Table 3. There was no significant decrease of H-reflex latency in group A both after treatment and at follow-up. The significant decrease of H-reflex latency was found in Groups B and C after treatment and at follow-up. Furthermore, more significant decrease of H-reflex latency was found in Group C at follow-up.

Changes in TUG test

The decrease in average Timed Up and Go tests in all groups is shown in Table 4. The average time of TUG tests decreased after treatment in all groups. Patients in Group A showed the least improvement in TUG test, and Group C had significant reduction in time after treatment and at the follow-up period. Besides, the time decreased gradually in group C more than that in Group B at follow-up.

DISCUSSION

The piriformis muscle anatomically originates from the surface of anterior sacrum, the gluteal surface of the ilium near the posterior margin of the iliac spine, and the capsule of sacroiliac joint.[1] The muscle exits the pelvis through the greater sciatic notch to inserts on to the piriformis fossa of the femoral bone.[21] The function of the piriformis muscle is to provide stability of the sacroiliac joint, to externally rotate the hip joint when the thigh is extended, and to abduct the hip when the thigh is flexed.[9,18] However, when piriformis syndrome occurs with sciatic nerve compression, it is often underdiagnosed and mistaken for more common conditions, such as facet arthropathy, sacroiliitis, lumbar disc disease, and radiculopathy,[21] with some cases even referred for lumbar spinal surgery.

The conventional management of piriformis syndrome consists of physical therapy combined with the use of anti-inflammatory agents, analgesics, muscle relaxants, and neuropathic pain agents to reduce inflammation, spasm, and pain.[1,10] Correction of abnormal biomechanics commonly caused by posture, pelvic obliquities, and leg length discrepancy should be done.[1] Physical therapy includes stretching techniques of the piriformis, strengthening of the hip abductor, external rotator and extensor to reduce strain on the piriformis, and massage physiotherapy of the piriformis muscle. If conservative therapy fails, other invasive techniques such as local injection with anesthetic, steroids, or botulinum toxin type A might be considered. Surgical decompression in recalcitrant cases or anatomic abnormalities of the piriformis muscle are also demonstrated.[22]

In our study results, subjects in Group B showed significant therapeutic effects in reduction of hip pain and H-reflex latency, and increase in hip ROM and functional performance, compared with Group A. This implies that pain and tightness of the gluteal muscle improves after stretching therapy and leads to better functional status, as in improvement of TUG. Thus, the stretching exercise therapy is important for biomechanical correction in treating the piriformis syndrome.

The potential beneficial mechanisms of ESWT have been studied, including direct tissue trauma and cavitation, altered cell-membrane permeability, direct effect on nociceptors and peripheral nerve stimulation.[23] Some studies in animals have shown that shockwave therapy might induce neovascularization and tendon healing by enhancing some angiogenesis-related factors such as eNOS, VEGF and PCNA.[24] After introduction of extracorporeal shockwave therapy (ESWT) for the treatment of nephrolithiasis, ESWT has been extended for chronic tendinopathy and musculoskeletal disorders, such as plantar fasciitis, epicondylitis, patellar tendinitis, calcific and non-calcific rotator cuff tendinosis, Achilles tendinopathy, myofascial pain syndrome and fibromyalgia.[25,26] In our previous studies, we demonstrated shockwave therapy in patients with knee osteoarthritis and cyamella formation over popliteal fossa and patients with cervical spondylosis and nuchal ligament calcification, which both showed significant therapeutic effects.[27,28]

The present study showed that subjects in Group C had better improvement of hip pain and range of motion, latency of H response, and TUG compared with those in Groups A and B. Moreover, there were significantly better improvements of pain score, latency of H reflex and TUG in the follow-up period compared with those in Group B. The improvement in H reflex latency may reflect less pressure of the muscle on the nerve in a FAIR position which measures a pathogenic mechanism of the syndrome.[29] Besides, improvement in pain score and TUG implied that shockwave therapy has more significant functional effects on rehabilitation of patients with piriformis syndrome.

In recent studies, ESWT has been proposed for treatment of spastic muscles. Some studies have focused on poststroke spasticity,[30,31] showing positive effects, either at the muscle belly or myotendinous junction.[32] However, the mechanism and clinical efficacy of ESWT on spasticity remains unclear. It is assumed that the reduction in spasticity is caused by the direct action on fibrous areas, through altering the rheological properties of chronic hypertonic muscles and by reducing intramuscular connective tissue stiffness.[33-35] The mechanisms of ESWT on muscle tissue are still unknown and further trials are warranted for better clarification and recommendations.

The limitations of our study are as follows. Firstly, the sample size was too small to examine other factors such as age, sex, life-style factors and other associated diseases. However, larger sample sizes are difficult to achieve under the relatively rare incidence of piriformis syndrome. Second, the present study lacks further classification of severity or severity of the piriformis syndrome. Further studies with larger numbers of participants and with further quantitative evaluation of functional improvement are needed.

In conclusion, ESWT is an effective adjuvant treatment in managing patients with piriformis syndrome, with improving pain and functional status. Conventional rehabilitation programs combined with stretching exercise therapy and ESWT will result in greater therapeutic effects.

REFERENCE

1. Benzon HT, Katz JA, Benzon HA, et al. Piriformis syndrome: anatomic considerations, a new injection technique, and a review of the literature. Anesthesiology 2003;98:1442-8.
2. Robinson DR. Pyriformis syndrome in relation to sciatic pain. Am J Surg 1947;73:355-8.
3. Parziale JR, Hudgins TH, Fishman LM. The piriformis syndrome. Am J Orthop (Belle Mead NJ) 1996;25:819-23.
4. Fishman SM, Caneris OA, Bandman TB, et al. Injection of the piriformis muscle by fluoroscopic and electromyographic guidance. Reg Anesth Pain Med 1998;23:554-9.
5. Hanania M, Kitain E. Perisciatic injection of steroid for the treatment of sciatica due to piriformis syndrome. Reg Anesth Pain Med 1998;23:223-8.
6. Sayson SC, Ducey JP, Maybrey JB, et al. Sciatic entrapment neuropathy associated with an anomalous piriformis muscle. Pain 1994;59:149-52.
7. Chen WS. Sciatica due to piriformis pyomyositis. Report of a case. J Bone Joint Surg Am 1992;74: 1546-8.
8. Giebaly DE, Horriat S, Sinha A, et al. Pyomyositis of the piriformis muscle presenting with sciatica in a teenage rugby player. BMJ Case Rep 2012;2012: bcr1220115392.
9. Barton PM. Piriformis syndrome: a rational approach to management. Pain 1991;47:345-52.
10. Kirschner JS, Foye PM, Cole JL. Piriformis syndrome, diagnosis and treatment. Muscle Nerve 2009;40:10-8.
11. Fabregat G, Rosello M, Asensio-Samper JM, et al. Computer-tomographic verification of ultrasound-guided piriformis muscle injection: a feasibility study. Pain Physician 2014;17:507-13.
12. Fanucci E, Masala S, Sodani G, et al. CT-guided injection of botulinic toxin for percutaneous therapy of piriformis muscle syndrome with preliminary MRI results about denervative process. Eur Radiol 2001;11: 2543-8.
13. Santamato A, Micello MF, Valeno G, et al. Ultrasound-Guided Injection of Botulinum Toxin Type A for Piriformis Muscle Syndrome: A Case Report and Review of the Literature. Toxins (Basel) 2015;7: 3045-56.
14. Jankovic D, Peng P, van Zundert A. Brief review: piriformis syndrome: etiology, diagnosis, and management. Can J Anaesth 2013;60:1003-12.
15. Dalton JA, McNaull F. A call for standardizing the clinical rating of pain intensity using a 0 to 10 rating scale. Cancer Nurs 1998;21:46-9.
16. Fishman LM, Dombi GW, Michaelsen C, et al. Piriformis syndrome: diagnosis, treatment, and

outcome--a 10-year study. Arch Phys Med Rehabil 2002;83:295-301.

17. Fishman LM, Wilkins AN, Rosner B. Electrophysiologically identified piriformis syndrome is successfully treated with incobotulinum toxin a and physical therapy. Muscle Nerve 2017;56:258-63.
18. Fishman LM, Zybert PA. Electrophysiologic evidence of piriformis syndrome. Arch Phys Med Rehabil 1992;73:359-64.
19. Podsiadlo D, Richardson S. The timed "Up & Go": a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc 1991;39:142-8.
20. Albert JD, Meadeb J, Guggenbuhl P, et al. High-energy extracorporeal shock-wave therapy for calcifying tendinitis of the rotator cuff: a randomised trial. J Bone Joint Surg Br 2007;89:335-41.
21. Masala S, Crusco S, Meschini A, et al. Piriformis syndrome: long-term follow-up in patients treated with percutaneous injection of anesthetic and corticosteroid under CT guidance. Cardiovasc Intervent Radiol 2012; 35:375-82.
22. Boyajian-O'Neill LA, McClain RL, Coleman MK, et al. Diagnosis and management of piriformis syndrome: an osteopathic approach. J Am Osteopath Assoc 2008; 108:657-64.
23. Speed CA. Extracorporeal shock-wave therapy in the management of chronic soft-tissue conditions. J Bone Joint Surg Br 2004;86:165-71.
24. Wang CJ, Wang FS, Yang KD, et al. Shock wave therapy induces neovascularization at the tendon-bone junction. A study in rabbits. J Orthop Res 2003;21: 984-9.
25. Ramon S, Gleitz M, Hernandez L, et al. Update on the efficacy of extracorporeal shockwave treatment for myofascial pain syndrome and fibromyalgia. Int J Surg 2015;24:201-6.
26. Speed C. A systematic review of shockwave therapies in soft tissue conditions: focusing on the evidence. Br J Sports Med 2014;48:1538-42.
27. Chen TW, Lin CW, Lee CL, et al. The efficacy of shock wave therapy in patients with knee osteoarthritis and popliteal cyamella. Kaohsiung J Med Sci 2014; 30:362-70.
28. Lin TY, Chen JT, Chen YY, et al. The efficacy of ultrasound-guided extracorporeal shockwave therapy in patients with cervical spondylosis and nuchal ligament calcification. Kaohsiung J Med Sci 2015;31: 337-43.
29. Fishman LM, Wilkins AN, Rosner B. Electrophysiologically identified piriformis syndrome is successfully treated with incobotulinum toxin a and physical therapy. Muscle Nerve 2017;56:258-63.
30. Guo P, Gao F, Zhao T, et al. Positive Effects of Extracorporeal Shock Wave Therapy on Spasticity in Poststroke Patients: A Meta-Analysis. J Stroke Cerebrovasc Dis 2017;26:2470-6.
31. Li TY, Chang CY, Chou YC, et al. Effect of Radial Shock Wave Therapy on Spasticity of the Upper Limb in Patients With Chronic Stroke: A Prospective, Randomized, Single Blind, Controlled Trial. Medicine (Baltimore) 2016;95:e3544.
32. Yoon SH, Shin MK, Choi EJ, et al. Effective Site for the Application of Extracorporeal Shock-Wave Therapy on Spasticity in Chronic Stroke: Muscle Belly or Myotendinous Junction. Ann Rehabil Med 2017;41:547-55.
33. Fleckenstein J, Friton M, Himmelreich H, et al. Effect of a Single Administration of Focused Extracorporeal Shock Wave in the Relief of Delayed-Onset Muscle Soreness: Results of a Partially Blinded Randomized Controlled Trial. Arch Phys Med Rehabil 2017;98: 923-30.
34. Kisch T, Wuerfel W, Forstmeier V, et al. Repetitive shock wave therapy improves muscular microcirculation. J Surg Res 2016;201:440-5.
35. Zissler A, Steinbacher P, Zimmermann R, et al. Extracorporeal Shock Wave Therapy Accelerates Regeneration After Acute Skeletal Muscle Injury. Am J Sports Med 2017;45:676-84.

體外震波治療於梨狀肌症候群之成效

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目的：梨狀肌症候群(piriformis syndrome)為臨床上診斷困難且治療不易突破、容易復發的疾病，體外震波治療(extracorporeal shockwave therapy)已廣泛應用於軟組織之發炎性鈣化，已被證實於足底肌膜炎、肩關節之旋轉肌鈣化有一定之療效；但目前對於慢性肌肉性病變之效應未明。本研究嘗試以體外震波治療應用於梨狀肌症候群之病人，並探討其治療效益。

方法：本研究收集符合梨狀肌症候群診斷之受試者 36 位，隨機分配為三組，分別接受為期六週之復健計畫，包括傳統復健治療（熱敷及電療）、傳統復健治療及伸展運動治療、傳統復健治療及伸展運動治療和震波治療。結果評估包括髖關節活動度（range of motion）、疼痛指數（visual analogue scale）、起身行走測試（Timed Up and Go test）及 H 反射傳導潛期（latency of H reflex），分別於治療前、治療後及追蹤三個月評估。

結果：接受伸展運動治療和震波治療的組別結果皆比傳統復健治療組別較好，其中接受伸展運動治療加上震波治療的組別有達到顯著差異（$p<0.05$），顯示體外震波治療可改善髖關節之活動角度及疼痛，於神經電學檢查及下肢功能評估上亦有顯著進步。

結論：體外震波治療於梨狀肌症候群病人能改善其疼痛並增加其功能性表現，可考慮作為臨床上治療選擇，此外，傳統復健治療合併伸展運動治療亦能有更好治療成效。（台灣復健醫誌 2018；46(1)：37 - 45）

關鍵詞： 梨狀肌症候群(piriformis syndrome)、伸展運動治療(stretch exercise therapy)、體外震波治療(extracorporeal shockwave therapy)

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