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IMMEDIATE EFFECT OF NERVE FLOSSING TECHNIQUE ON F-WAVE IN PIRIFORMIS SYNDROME

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ABSTRACT:

INTRODUCTION:

Piriformis syndrome is a neuromuscular disorder that occurs when the sciatic nerve is compressed or irritated by the piriformis muscle. This may cause pain, tingling and numbness in the buttocks and along sciatic nerve. Nerve flossing technique is a neurodynamic technique, which moves the nerve through the tissues proximally and distally to the maximum possible extend by moving every joint and body part that the nerve crosses. Standard nerve conduction studies for evaluation of the sciatic nerve includes testing the ipsilateral common fibular and tibial motor nerve conduction and minimum F-wave latencies.

METHODS:

10 Male and female subjects of age 20 to 30 were selected on the basis of inclusion criteria from Dolphin (P.G) Institute of biomedical and natural sciences, Dehradun. All subjects were assessed for piriformis syndrome.

RESULTS:

The results of the paired sample t-test showed statistically significant difference between the values of pre and post data in posterior tibial nerve when stimulated at ankle and popliteal fossa. Meanwhile, no statistically

significant difference was seen in the parameters in the common peroneal nerve when stimulated at ankle, head of fibula and popliteal fossa.

CONCLUSION:

The study depicts that the neural flossing techniques have significant effects on piriformis syndrome and it was concluded that F-waves can show significant results in prognostic evaluation of the peripheral compressive neuritis of the nerve in piriformis syndrome.

INDEX TERMS:

piriformis syndrome, F-wave, nerve flossing, posterior tibial nerve, common peroneal nerve

INTRODUCTION

Piriformis syndrome is a neuromuscular disorder that occurs when the sciatic nerve is compressed or irritated by the piriformis muscle which may cause pain, tingling and numbness in the buttocks and along sciatic nerve.[1,2] Piriformis syndrome is often a misdiagnosed cause of low back pain and sciatica secondary to sciatic nerveentrapment in piriformis muscle at greater sciatic notch.[3,4]The piriformis muscle is innervated by the branches of L5, S1, and S2 spinal nerves.[4] Sciatic nerve runs behind piriformis muscle in most people.[5]

Piriformis syndrome is myofascial dysfunction syndrome which causes pain not only because of trigger points within the muscle but also due to peripheral neuritis of the sciatic nerve. Symptoms of piriformis syndrome may be caused by referred pain from trigger points in the muscles by neural and vascular entrapment by the muscle against the greater sciatic foramen, and by sacroiliac joint dysfunction.[4,6]

There are two components, namely somatic and neuropathic. The neuropathic component refers to the compressions or irritation of sciatic nerve as its courses through the infrapiriform foramen.[7] Piriformis syndrome usually generates pain in the buttock, which may radiate to the lower leg.[8]

Nerve flossing technique is a neurodynamic technique, which is actively performed procedure by the patient. It is mechanically and physiologically beneficial treatment option which moves the nerve through the tissues proximally and distally to the maximum possible extend by moving every joint and body part that the nerve crosses.[9,10]

Diagnosis of piriformis syndrome can be made through clinical features, electromyography and nerve conduction velocity.[4,11]Standard nerve conduction studies for evaluation of the sciatic nerve includes testing the ipsilateral common fibular and tibial motor nerve conduction and minimum F-wave latencies.[12]

The purpose of this study was to identify the immediate effects of neural flossing technique on the F-wave parameters of common peroneal and posterior tibial nerve in patients with piriformis syndrome which may determine the effectiveness of neural flossing technique in piriformis syndrome.

METHODOLOGY

Sample

10 Male and female subjects of age 20 to 30 were selected on the basis of inclusion criteria from Dolphin (P.G) Institute of biomedical and natural sciences, Dehradun. All subjects were assessed for piriformis syndrome.

Inclusion Criteria[13,14,2,15]

- Low back pain aggravated on sitting
- Tenderness over piriformis muscle, SI joint, greater sciatic notch
- Positive FAIR test
- Positive Laseguesign (applied as 15-degree reduction in SLR on the affected side or less than 65 degrees as it intensifies contact between the tendinous edge of the piriformis muscle and the sciatic nerve).

Exclusion Criteria[16,13]

- Recent surgery of back, hip and knee
- Recent systematic disease
- Fractured lower limb
- History of vertebral fractures
- Diagnosed cases of PIVD

- Spondylolisthesis
- Spinal TB, rheumatic disease

Treatment Protocol

Subjects with low back pain and gluteal pain on prolonged sitting were assessed and examined with Lasegue sign and FAIR (flexion, adduction, internal rotation) test, tenderness of gluteal muscle on palpation. Subjects with positive Lasegue sign at 65 degrees and FAIR test positive and tenderness on piriformis palpation[14]were included in the study.

PROCEDURE

Subjects from the institute with low back pain, tenderness at sciatic nerve and pain with prolonged sitting were examined for positive lasegue sign, positive FAIR test.

Pre- intervention test evaluation for posterior tibial nerve was done by stimulating

- at site 1-ankle recordings were made followed by stimulation
- at site 2- popliteal fossa with the 10 supramaximal stimuli and the F-wave parameters were noted.

Pre- intervention test evaluationfor common peroneal nerve was done by stimulating with 10 supramaximal stimuli

- at site 1- ankle,
- at site 2- head of fibula,
- at site 3- popliteal fossa and the F wave parameters were recorded.

After that nerve flossing technique was actively performed with a subject sitting on a plinth. adopting the protocol of Pallipamula and singaravelan, the participants flexed the knee of the target lower extremity backwards beside the chair, as far back as possible and flexed the neck at same time, holding both the flexed knee and the neck in this position for 5 seconds. The participant in turn extended the neck and the knee of the target lower extremity, abducted and flexed the hip until pain was felt and did not push beyond that point. This extended position was equally maintained for 5 seconds. As the nerve became less sensitive, the participant increased the stretching effect by dorsiflexing the ankle and extending the toe of the foot upward toward the knee.

Fig 1.1: Showing Stimulation Sites S1,S2 and S3 for Common Peroneal Nerve

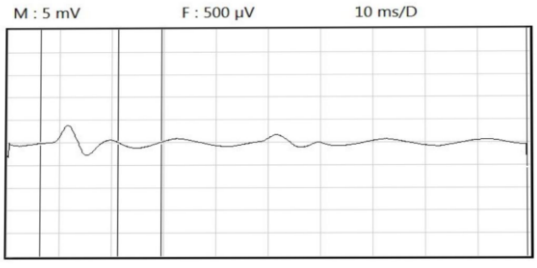
Fig 1.2: Showing Stimulation Site S1 and S2 for Posterior Tibial Nerve

RESULTS

The results of the paired sample t-test showed statistically significant difference between the values of pre and post data of M Latency (p=0.03), F MIN Latency (p=<0.01), F MAX Latency (p=0.002), F MEAN Latency (p=0.001), F-M Latency (p=<0.01) and F Velocity (p=0.001) in posterior tibial nerve when the stimulation site was at ankle. Also, the results revealed statistically significant difference between the values ofF MIN Latency (p=<0.027), F MAX Latency (p=0.032), F MEAN Latency (p=0.002), F-M Latency (p=<0.002) and F Velocity (p=0.01) in posterior tibial nerve when the stimulation site was at popliteal fossa. Meanwhile, no statistically significant difference was seen in the parameters in the common peroneal nerve at all three sites of stimulation.

	Posterior Tibial Nerve Stimulation (Site Ankle)		Posterior Tibial Nerve Stimulation (Site Popliteal Fossa)		Common Peroneal Nerve Stimulation (Site Ankle)		Common Peroneal Nerve Stimulation (Site Head of Fibula)		Common Peroneal Nerve Stimulation (Site Popliteal Fossa)	
	t-value	Sig	t-value	Sig	t-value	Sig	t-value	Sig	t-value	Sig
M Latency (ms) Pre-M Latency (ms) post	-2.565	0.030*	-2.18	0.057	-0.62	0.55	1	0.343	-2.05	0.071
F MIN-Latency Pre (ms) - F MIN-Latency Post (ms)	-5.650	<0.01*	-2.64	0.027*	-0.43	0.68	1	0.343	-2.05	0.071
F MAX-Latency Pre (ms) - F MAX-Latency Post (ms)	-4.151	0.002*	-2.53	0.032*	0.00	1	1	0.343	-2.05	0.071
F MEAN Latency Pre (ms) - F MEAN Latency Post (ms)	-4.771	0.001*	-4.49	0.002*	0.00	1	1	0.343	-2.06	0.070
F-M Latency Pre (ms) - F-M Latency Post (ms)	-5.513	<0.01*	-4.32	0.002*	0.216	0.834	1	0.343	-2.05	0.071
F Velocity Pre (m/s) - F Velocity Post (m/s)	4.829	0.001*	6.981	<0.01*	0.067	0.95	-1	0.343	2.213	0.054

Table 1.3: Paired Sample t-test results

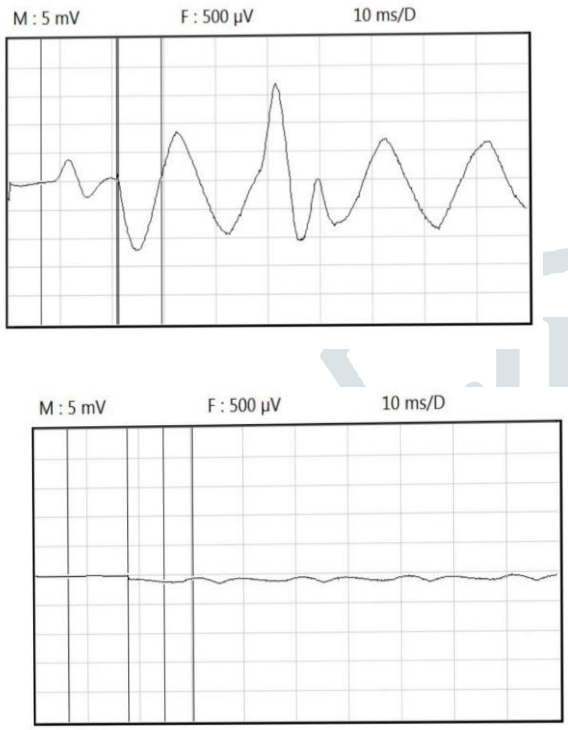


The graphical presentation below shows the pre-intervention and post-intervention F-waves for common peroneal nerve and posterior tibial nerve.

Pre-intervention

Post-intervention

Fig 1.4: Pre and Post Intervention F-Wave in Posterior Tibial Nerve Stimulation



Pre-intervention

Post-intervention

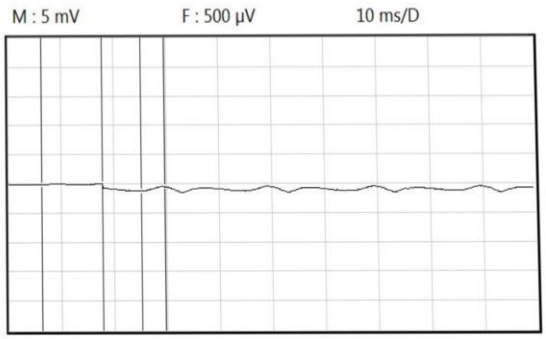


Fig 1.5: Pre and Post Intervention F-Wave in Common Peroneal Nerve Stimulation

DISCUSSION

Shacklock theory of neurodynamics shows the interconnection between nerve mechanics and physiology.[16]F-wave studies have been established as a valuable tool in clinical neurophysiology.[17]In this study attempt was made to measure the immediate effects on nerve mechanics following a technique theorized to affect the nerve physiology as measured by F-wave parameters the latency and velocity. This comes in agreement with the Charles Steiner et. al study who mentioned that the piriformis syndrome has been attributed to contracture of the muscles resulting in pressure on sciatic nerve, compression of a nerve usually results in impairment, neuritis & loss of conduction.[18,19]

Nerve conduction studies had shown delayed F-wave and H reflex and detect sciatic impingement in Piriformis Syndrome.[4,6]

Frank Weber in his study discussed the concept of F wave that is ideally suited to assess the proximal conduction.[20]In relation to it, we examined the common peroneal and tibial nerve where the F-wave latencies produced significant differences in pre and post intervention values.

On comparing the F-wave parameters, statistically significant difference between the values of pre and post data of posterior tibial nerve were observed: -

F Velocity (p=0.001) [table:1.3]

F Velocity (p=0.01) [table:1.3]

Which determined the effectiveness of sciatic nerve flossing techniques on piriformis syndrome patients through F-wave studies by stimulating distal components of nerve i.e the posterior tibial nerve and common peroneal nerve which coincides with the previous studies.[9,21]The reason behind it can be the involvement of posterior tibial nerve which is both more frequent and more severe in piriformis syndrome.[15]

Common peroneal nerve showed no statistically significant differences in the values which coincides with the study by S Kuwabara et al where peroneal F waves were not analyzed because there is relatively frequent absence of responses in normal subjects.[22] Confirmed by Frank Weber that F waves in the peroneal nerve can be infrequent and inherently variable.[20,23]

Stimulation technique used in this study was supramaximal stimulation where submaximal stimulation of distal nerves activated fewer motor axons than supramaximal stimulation and resulted in statistically significant differences in

persistence.[17]F-wave is ideally suited to assess proximal conduction supports the present study.[20]

Toyokura and Murakami in 1996 reported high sensitivity of F-minimum, F-maximum, F-difference and F-duration on affected side which supports the present study.

Present study showed that pre-test values of conduction velocity were prolonged whereas post-test conduction velocity had shortened, which is supported by Milind A. Nisargandha et al, study that showed – demyelination of a nerve results in prolongation of conduction time.[13]

CONCLUSION

The results of the present study suggest that the neural flossing techniques have significant effects on piriformis syndrome. Based on the findings it was concluded that F-waves can show significant results in prognostic evaluation of the peripheral compressive neuritis of the nerve in piriformis syndrome.

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