Concussion Clinical Pathway: Headache and Cervical Assessment Framework

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ABSTRACT

The prevalence of sport specialization is a common concern in contemporary youth sports and has been linked to potential negative physical and psychological effects for developing athletes. While the evidence regarding negative physical effects, such as overuse injury, are consistent in the literature, the psychosocial outcomes are unclear due to the lack of published studies on the topic. Specialization is thought to lead to added stress, which may affect an athlete's mental health, whereas athletes who sample multiple sports are believed to have a healthier psychosocial experience. Burnout is characterized as physical and emotional exhaustion, sport devaluation and a reduced sense of accomplishment in athletics. This guiding review evaluates the evidence regarding burnout levels between specializers and samplers. Two of the articles included in the review directly assessed burnout in samplers vs specializers and noted inconsistencies in higher burnout rates. The six other articles studied burnout only in specializers by indirectly assessing burnout through perfectionism, fear of failure, motivation, and drop out. The comparisons of these variables illustrated heightened burnout in athletes who specialize. The results from these studies provide moderate evidence for recommendations that athletes should delay specializing in one sport.

Content Focus: Health Care Competency

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Full Citation
Hattrup N, Pfeifer N, Valovich McLeod T. Concussion clinical pathway: headache and cervical assessment framework. *Clin Pract Athl Train.* 2023;6(1): 73-79. https://doi.org/10.31622/2023/0006.01.11.

Background

The emphasis on the identification of vestibular-oculomotor dysfunction following concussion has brought attention to impairments associated with headache disorders and the cervical spine. Utilizing a classification-based approach for headaches can help to identify impairments associated with a patient's headache.[4] Furthermore, encouraging the importance of impairments for headache disorders following concussion may help to adopt organized treatment approaches. A previous study identified athletic trainers who perceived a greater importance in identifying cervical impairments were more likely to use an intervention targeted the cervical spine following a concussion.[1] The reassessment of the cervical spine to ultimately treat concussive symptoms is needed due to the potential presence of cervical impairments with symptoms of headaches and dizziness. Creating a systematic approach to the assessment of headache disorders while acknowledging regional influences such as the cervical spine may help clinicians in implementing headache assessments. The purpose of this article is to describe the various differentials for headache disorders following a concussion, as well as the contributions of the cervical spine to headache and dizziness symptoms.

Clinical Assessment

When examining the cervical spine for possible symptom generators, various neurological and orthopedic impairments can generate headache and dizziness symptoms. The following sections will discuss headache and migraine disorders defined by the Internal Classification of Headache Disorders as well as regional dysfunctions of the cervical spine (i.e., cervical facet pain and cervicogenic dizziness).[4]

Headache and Migraine Disorders

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The International Classification of Headache Disorders (ICHD) has developed criteria for the assessment of primary and secondary headaches,[4] with secondary headaches caused by a co-presenting disorder.[4] An example of a secondary headache disorder, is a post-traumatic headache which occurs in close temporal relation to the site of trauma or injury.[4] Various presentations of post-traumatic headache can occur, including cervicogenic headache, tension-type headache, headache attributed to cervical myofascial pain, occipital neuralgia, cluster headache, headache attributed to temporomandibular disorder, headache attributed to eye disorders, medication overuse headache and migraines (Table 1).

Classification of Headaches

In patients with cervicogenic headache, the symptoms present unilateral with symptom location wrapping from the base of the skull around the ear to the lateral eye (i.e., ram's horn sign).[4] The clinical assessment of this pathology follows a local assessment to the cervical spine, with the addition of a cervical flexion rotation test as it is shown to have high discriminatory ability to identify cervicogenic headache.[3]

Tension-type headaches usually present bilaterally with patient descriptors of "pressing" or "tightening" with non-pulsating quality.[4] Of importance, the absence of nausea and vomiting is important as if these symptoms are present, it may indicate migraine like symptoms.[4] When utilizing pharmacological intervention, the use of ibuprofen early on either alone or in conjunction with acetaminophen has shown better outcomes than the use of acetaminophen alone for tension headaches.[7]

Regarding headaches attributed to cervical myofascial pain, the headaches often start in relationship to the onset of cervical myofascial pain and pressure on the involved cervical muscles may increase the headache intensity. [4]

In patients with occipital neuralgia, the presentation can be unilateral or bilateral within the sensory distribution of the greater, lesser and/or third occipital nerves.[4] Patients will describe recurring paroxysmal attacks lasting for a few seconds, severe in intensity, and shooting, stabbing, or sharp in quality.[4] Additionally, tenderness over the affected occipital nerve branches and/or trigger points at the emergence of the greater occipital nerve should be present. [4]

While uncommon, there has been anecdotal cases of cluster headaches following traumatic head injury which is described as a unilateral headache presenting over the orbits and supraorbital region lasting from 15-180 minutes. [4] An important distinction of this headache is the presentation of ipsilateral cranial autonomic for example forehead and facial sweating. [4]

With headaches attributed to temporomandibular disorder, the headache presents in relationship to a temporomandibular disorder and is aggravated by active and passive movement of the jaw along with the palpation of muscles associated with mastication [4] Typically, the headache is most prominent in the temporal regions, preauricular areas of the face, and/or masseter muscles.[4] When patient's present with temporomandibular disorders assessment of the atlantooccipital and atlantoaxial joint should be performed, previous research has identified co-morbid impairments within the upper cervical spine in temporomandibular disorders with headaches.[8]

Headaches can often be accompanied with visual deficits or decreased oculomotor function. With headaches attributed to eye disorders, the patient may complain of either blurred vision, diplopia, or difficulty switching from near to far focus.[4] This headache will be aggravated by sustained visual tasks and improve with the

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cessation of the visual task.[4] These types of headaches are best resolved with treatment and improvement of the visual impairment whether it be refractive error, oculomotor phoria, or other oculomotor impairments indicating the need for optometric assessment.[4]

Patients that have been taking over the counter medication for an extended period following their injury and continue to present with a headache may present with medication over-use headache. Patients with medication-overuse headaches typically present with a headache occurring greater than or equal to 15 days/month with a pre-existing headache disorder and regular overuse of analgesic medication for greater than 3 months. [4]

Migraine

It is important for providers who treat patients following concussion to realize a subset of patients may present with a headache with migraine like symptoms.[9] A main difference in the assessment and treatment of migraines is with migraines the focus is on reducing the frequency of migraine episodes through the identification and avoidance of personal and environmental triggers. The clinical criteria for migraine with and without aura (i.e., sensory disturbances) can be found in Table 1. In recent years, cervical afferents within migraine disorders have been identified as an important regional impairment.[10] At this time there is no gold standard clinical approach to the physical assessment of cervical impairments in migraine disorders, therefore a comprehensive cervical spine assessment should be performed.[10] Treatments which have shown promise for the reduction of migraine symptoms and episodes span from the use of medications, dry needling, botulinum toxin injections, and lifestyle modifications (i.e., diet and fitness).

Regional Influences

Pain from the cervical facet joints has been shown to radiate into the upper thoracic spine as well as the posterior skull. Specifically, C2-C4 can generate pain in and around the occiput, temporalis, and trapezius regions. Currently when examining the facet joints, the extension rotation test and unilateral posterior to anterior mobilizations eliciting the patient's symptoms (i.e., concordant sign) have shown the most clinical utility to identify cervical facet dysfunction.[5] If patients present with pain stemming from the cervical facet joint, joint mobilization and/or manipulation of the cervical spine as well as targeted treatment to the tonic (i.e., spastic) musculature has shown promise.[3]

When examining the upper cervical spine, an important dysfunction to consider is cervicogenic dizziness since it may present alone or in conjunction with vestibular dysfunction. For cervicogenic dizziness the cause of dizziness stems from impairment of the upper cervical structures which can influence both the oculomotor and vestibular systems causing generalized dizziness. The assessment of cervicogenic dizziness should utilize a multi-clinical test framework. The use of the head neck differentiation test can indicate the presence of possible cervical involvement, while the use of the cervical neck torsion test and smooth pursuit neck torsion test can assess the influence of the upper cervical afferent system on oculomotor control.[6] Further, the use of the cervical joint position error test can determine sensorimotor impairment.[6] When creating a treatment plan for a patient with cervicogenic dizziness, joint mobilization and manipulation targeted to the upper cervical, soft tissue mobilization, and/or dry needling have shown promise.[3] Active exercises to reestablish kinesthetic sense should be prescribed in conjunction with passive interventions, furthermore oculomotor/head-shake exercise has shown promise for treating cervicogenic dizziness.[3]

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Table 1. Characteristics of Migraines and Headaches

	Aura	Site	Characteristics	Aggravating Factors	Nausea or Vomiting	Photo or Phono - phobia	Autonomic Features
Migraine	Possible	Unilateral	Pulsatile	Movement	Yes	Yes	Yes, subtle
Tension	No	Bilateral: Band Like	Pressure, Tightening Sensations	Movement	No	No	No
Cervicogenic	No	Unilateral: Occipital to Orbital Region	Tightening, Burning Sensations	Head Movement	No	No	No
Medication Overuse	No	Diffuse (Non-Specific)	Pressing, Tightening, Pulsating Pain	No	No	No	No
Cluster	No	Unilateral: Orbital, Supra-orbital, Temporal Regions	Stabbing Pain	No	Maybe	Maybe	Yes
Occipital Neuralgia	No	Unilateral/Bilateral: Greater, Lesser, Third Occipital Nerve Regions	Shooting, Stabbing, Sharp Pain	Palpation	No	No	No
Headache attributed to Temporomandibular Disorder	No	Unilateral/Bilateral: Temporal, Pre-auricular, or Masseter Regions	Variable	Jaw Movement	No	No	No
Headache attributed to Eye Disorder	No	Unilateral/Bilateral: Orbital and Frontal Regions	Variable	Visual & Oculomotor Tasks	No	No	No
Headache attributed to Cervical Myofascial Pain	No	Unilateral/Bilateral: Pain Referral Regions from Neck and/or Face Musculature	Variable	Referred Pain from Muscle Palpations	No	No	No

Sinister Pathology

While the focus of this article is on the post-acute identification of headache disorders, and the contribution of the cervical spine to headaches and dizziness, readers should understand severe pathology such as

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fractures, vascular and ligament injuries as potential differentials. The Canadian C-Spine rules and International Federation of Orthopedic Manipulative Physical Therapists Vascular Framework are useful resources for the assessment of severe osseous and vascular pathologies.[2,3] Without a gold standard clinical test for upper cervical spine integrity,[3] if upper cervical spine instability is suspected, flexion, extension and odontoid x-ray views should be ordered to rule out serious pathology to the ligament structures.

Outline of Evaluation

While the above information provides a broad overview of headache disorders, a simple streamlined evaluation can differentiate headache disorders (Figure 1). The post-acute clinical assessment of a patient with a headache following a concussion should consider the mechanism of injury and comorbid symptoms. If the mechanism were traumatic, but the patient has full range of motion of the neck they would be considered low risk for cervical fracture based on the Canadian C-Spine rules and a further cervical assessment should continue. Next, determining if the patient has any possible signs (e.g., changes in blood pressure, carotid artery auscultation differences) and symptoms (e.g., ataxia, weakness, dysphasia, dysarthria, and aphasia) necessitating further examination for vascular pathology is important.[2] If it is determined the patient is at a low risk for vascular pathology, the next consideration is upper cervical instability. While the use of Sharp-Purser and Transverse Ligament selective tissue tests may be sensitive for upper cervical instability, they should be interpreted with caution due to low clinical utility in ruling out pathology.[3] Lastly, an upper quarter and lower quarter screen could be performed to assess reflexes, myotomes, and dermatomes.

Further assessment should be informed by the patient's clinical presentation. Understanding if the headache is unilateral versus bilateral would help to differentiate tension-type headache versus other headache disorders. Additional key history information of prolonged analgesic use for headaches, worsening symptoms with oculomotor tasks which resolve after activity, and sharp intense headaches over the orbit and forehead area with facial sweating may suggest other headache disorders.

The patient should be seated at the start the evaluation to complete range of motion and if dizziness is present, the assessment could include the head-neck differentiation test, cervical neck torsion test, smooth pursuit neck torsion test, and/or joint position error assessment before further manual physical examination is completed to decrease patient irritability. Lastly, if the patient describes the headache in the area where a cervical facet joint can generate pain in the lower occiput and temporal regions, the extension rotation assessment could be performed in the same position.

Once these assessments are performed, palpation of the greater and lesser occipital nerves along with the sub-occipital and trapezius muscles in sitting can be completed. Following this the patient can be placed in supine where the clinician can assess cranial cervical flexion and perform the cervical flexion rotation test for cervicogenic headache. In this position palpation of the orofacial muscles (i.e., temporalis, masseter, and pterygoid) are recommended to be performed. The patient can then be placed in a prone position where unilateral posterior to anterior mobilizations can be performed if further assessment for cervical facet and migraine is warranted.

While the above examination is inclusive of the various headache and migraine disorders discussed, clinical expertise and judgement should be used to determine which assessments should be performed and which differentials should be considered. The data obtained from the patient's history should help with planning for the physical examination as well as the specific order and priority for testing. Decreasing the potential

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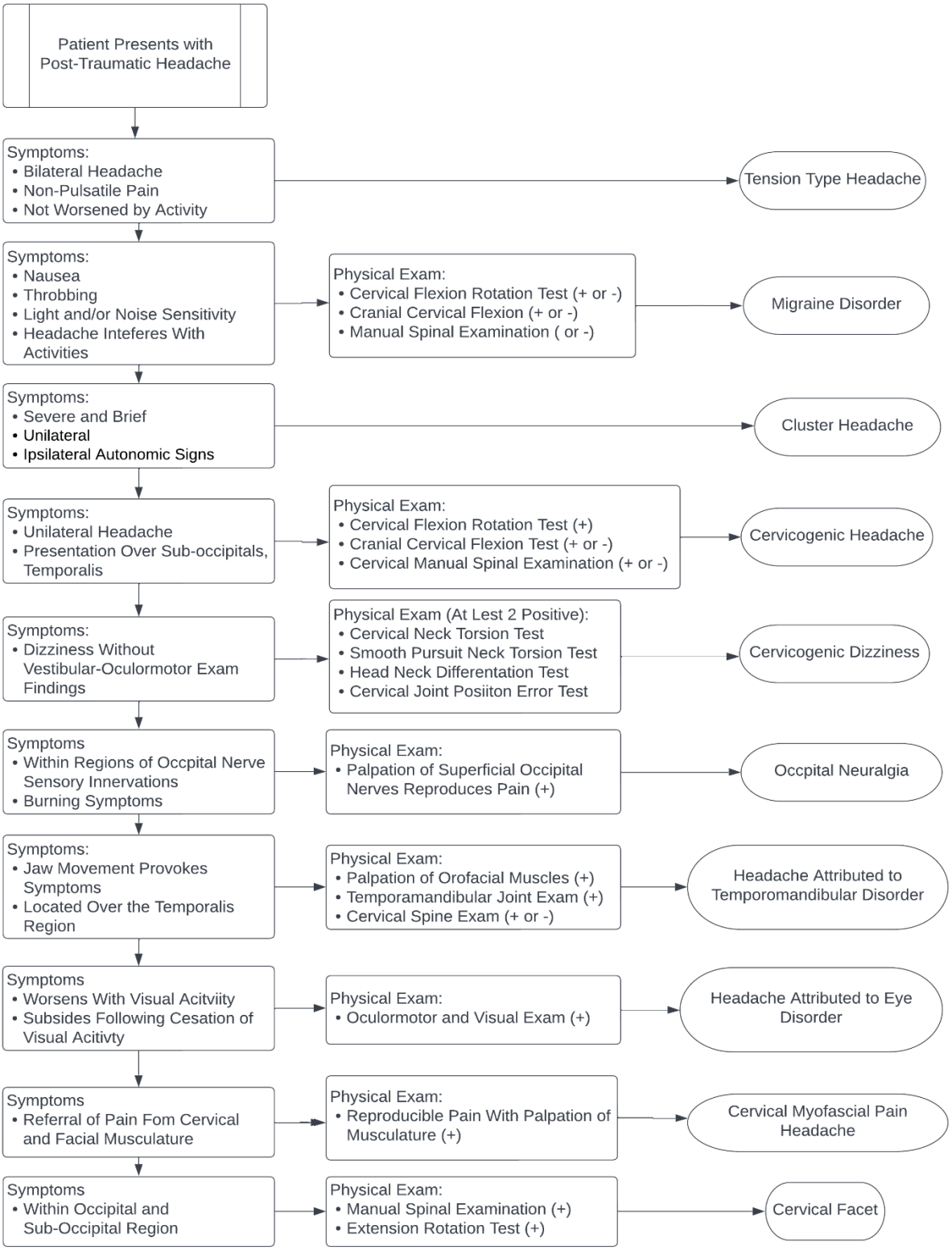
Figure 1. Evaluation Flow Chart



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for patient irritability when performing a physical examination is important to reduce the confounding results throughout the physical examination.

Lastly, various outcome measures can be utilized to gauge patient disability, treatment effectiveness, and monitor patient progress.[11] Interventions for post-traumatic headache are diverse consisting of cognitive behavioral therapy, massage, non-steroidal and steroidal medications, aerobic and therapeutic exercise, as well as manual therapy and dry needling based on the impairments. For patients with persistent headache or migraine symptoms a multidisciplinary approach may be warranted.

Conclusion

Like other pathways for concussion assessment, further assessment of headaches can allow for more targeted treatment. The use of an appropriate history and physical examination with consideration of differentials may help to improve outcomes, especially in the presence of headache disorders and cervical impairments.

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