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Original Article

The Combined Efficacy of Sacro-Occipital Technique and Electrical Stimulation Therapy in the Treatment of Cumulative Trauma Disorders with Cervicogenic Cephalgia

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ABSTRACT

Background and Aim: Cumulative trauma disorders attributed to poor sustained posture in working or repetitive physical activity. Cervicogenic headaches are assumed to be associated with cervical dysfunction and may include facial pain. Cervicogenic Cephalgia may result from the entire body´s muscle imbalance as well as Temporo-Mandibular Joint (TMJ) disorder. **Methods:** 31 male and 39 female subjects diagnosed with CTDs with Cervicogenic Cephalgia were recruited and they were randomized into 2 groups. The study group participants underwent Sacro-Occipital Technique and Electrical Stimulation Therapy and control group underwent only the electrical stimulation therapy. Pain intensity assessment, posture and gait evaluation was done before and after intervention. **Results:** Pain intensity was reduced in the study group compared to control group and the gait and posture was improved in study group participants following intervention which was statistically significant. **Conclusion:** The symptoms of CTDs with Cervicogenic Cephalgia were improved by the Sacral–Occipital Technique (S.O.T.) and the electrical stimulation therapy that are non-phamacotherapy for normalizing neuromusculoskeletal system. So the overall effective rate is 95.0%.

Key words: Cumulative trauma disorders, Cervicogenic cephalgia, Sacro-occipital technique, Electrical stimulation therapy, Pain, Posture.

INTRODUCTION

Cumulative Trauma Disorders with Cervicogenic Cephalgia

Cumulative trauma disorders (CTDs) are injuries to the nervous and/or musculoskeletal system attributed to repetitive physical tasks, 'poor sustained posture/biomechanics, vibrations, and/or repetitive forceful exertions. It has also been called repetitive strain injury, overuse injury syndrome, cumulative movement disorder, and repetitive motion injury.[1,2] CTDs is an umbrella term that includes multiple specific diagnoses and nonspecific conditions affecting primarily the upper limbs; shoulder, neck, and lower back.[3] Among the most common CTDs are lumbar back pain, carpal Tunnel syndrome (CTS), epicondylitis, neck pain, and de Quervain's tenosynovitis.[3] Mild headaches are very common and are typically short lived and self-limiting. More severe headaches, such as migraines or cluster headaches, are debilitating and occur more frequently in some individuals. Cervicogenic headaches are assumed to be associated with cervical dysfunction and may include facial pain. Neck pain is commonly encountered in jobs requiring prolonged posturing of the neck, forceful exertions, and highly repetitive tasks with static postural loads.[4,5]

Poor neck posture has been strongly associated with occupational neck pain and appears to be the most significant factor in work-related neck disorders. Specifically, prolonged neck flexion or extension in combination with arm elevation is problematic. Other studies have found associations between forward head posture and headaches,[6] overhead arm tasks and radiating neck pain, and simultaneous head extension and arm elevation with neck/shoulder pain.[7,8]

The cervical musculature controls head movement and provides stability. Pain in the neck area can arise from overwork of the musculature, impingement of cervical nerve roots, or degenerative arthritis of the spine.[9,10] Because major neck muscles extend to the shoulder or base of the skull, shoulder pain and headache are commonly associated.[2,8] Tension neck syndrome involves persistently stiff neck muscles resulting in aching discomfort at the base of the neck, upper back, and sub-occipital region.[11,12]

The mainstay of CTD management involves ergonomic interventions to correct underlying postural and mechanical causes. In addition to

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ergonomic interventions, treatment can include physical therapy as well as various non-pharmacotherapy.[13-17]

Sacro - Occipital Technique (SOT) combined with the electrical stimulation therapy to recover muscle imbalance

SOT has been developed as one of the main technique among the Chiropractic Adjustment used to block by Major Bertrand Dejarnette in 1946 for the first time.[5]

Many researchers had divided the technique into several parts including Sacro - Occipital Technique, Cranial Technique, CMRT (Chiropractic Manipulative Reflex Technique) and Extremity Technique. Cranio-Sacral Pump and Cerebrospinal Fluid are important theory relative to Spinal Manipulation, especially SOT.[3,5,10,18]

The motion caused by the diaphragm during breathing that sometimes called the Secondary Respiratory Impulse (SRI) and Primary Respiratory Impulse (PRI) have been likened to the movements of the see, whereby the rhythm of the small waves (the PRI) exists in a larger, more dynamic framework caused by that of the tides (SRI).[19]

The sacrum at the bottom, the Spheno-Basilar Junction at top, and the spinal dura in the middle form the three components of the Craniosacral Pump.[8]

The Cranio–Sacral Pump is important as a model because it gives us a glimpse of a "big picture." The picture is so vast, in fact, that Dr. Dejarnette had to divide the technique into several parts including Sacro-Occipital Technique, Cranial Technique, CMRT and Extremity Technique.[5,9,10]

They also said that beyond the vertebral subluxation there is fundamental relationship between the pelvic and cranial structures that merely reducing spinal fixations alone was not sufficient in restoring the body to optimal well-being. So, dysfunctions involving the anterior, synovial portion of the sacroiliac joint cause an A-P fixation of the sacrum on the ilium, whereas problems involving the posterior, ligamentous portion of the joint cause a lateral separation of the ilia from the sacrum. They called these lesions Category One and Two. Category Three is a problem commonly associated with the cartilagenous portion of the lumber spine, notably the intervertebral disk.[5,9,10,20]

The distinction of SOT has 3 methods relative to symptoms and diagnosis. Due to muscle imbalance, when the muscles pull asymmetrically on the shoulder girdle, the neck muscles counteract to maintain visual and vestibular balance by altering neck and head position.[4,21,22] Additionally, the close interplay between joint restrictions and muscular Trigger Points can enhance or perpetuate dysfunction. For example, in the forward head posture, movement restrictions at the cervicocranial junction often relate to hypertonic or tight and short cervicocranial extensor and sternoclavicular muscles. The head is stabilized by muscles in the shoulder girdle, which in turn is balanced over the trunk and lower extremities. Thus dysfunction in any part of the neuromusculoarticular system is never localized; it affects the function and movement of all or part of the whole kinetic chain.[4,23]

This can also affect the muscles supporting the Temporo-Mandibular Joint (TMJ). During the day (and with gravity assisting), the asymmetric downward pull of the musculoskeletal system is offset by asymmetric compensations of the TMJ support muscles. At night however, the body is supine. Gravity is no longer a factor. The muscular forces on the TMJ are now unequal.[24,25] The resulting imbalance makes occlusion and TMJ condylar position difficult for the patient to maintain unconsciously. This is one explanation of how an ascending musculoskeletal pattern causes nocturnal bruxism. It is the body´s attempt to stabilize the asymmetrical forces affecting the mandible and airway space. Headaches with chronic neck pain (Cervicogenic Cephalgia), and crepitus may all result from compensations secondary to Category Two pelvic instability.[5,26,27]

For the treatment Cervicogenic Cephalgia due to muscle imbalance according to SOT Category system, we have studied find out the effect of the treatment combined SOT and electrical stimulation.[2,28]

MATERIALS AND METHODS

Subjects

Seventy out-patients with diagnosis of CTDs with Cervicogenic Cephalgia (Male: 31, Female: 39) who visited at Rehabilitation department of Pyongyang medical college hospital, Kim Il Sung university from March, 2012 to March, 2014. CTDs with Cervicogenic Cephalgia has the highest incidence rate in male (44.3%) and officer (55.7%) according to gender, and in the patient aged 40 to 60 years (78.6%).

Procedure

Study group underwent SOT as published elsewhere[7] and the electrical stimulation therapy. On the other hand control group underwent only the electrical stimulation therapy.

Instrument

We have used the blocking and the machine of electrical stimulation therapy. We have applied the treatment once a day or two and duration of treatment is 15 days and once a day.

Observation Indices

Pain intensity evaluation

Pain intensity evaluation of Cervicogenic Cephalgia

Pain intensity evaluation method of Cervicogenic Cephalgia was assessed by Visual analog pain scale (VAS) and the scoring is as follows:

0-100: No pain at all to severe pain

0-4: No pain

5-44: Mild pain

45-74: Moderate pain

75-100: Severe pain

Measurement method of electrical pain thresholds in cervical area

We have identified the most painful area in cervical position by palpation. After that, the measurement of electrical pain thresholds using revulsion of intercilium wave on electromyogram (EMG) was applied in this area.

The posture assessment method using biomechanical balance equipment[29]

We have applied assessed the change of biomechanical balance equipment because of cervical disorder and Cervicogenic Cephalgia associated with abnormal posture including the forward head posture. To do this, we have assessed the evaluation of post urea of the patient in standing on the equipment.

The other hand, we have measured half body weights and assessed the change rate of half body weights using the formula: both difference of half body weight/entire weight×100.

Trunk Vertical Axis Deviation Test

When a perpendicular line is dropped from the center of ear to the base in side of the patient in standing, we evaluated the change of the deviation of a perpendicular line from the center of external malleolar as cm after treatment compared with before.

Difference of Shoulder Height

We have measured and assessed the difference of height between virtually connecting line left-to-right acromion and vertical line in posterior.

Difference of Subscapular Angle Height

We have measured and assessed the difference of height between virtually connecting line left-to-right subscapular angle and transversal line in posterior.

Evaluated Method of the Change Rate of Half Body Weights

We have measured and assessed using the formula: both difference of half body weight/entire weight×100.

Gait Evaluation

We have applied the gait evaluation indicator such as walking base, length of step and number of step to evaluate imbalance of the CTDs patient with Cervicogenic Cephalgia.

Criteria for Treatment Result

Cured: Subjective and objective symptoms disappeared; remarkable improvement in the instrument examination.

Effect: Pain remains in motion but no pains while in rest with improvements in the instrument examination.

No effect: No effect in the treatment.

RESULTS AND DISCUSSION

As shown in Table 1, the changes of Pain intensity (VAS) evaluation of Cervicogenic Cephalgia have been improved significantly after treatment in study group (26.7±3.4) compared with control group (55.3±2.0).

As shown in Table 2, the changes of Electrical pain thresholds in cervical area have been improved significantly after treatment in study group (22.55 ± 1.09mv) compared with control group (31.67±1.27mv) (P<0.05).

As shown in Table 3, the changes of the posture assessment indices using biomechanical balance equipment have been improved significantly after treatment in study group compared with control group (P<0.05).

As shown in Table 4, the changes of the gait evaluation indicator such as walking base, length of step and number of step have been improved significantly after treatment in study group compared with control group (P<0.05).

As shown in Table 5, overall efficacy of 95% was significantly higher compared with control group which was 73.3% (P<0.05).

Table 1: The changes of Pain intensity evaluation.

Groups		Pain intensity (VAS)			
		5~44	45~74	75~100	$\bar{X} \pm SE$
Study group (n=40)	Before treatment	8 (20.0)	18 (45.0)	14 (35.0)	65.2±4.0
	After treatment	31 (77.5)	9 (22.5)	-	26.7±3.4
Control group (n=30)	Before treatment	6 (20.0)	14 (46.7)	10 (33.3)	66.7±1.0
	After treatment	10 (33.3)	12 (40.0)	8 (26.7)	55.3±2.0

Table 2: The changes of Electrical pain thresholds in cervical area (mV).

Groups	Electrical pain thresholds (mV)	
	Before treatment	After treatment
Study group (n=40)	35.09 ± 1.31	22.55 ± 1.09
Control group (n=30)	34.70±1.24	31.67±1.27*

*P<0.05 (compare with control group) (n=70)

Table 3: The changes of the posture assessment using biomechanical balance equipment.

Division		The changes of the changes of the posture assessment			
		Trunk vertical axis deviation (cm)	The difference of shoulder height (cm)	The difference of subscapular angle height (cm)	The change rate of half body weights (%)
Study group (n=40)	Before treatment	4.1±0.1	2.1±0.3	2.1±0.3	9.8±1.2
	After treatment	1.2±0.2	0.9±0.2	0.5±0.2	3.2±1.3
Control group (n=30)	Before treatment	4.2±0.3	2.1±0.2	2.2±0.2	10.0±1.4
	After treatment	2.6±0.2*	1.6±0.1*	1.7±0.1*	7.9±1.7

* P<0.05

* Comparison with control group (n=70)

Table 4: The changes of the gait evaluation indices $(\bar{X} \pm SE)$.

Groups		The changes of the Gait evaluation indices		
		walking base (cm)	length of step (cm)	number of step
Study group (n=40)	Before treatment	14.1±0.4	25.2±2.1	52.7±3.7
	After treatment	7.5±0.2	37.6±1.3	85.6±4.3
Control group (n=30)	Before treatment	14.8±0.3	24.3±1.3	53.5±5.1
	After treatment	11.7±0.4*	29.5±1.0*	68.3±4.0*

* P<0.05

* Comparison with control group (n=70)

Table 5: Overall score.

Division		Efficacy Rate (%)			
			Efficacy		
		No Effect	Effect	Cured	Total
Study group	40 (100.0)	2 (5.0)	12 (30.0)	26 (65.0)	38 (95.0)*
Control group	30 (100.0)	8 (26.7)	18 (60.0)	4 (13.3)	24 (73.3)

* P<0.05

* comparison with control group (n=70)

CONCLUSION

The symptoms of CTDs with Cervicogenic Cephalgia was improved by the SOT and the electrical stimulation therapy. Combination therapy of SOT and the electrical stimulation therapy increased the efficacy of treatment to 95.0%.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

ABBREVIATIONS

CTD: Cumulative Trauma Disorders; **CTS:** Carpal Tunnel Syndrome; **SOT:** Sacro - Occipital Technique; **SRI:** Secondary Respiratory Impulse; **PRI:** Primary Respiratory Impulse; **TMJ:** Temporo Mandibular Joint; **VAS:** Visual Analog Pain scale.

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