

## Misdiagnosis in Patients with Cervicogenic Headache: The Case Reports of Three Adults

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### Abstract

**Introduction:** Cervicogenic headache is known to be the most controversial type of headache, because its diagnosis is difficult and usually associated with errors. The signs and symptoms of this headache confuse therapists and cause misdiagnosis; definitive diagnostic criteria and physical tests should be used to accurately diagnose cervicogenic headaches. The current study investigated patients suffering from headaches, then reassessed them using a new diagnosis protocol, and finally provided them with physiotherapy using clinical reasoning strategies. **Materials and Methods:** In this study, three patients who had suffered headaches and tolerated inappropriate treatment due to misdiagnosis were evaluated using diagnostic criteria and physical examination based on the International Headache Society (IHS) criteria. Cervicogenic headache was diagnosed, and accordingly, physiotherapy with a multi-modal intervention approach based on clinical reasoning was administered. The outcome of treatment was assessed using the headache index questionnaire. **Conclusion:** Subjects who had suffered, on average, 15 years of chronic, medicine resistance headaches were evaluated. Cervicogenic headache was diagnosed in each of them and physiotherapy was begun. An average improvement rate of 74% was achieved based on the headache index formula. It can be concluded that the use of physical tests in addition to diagnostic criteria will decrease the rate of misdiagnosed cervicogenic headache, and physiotherapy can be the appropriate treatment.

**Keywords:** Cervicogenic headache, Physiotherapy, Misdiagnosis, Multimodal interventions

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### Introduction

Headaches are the most prevalent neurological complaint experienced by most people at least once in their lifetimes (1). The prevalence of headache varies from one community to another. Studies have reported an estimated 50% prevalence rate (2), with cervicogenic headaches comprising 0.4% to 4.1% of the incidence rate (3). This difference can be attributed to different diagnostic methods. One prevalence study reported the incidence of such headaches in clinics to range from 0.4% to 80% and explained this finding as the inability to accurately diagnose such headaches (3).

As defined by the IHS, cervicogenic headache is a secondary headache that results from damage to bone, muscle, or soft tissue areas of the neck. This headache is usually accompanied by pain in the neck region. Thus, cervicogenic headaches have several origins and cause various signs and symptoms which can be similar to those of other headache types (4). Thus, diagnosis becomes difficult.

Pfaffenrath *et al.* reported the error rate in diagnosing cervicogenic headache to be 50% due to overlapping signs and symptoms (5). Sjaastad called cervicogenic headache the most controversial type of headache because of the difficulty in diagnosing it (6). According to Sjaastad, this type of headache is largely mistaken for migraine because of the similarity in their signs and symptoms (6). Therefore, diagnosing cervicogenic headache requires a more precise tool than mere signs and symptoms (7).

The IHS has identified diagnosis criteria for this type of headache as the onset of pain behind the head and neck, stiffness and limitation of neck movement, pain provocation with neck movements, and radiation of pain to the ipsilateral shoulder and arm (IHS ICHD 3 beta, 2013). Bono *et al.* (1998) examined the validity of the diagnostic criteria. Their results revealed that most people with migraine headache also had 75% of the diagnostic criteria for cervicogenic headache (Bono, Antonaci, *et al.*, 1998). This finding suggests that the use of these criteria alone can result in up to 75% error in diagnosis.

Therefore, the use of physical tests alongside these criteria can be useful. Ochoa *et al.* investigated valid physical tests for cervicogenic headache in a systematic review. Flexion-rotation, craniocervical flexion, and passive accessory intervertebral movement tests were found to have 100% sensitivity and 94% specificity combined (8). Similarly, mastoid pressure pain and sternocleidomastoid pressure pain tests had a kappa score of over 0.80 (9).

The purpose of the current study is to report three patients who suffered from headaches for several years and were treated inappropriately due to misdiagnosis. In this study, they were evaluated by the criteria and physical tests mentioned, and after obtaining a diagnosis of cervicogenic headache, they were treated with the appropriate physiotherapy. The headache index and the formula given below were used to assess the rate of improvement.

$H_i = \text{frequency} + \text{intensity} + \text{duration}$

$\text{Improvement} = 1 - (H_i \text{ post} \div H_i \text{ pre})$

## Case Reports

### Case 1:

This 52-year-old woman suffered from headaches for 20 years. In recent years, she had visited a neurologist three times. The symptoms were pain in the occipital region that radiated to the frontotemporal area of her head and was bilateral. After MRI and electroencephalography, she was given a diagnosis of migraine headache and prescribed Depakine and simple NSAIDs. She refused to take Depakine and used only simple sedatives for pain relief. The frequency of her headache was 28 days per month, the intensity of the pain on the modified visual analog scale (VAS) 25 chart was 25, and the duration of the headache was about 24 hours. The patient signed the consent form and was enrolled in the study.

**Clinical findings:** All diagnostic criteria were present in the patient, and all physical tests were positive for her. Another peer evaluated these test results and achieved similar findings. Therefore, cervicogenic headache was diagnosed for her. According to the evaluations, the cause of her headache was C1-C2 hypomobility with trigger points in the sternocleidomastoid (SCM), sub-occipital, upper trapezius, and levator-scapula muscles.

**Therapeutic intervention:** The patient underwent 10 sessions of physiotherapy. In these treatment sessions, along with the use of the transcutaneous electrical nerve stimulation (TENS), other techniques such as muscle energy techniques (MET) mobilization, myofascial release (MFR), positional release, and exercise therapy were also used to manage the identified disorders and reduce the activity of trigger points in the mentioned muscles.

**Outcomes:** After 10 treatment sessions, another peer measured the headache index again. The frequency of headaches had decreased from 28 to 12 days per month, intensity had decreased from 25 to 13, and the duration of each attack was 3 to 5 hours. In total, the

headache index before treatment was 78 and decreased after treatment to 30. The rate of recovery was 62%; at the 2-week follow up, the same result was reported.

### Case 2:

This case was a 38-year-old woman who had suffered from chronic headaches for six years. She had been evaluated seven times by neurologists and ENT specialists and diagnosed with migraine. Depakine, magnesium tabs, and simple NSAIDs were prescribed for her, and two corticosteroid injections were given in the patient's temporomandibular joint. The patient's headache frequency was 12 days a month, intensity was 16 out of 25, and duration was 24 to 48 hours without medication. The patient's main complaint was pain in the forehead and eyes. She signed the consent form and enrolled in the study.

**Clinical findings:** All diagnostic criteria were present in the patient, but the pain did not spread to her shoulders or arms. All of her physical tests were positive. Therefore, cervicogenic headache was diagnosed. After evaluation, the cause of the headache was determined to be myofascial trigger points in the SCM and sub-occipital muscles.

**Therapeutic intervention:** The subject underwent 10 sessions of physiotherapy. During these sessions, attempts were made to eliminate the joint hypomobility and reduce the activity of the trigger points in the muscles. For this purpose, MET, mobilization, MFR, positional release techniques, exercise therapy, and TENS modality were used.

**Outcomes:** After ten treatment sessions, the patient's headache frequency was reduced to 1 day per month, intensity decreased to 2 out of 25, and duration decreased from 48 hours to 5 hours without medication. The headache index values before and after the interventions were 76 and 8, respectively. The rate of improvement was 90% and at the 2-week follow up, the same result was reported.

### Case 3:

This case was a 43-year-old woman who had suffered from chronic headaches for more than 20 years. She had visited a neurologist ten times and was diagnosed with migraine. Her treatments included sodium valproate, simple NSAIDs, and exercise therapy. The frequency of her headaches was 12 days per month, the intensity was 25 out of 25, and the duration of the headache was 3 to 5 hours. The patient's main complaint was pain in the temporal area and top of the head. The pain spread from the back to the front of her head. The patient signed the consent form and enrolled in the study.

**Clinical findings:** All diagnostic criteria were present, and all physical tests were positive. Another peer once again performed the tests, and the results were quite similar. According to evaluations, atlanto-occipital hypomobility and trigger points in the sub-occipital, SCM, and master muscles were determined to be the cause of the headache. Furthermore, there seemed to be a greater occipital nerve entrapment, and the patient's slump test was positive.

**Therapeutic intervention:** The patient underwent ten sessions of physiotherapy with MET, mobilization, MFR, ischemic compression, neuromobilization of the occipital nerve, and exercise therapy.

**Outcomes:** Upon completion of the ten treatment sessions, the frequency of headaches decreased from 12 days to 4 days in a month, intensity decreased from 25 to 7, and duration decreased from 3-5 hours before treatment to 1-2 hours without medication. Therefore, the headache index values before and after treatment were 42 and 13, respectively. The improvement rate was 70% and at the 2-week follow up, the same result was reported.

## Discussion:

Cervicogenic headaches can have various causes. One of the main mechanisms for the development of this type of headache is the interference of the sensory signals of the trigeminal nerve with the sensory messages of the first three cervical nerve roots in the trigeminal nerve nucleus (1). Unlike others such as migraine or cluster headaches, cervicogenic headaches are caused by physical disorders. Therefore, physical interventions should be considered for treatment. Perhaps the reason that many articles have considered drug treatment for this type of headache with temporary or no effect is the same point (10). Physiotherapy graduates as therapists who have full knowledge of the anatomy and biomechanics of the human body, the use of effective physical modalities, and the use of advanced manual techniques can play a significant role in the diagnosis and treatment of this type of headache.

The main result of this study was the reduction in the headache index from 65 to 17 and the approximately 74% average improvement despite the fact that the patients had suffered headaches for, on average, over 15 years and through 6 visits to neurologists. Perhaps the reason for their treatment failure before their involvement in this study was a lack of proper diagnosis of headache type.

In this study, all patients were diagnosed with cervicogenic headache despite having previous diagnoses of migraine headache. Recognizing cervicogenic headache is always a difficult task and requires a reliable and valid tool. Using a combination of diagnostic criteria and physical tests is recommended for correctly diagnosing this type of headache. There are several therapeutic methods as well as different diagnostic methods for this headache. All individuals in this study underwent physiotherapy. This study differs with other similar studies in that physiotherapy with a multimodal intervention approach based on clinical reasoning was used.

As previously mentioned, the causes of cervicogenic headache are varied, and each one needs specific treatment (4). In this study, two of the volunteers had C1-C2 hypomobility and one suffered atlanto-axial joint hypomobility. The TENS is a physical modality used with a high frequency (100 Hz) mode. One of its mechanisms in pain relief is applying a pain gate mechanism (Val Robertson,

2006). MET were used to treat joint hypomobility in the upper cervical region with the aim of increasing the range of movement and elongation of the tissue through the inhibition of neurons' alpha-motor and mobilization intended to change the position of the vertebrae and increase the range of movement. To treat muscle impairment, the MFR and positional release methods were used to treat the volunteers. Physiotherapy is one of the main treatment options for patients with cervicogenic headache, but more evidence is needed (11).

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## Authors' contributions:

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

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