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The cervical spine in tension type headache

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ABSTRACT

Introduction: The concept that headaches may originate in the cervical spine has been discussed over decades and is still a matter of debate. The cervical spine has been traditionally linked to cervicogenic headache; however, current evidence supports the presence of cervical musculoskeletal dysfunctions also in tension-type headache.
Purpose: This position paper discusses the most updated clinical and evidence-based data about the cervical spine in tension-type headache.
Implications: Subjects with tension-type headache exhibit concomitant neck pain, cervical spine sensitivity, forward head posture, limited cervical range of motion, positive flexion-rotation test and also cervical motor control disturbances. In addition, the referred pain elicited by manual examination of the upper cervical joints and muscle trigger points reproduces the pain pattern in tension-type headache. Current data supports that the cervical spine can be also involved in tension-type headache, and not just in cervicogenic headache. Several physical therapies including upper cervical spine mobilization or manipulation, soft tissue interventions (including dry needling) and exercises targeting the cervical spine are proposed for managing tension-type headache; however, the effectiveness of these interventions depends on a proper clinical reasoning since not all will be equally effective for all individuals with tension-type headache. Based on current evidence, we propose to use the terms cervical "component" and cervical "source" when discussing about headache. In such a scenario, in cervicogenic headache the neck can be the cause (source) of the headache whereas in tension-type headache the neck will have a component on the pain pattern, but it will be not the cause since it is a primary headache.

1. Introduction

Tension type headache (TTH) is a primary headache with considerable society burden (Dowson, 2015). It is characterized by a bilateral headache pattern, of pressing or tightening in quality and of mild to moderate intensity, and can last minutes to days. The headache does not worsen with routine physical activity and is not associated with nausea, but photophobia or phonophobia may be present in some individuals, particularly those with a high frequency of headaches (Headache Classification Committee of the International Headache Society, 2018). A recent review has reported that the pooled estimated prevalence of TTH in the general population is 26% (95%CI 22.7–29.5) (Stovner et al., 2022); however, almost 90% of adults can experience this type of headache at some time during their life (Schramm et al., 2013). In a recent Global Burden of Disease Study, TTH was found to be the second most prevalent disorder in the world (Feigin et al., 2016). The cost of all forms of headaches in Europe in 2010 was estimated to be €13.8 billion; most were associated with migraine or TTH (Raggi and Leonardi, 2015). Nevertheless, TTH is a neglected primary headache, potentially because the mechanisms are not completely understood (Jensen, 2018).

The hypothesis that multiple forms of headaches may originate in the cervical spine has been discussed over decades, and it is still a matter of debate. The neuro-anatomical basis linking the cervical spine with headaches is the trigemino-cervical nucleus caudalis (Bogduk, 2001). In this nucleus, nociceptive afferents from the upper cervical spinal nerves (C1-C3 segments) converge onto second-order neurons that also receive afferents from the first division of the trigeminal nerve, via the trigeminal spinal tract (Bogduk and Govind, 2009). The trigemino-cervical nucleus caudalis allows interchange of inputs between the upper cervical segments and the first (ophthalmic) branch of the trigeminal nerve providing the anatomical substrate for referred pain to the head from a cervical source. The trigemino-cervical nucleus caudalis would theoretically support that every structure innervated by the upper cervical spine and the trigeminal nerve can potentially elicit referred pain to the

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head and, accordingly, may be implicated in the genesis of headache (Bolton et al., 2005).

Tension type headache is considered a primary headache (meaning that no underlying medical cause is identified), whereas cervicogenic headache (CeH) is considered a secondary headache (associated to an identifiable lesion of the cervical spine) (Headache Classification Committee of the International Headache Society, 2018). Accordingly, most associations involving the cervical spine and headaches has been primarily focused on CeH. Increasing evidence has revealed that musculoskeletal disorders of the cervical spine are also present in subjects with migraine and TTH. In fact, a meta-analysis by Liang et al. (2019) concluded that subjects with TTH exhibited greater forward head posture and less cervical range of motion than headache-free controls. Similarly, Szikszay et al. (2019) identified that restricted cervical range of motion, a positive cervical flexion-rotation test, and forward head posture were able to differentiate subjects with migraine from healthy controls. Different clinical findings including manual joint palpation, trigger point examination, the cranio-cervical flexion test, testing of the shoulder girdle muscles, passive physiological intervertebral examination of the upper cervical spine, reproduction/resolution of headache, screening of the thoracic spine, and combined movement tests were identified in a Delphi study as clinically useful for examining patients with headaches (Luedtke et al., 2016b). Nonetheless, it is worth recognizing that the presence of these musculoskeletal impairments does not mean that the cervical spine is the cause of the pain in a particular headache, since the relevance of these impairments in the evolution and the severity of the headache should be evaluated (Jull and Hall, 2018).

The current position paper discusses the most pertinent data regarding the relevance of the cervical spine in people with TTH. The paper outlines plausible mechanisms associated with TTH, concurrent clinical findings, and appropriate management processes.

2. Neck pain and cervical spine sensitivity as epiphenomenon of headaches

Neck pain is a frequent complaint experienced by individuals with migraine and TTH, with nearly 88.4% in patients with TTH (Ashina et al., 2015), and there appears to be a correlation with the frequency of headaches. A meta-analysis observed a pooled frequency of neck pain up to 77% in patients with migraine (Al-Khazali et al., 2022); however, the number of studies investigating the prevalence of concomitant neck pain in TTH is scarce.

The presence of self-reported neck pain in patients with migraine has been associated with a worse clinical presentation of migraine, particularly cutaneous allodynia (Bragatto et al., 2019). Notably, the presence of neck pain has been shown to not be associated with the presence of aura, a symptom associated with a higher sensitization of the trigemino-vascular system (Carvalho et al., 2021). To our knowledge, no studies have investigated if the presence of neck pain is associated with higher related-disability or burden in individuals with TTH. Based on available data, the presence of neck pain can be considered a primary phenomenon not related to headache or could be also an epiphenomenon (a secondary effect) due to the sensitization of the trigemino-cervical nucleus caudalis. Liang et al. (2021) observed that the presence of neck pain in patients with migraine was not always associated with the presence of musculoskeletal dysfunctions in the cervical spine, supporting that neck pain could be an epiphenomenon of migraine. We do not currently know if the same secondary findings would be observed in TTH. It is possible that the presence of neck pain symptoms in individuals with TTH would be more relevant than in other headaches due to the relevance of referred pain from the neck-shoulder musculature in TTH (next sections).

Another common finding in TTH, but also in migraine, is the presence of pressure pain hyperalgesia in the cervical spine. Patients with TTH have exhibited lower pressure pain thresholds in the cervical spine (MD -88.17 kPa, 95%CI -108.43 to −67.92) as compared with a headache-free control group (Fernández-de-las-Peñas et al., 2021). Similarly, subjects with TTH, either with episodic or chronic form, exhibit higher total tenderness scores (based on sensitivity to manual palpation of neck and head structures) than headache-free controls (Castien et al., 2021). Interestingly, the presence of concomitant neck pain was associated with higher total tenderness scores in individuals with chronic TTH, but to a lesser extent in those with episodic TTH (Ashina et al., 2022).

Current data suggest that cervical spine sensitivity also has its substrate in the presence of sensitization of the trigemino-cervical nucleus caudalis. In fact, a longitudinal cohort study found that hypersensitivity is a consequence, not a risk marker, of TTH (Buchgreitz et al., 2008). This hypothesis is further supported by the fact that no association is found between sensitivity to pressure pain with clinical features such as pain intensity or related-disability (Hübscher et al., 2013). It is possible that neck pain or cervical spine hypersensitivity can be considered sensitization-associated phenomena seen in individuals with primary headaches such as TTH.

3. Forward head posture

Head posture is a common examination used by physical therapists in clinical practice; however, its relevance to specific musculoskeletal disorders is still a matter of debate. Fernández-de-las-Peñas et al. (2006) found that patients with chronic TTH showed a forward head posture, as expressed by a smaller cranio-vertebral angle, as compared to headache-free controls. The presence of a forward head posture can be a promoting factor for pain or could also be considered an antalgic adaptative posture for avoiding pain. In fact, changes in head posture were found to be not directly associated with changes in headache clinical parameters, suggesting that the relevance of head posture in TTH could be small (Fernández-de-las-Peñas et al., 2007a). It seems that the presence of a forward head posture may be a common finding (supported by moderate to strong evidence) observed in individuals with chronic primary headache (Elizagaray-Garcia et al., 2020).

4. Cervical range of motion

Restricted cervical range of motion is proposed as one of the main features and is considered a clinical diagnostic criterion for CeH (Headache Classification Committee of the International Headache Society, 2018). Previous work has suggested that restriction of cervical range of motion is an inconsistent finding in primary headaches (e.g., TTH or migraine) although individuals with CeH exhibited a clear limitation (Zito et al., 2006). More recent reviews have found that restricted cervical range of motion is also observed in people with TTH (Liang et al., 2019) and migraine (Szikszay et al., 2019); albeit cervical range of motion is more restricted in individuals with CeH than in those with primary headache such as migraine (Anarte-Lazo et al., 2021).

It is important to consider if the presence of restricted range of motion of the neck can be a cause and/or a consequence of pain. It is possible that in patients with TTH or migraine, the presence of neck pain symptoms can potentially lead to a secondary limitation of cervical range of motion, whereas that the restricted cervical range of motion in individuals with CeH could represent as neck source of nociception. In a small clinical study, changes in cervical range of motion were not directly associated with changes in outcomes for individuals with headaches, suggesting that restricted cervical range of motion could be a consequence rather than a cause of TTH (Fernández-de-las-Peñas et al., 2007a).

5. Cervical flexion-rotation test

The cervical flexion-rotation test (Fig. 1) is a clinical test used for diagnosis of upper cervical spine (typically C1-C2 joint) restriction and it is the examination with the highest reliability and the strongest

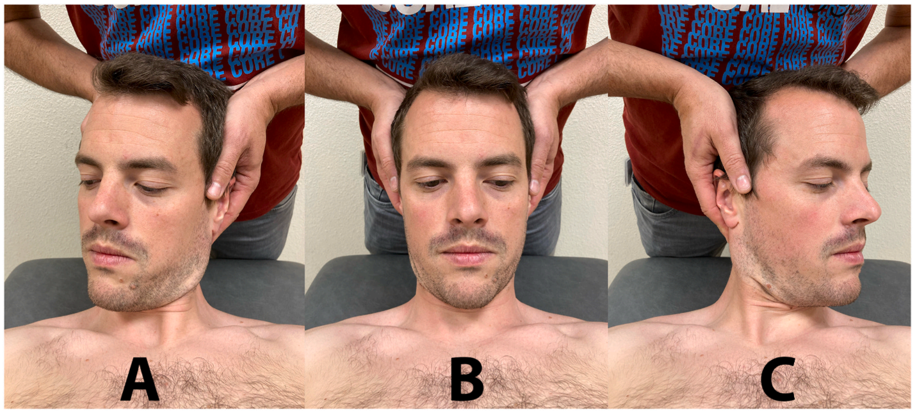

Fig. 1. Cervical Flexion Rotation Test. Initial position (B), rotation to the right (A), rotation to the left (C).

diagnostic accuracy for the diagnosis of CeH (Rubio-Ochoa et al., 2016). It has been proposed that patients with CeH should exhibit side-to-side differences of at least 10° in the cervical flexion-rotation test (based on an expected range of rotation of 44° degrees) to be considered positive (Hall et al., 2010). In fact, Hall et al. (2010) found that an experienced examiner was able to make a correct diagnosis with an accuracy of 85% with a positive cut-off value of 30° in the FRT. A recent study has reported that the FRT exhibits strong concurrent validity (ICC 0.97) with cervical range of motion and excellent intra-rater reliability (ICC 0.94 to 0.96) (Luedtke et al., 2020). However, the cervical flexion-rotation test has been also been shown to exhibit positive findings in individuals suffering from migraines (Szikszay et al., 2019). To our knowledge, no studies have investigated the cervical flexion-rotation test in people with TTH, although preliminary evidence suggests that passive range of motion in axial rotation of the upper cervical spine is reduced in patients with TTH (Dugailly et al., 2017).

Recent research has proposed the use of the C0-C2 axial rotation test (Fig. 2) to evaluate upper cervical spine dysfunction. Satpute et al. found that the C0-C2 axial rotation test exhibited moderate to high reliability and correlated well with the cervical flexion-rotation test in patients with headache (Satpute et al., 2021). To date, this test has not been investigated in patients with TTH.

6. Upper cervical spine referred pain and tension type headache

Reproduction of headache by manual stimulation from the upper cervical spine (e.g., C0/C1 and C1/C2 segments) has been proposed as a clinical finding for discrimination of CeH from migraine or TTH (Amiri et al., 2007; Jull et al., 2007). The presence of painful upper cervical joint dysfunctions combined with limited active cervical range of motion, particularly in extension, and impaired performance on the cranio-cervical flexion test was proposed as cluster examination showing good sensitivity and specificity values to differentiate CeH from TTH and migraine (Amiri et al., 2007; Jull et al., 2007). This cluster of examination findings (i.e., reduced cervical range of motion in extension, painful cervical joint dysfunction and impaired cervical muscle function) is able to identify CeH with an expected prediction error of 0.57 and accounted for 65% of the variance in responses against diagnostic blocks at the C2/C3 or C3/C4 levels (Getsoian et al., 2020). A recent meta-analysis concluded that this test cluster may be useful for diagnosing CeH, although with less certainty than previously proposed (Demont et al., 2022). This could be explained by the fact that manual examination of upper cervical segments (C1/C2 joints) has also been shown to reproduce the headache pain pattern in individuals with TTH (Watson and Drummond, 212). The referred pain elicited by manual examination of C1/C2 segments in patients with TTH was the same as noxious stimulation of C1/C2 joints (Aprill et al., 2002). In addition, the reproduction of migraine by applying passive accessory inter-vertebral

Fig. 2. C0-C2 axial rotation test.

motion of the upper cervical spine (Fig. 3) has also been identified in all phases of the migraine cycle (interictal or ictal), independent of the presence of neck pain (Di Antonio et al., 2022), and in patients with migraine with aura (Carvalho et al., 2021). Accordingly, current data suggests that referred pain from the upper cervical spine joints could also be involved in primary headaches such as TTH and migraine, and not just in CeH (Amiri et al., 2007; Jull et al., 2007).

7. Trigger points in tension type headache

Individuals with TTH describe their symptoms as pressing and/or tightening, dull or heaviness (Headache Classification Committee of the International Headache Society, 2018); these are clinical features

Fig. 3. Passive accessory inter-vertebral motion (posterior-anterior pressure) of the left C1-C2 joint.

mimicking those reflective of muscle referred pain. Accordingly, it has been proposed that TTH resembles the prototype of headache where muscle referred pain may also play a relevant role (Fernández-de-las-Peñas, 2015). An experimental-induced model using hypertonic saline injections into the neck-shoulder musculature (e.g., splenius capitis, upper trapezius) found that the referred pain elicited by stimulation of these muscles spread to the head region mimicking TTH features (Schmidt-Hansen et al., 2006).

A key indicator for TTH diagnosis is the presence of referred pain, since there has been a misconception in the headache literature between tenderness and muscle trigger points (TrPs) (Bendtsen, 2000). Based on available clinical and neurophysiological data, a pain model hypothesized that muscle referred pain from TrPs located in muscles innervated by the trigeminal nerve and upper cervical segments would be responsible for sensitization of the trigemino-cervical nucleus caudalis and the central nervous system, in patients with TTH (Fernández-de-las-Peñas et al., 2007c). This model has been supported by several studies showing that the referred pain elicited by TrPs in the head and neck-shoulder muscles reproduces the pain pattern in patients with TTH (episodic or chronic) (Do et al., 2018) and that the presence of TrPs is also associated with widespread pressure pain hypersensitivity (Fernández-de-las-Peñas and Arendt-Nielsen, 2017). A scoping review concluded that the suboccipital, temporalis, upper trapezius, and sternocleidomastoid muscles (Fig. 4) are the most commonly affected by TrPs in patients with TTH (Abboud et al., 2013). Nevertheless, it should be recognized that the referred pain from TrPs will not reproduce the headache pattern in all individuals with TTH, and accordingly, subgroups of patients with TTH likely exist (Arendt-Nielsen et al., 2016).

8. Cervical motor control impairments and tension type headache

Patients with CeH exhibit deficits in motor control of the cervical spine musculature and lower performance during the cranio-cervical flexion test and decreased strength of neck flexors/extensors (Amiri et al., 2007; Anarte-Lazo et al., 2021; Demont et al., 2022; Getsoian et al., 2020; Jull et al., 2007; Rubio-Ochoa et al., 2016). The presence of motor control disturbances in the cervical spine has led to the assumption that the cervical spine is a source of nociception in CeH. Recent studies have confirmed that individuals with primary headaches also exhibit motor control disturbances of the cervical musculature. For instance, people with migraine exhibit reduced angular velocity of cervical movement (Pinheiro et al., 2021), have decreased isometric strength of the neck flexors/extensors (Florencio et al., 2021) and show an increased antagonist co-activation of the cervical extensor muscles during the cranio-cervical flexion test (Florencio et al., 2016), when compared with headache-free controls.

Current evidence suggests that individuals with TTH also exhibit altered motor control activity of the neck muscles, lower strength of the cervical flexors, and muscle atrophy of the deep cervical musculature. Fernández-de-las-Peñas et al. (2008) found that women with TTH exhibit greater co-activation of antagonist muscles during sub-maximal isometric contractions in cervical extension (i.e., sternocleidomastoid) and flexion (i.e., splenius capitis) as compared with healthy women.

Fig. 4. Manual examination of trigger points (TrPs) in the upper trapezius (A), sternocleidomastoid (B), temporalis (C), and suboccipital (D) muscles.

Similarly, individuals experiencing TTH also exhibit overactivity of sternocleidomastoid and temporalis muscles at rest as compared with individuals suffering migraine (Biyouki et al., 2016). Sohn et al. (2013) reported that patients with TTH exhibited higher fatigue of the cervical musculature during maximum voluntary contractions. Further, patients with TTH have also been found to have lower force steadiness and decreased rate of force development during maximal contractions as compared to controls (Madsen et al., 2018a,b). These findings would suggest a potential reorganization of the motor-control strategy in TTH.

Castien et al. (2015) observed that individuals with TTH exhibit decreased isometric strength endurance of the neck flexor muscles, a finding associated with pressure pain hyperalgesia. A more recent study observed changes in thickness of deep neck flexor/extensor muscles in a small sample of patients with TTH, which was associated with performance of the cranio-cervical flexion test (García-Pérez-de-Sevilla et al., 2022). The presence of morphological changes (i.e., lower cross-sectional areas), potentially associated with atrophy in the suboccipital muscles, has been previously identified in women with chronic TTH (Fernández-de-las-Peñas et al., 2007b). Whether morphological changes (i.e., muscle atrophy) are a primary or a secondary phenomenon remain unclear.

9. Management of the cervical spine in tension type headache

Management of TTH must be multidisciplinary and should include neurologists, physicians, physical therapists, psychologists, nurses and dentists. Further, physical therapy management should also be multimodal, including bottom-up (tissue-based impairment) and top-down (central nervous system) interventions. Bottom-up strategies include joint-biased, nerve- and soft-tissue biased procedures whereas top-down strategies include active exercise as well as cognitive approaches (Fernández-de-las-Peñas et al., 2020). Accordingly, treatment of TTH should include interventions targeting headache and related-disability (i.e., manual therapies targeting musculoskeletal impairments), health-related or function (i.e., exercise), altered nociceptive mechanisms (i.e., pain neuroscience education) as well as psychological (i.e., cognitive behavior, copying strategies, relaxation interventions) aspects (Fernández-de-las-Peñas et el., 2020). A meta-analysis investigating the effects of physiotherapy interventions found significant reductions in the intensity, frequency and duration of TTH, although the heterogeneity of the published studies did not allow for definitive conclusions (Luedtke et al., 2016a). A network meta-analysis has recently supported that combining manual therapy with exercise was the most effective intervention to reduce headache frequency in TTH (Jung et al., 2022).

Next, we will briefly discuss the effectiveness of cervical treatment approaches into the clinical course of TTH to determine the relevance of the cervical spine in this condition, with an understanding that not all interventions are effective for TTH (Fernández-de-las-Peñas and Cuadrado, 2016). A Delphi study identified that upper cervical spine mobilizations and active exercises are the top treatment strategies for managing the cervical spine in people with headaches, but particularly CeH (De Paw et al., 2021). The Ontario Clinical Practice Guideline for headaches associated with neck pain recommends combining low-load cranio-cervical and cervico-scapular exercises, general exercise program, with manual interventions for TTH (Côté et al., 2019). These assumptions have recently been confirmed in an umbrella review concluding that combination of exercise and manual therapy can be effective for the management of TTH (Varangot-Reille et al., 2022a,b). Interestingly, the effectiveness of joint-biased interventions (e.g., mobilizations/manipulations) of the upper cervical spine, when applied in isolation, for TTH is conflicting (Coelho et al., 2019; Posadzki and Ernst, 2011). In fact, the Ontario Clinical Practice Guideline for headaches did not recommend the isolated application of cervical spine manipulation as a sole form of treatment for TTH (Côté et al., 2019). Nevertheless, preliminary evidence suggests that spinal manipulation may be effective when combined with pharmacological therapy for TTH (Posadzki and Ernst, 2012).

A lack of consistent effects of spinal joint interventions targeting the upper cervical spine in people with TTH could be related to the fact that headache pain pattern of TTH is more reproductible with examination of muscle tissue, i.e., TrP referred pain, rather than with examination of joint dysfunctions (Fernández-de-las-Peñas and Cuadrado, 2016; Fernández-de-las-Peñas et al., 2020). However, it seems that there would be a subgroup of patients with TTH who will benefit from joint-biased interventions since upper cervical joint examination also reproduces the pain pattern in some patients with TTH (Watson and Drummond, 2012).

The effectiveness of soft-tissue biased interventions in TTH is more consistently advocated, but recommendations are worth discussing. The Clinical Guideline of European Federation of the Neurological Societies recommends that non-pharmacological treatment (e.g., physical therapy) should always be considered for TTH although its scientific basis is still limited (Bendtsen et al., 2010). A meta-analysis by Mesa-Jiménez et al. (2015) concluded that physical therapy approaches including soft-tissue manual therapies were more effective for reducing headache frequency, intensity and duration at short-term, but equally effective at long-term, than medication for managing TTH. A meta-analysis specifically investigating the effectiveness of TrP manual therapy of head/neck muscles found low to moderate evidence for reducing the frequency, intensity, and duration of headaches in TTH; however, the number of studies in some comparisons was small (Falsiroli Maistrello et al., 2018). Similarly, the application of dry needling (an intervention also targeting TrP related-pain) provides greater improvement in related disability in the short term in patients with TTH, although evidence was of low quality (Pourahmadi et al., 2021). In the authors' clinical experience, TrP manual therapy is effective for managing TTH when manual examination of the head/neck muscles is able to reproduce the headache pain pattern. Not all published studies have used this criterion in their clinical reasoning, and accordingly, this could explain discrepancies.

Exercise is proposed as an effective treatment for managing chronic pain since exercise-induced hypoalgesia has been shown to be related to activation of descending inhibitory pain pathways (Daenen et al., 2015; Vaegter et al., 2014). It is important to consider that exercise itself is effective in the management of TTH and migraine, but the type of exercise may exhibit heterogeneous results for different headache conditions. For instance, aerobic exercise was assumed to be the best option for migraine prophylaxis, whereas specific neck/shoulder exercises were proposed as a better choice for TTH (Hindiyeh et al., 2013); a hypothesis that has been supported in a recent meta-analysis (Varangot-Reille et al., 2022a,b). Castien et al. (2013) found that neck flexor muscle endurance partially mediates the effect of manual therapy in individuals with TTH, supporting the potential relevance of this type of exercise. Nevertheless, an ergonomic and postural correction exercise program was found to be as equally effective as a strengthening cervical exercise program for reducing headache intensity and frequency in people with TTH (Madsen et al., 2018a,b).

Finally, adherence to exercise is a consideration that must be considered. Gaul et al. (2011) found that adherence to regular practice of exercise predicted the effectiveness of a multidisciplinary therapeutic program in subjects with TTH. Accordingly, clinicians should choose any particular exercise program based on clinical finding during the examination of the patient but should also consider the patient's preferences and likelihood of completing the program.

10. Decision tree for cervical spine examination/treatment

Current evidence clearly supports the presence of several musculoskeletal disorders of the cervical spine in people with TTH (Fig. 5); however, there are two questions which clinicians should consider: 1) are all cervical musculoskeletal impairments relevant for the clinical course of TTH?; and 2) has the treatment of cervical musculoskeletal impairments a positive effect on the clinical course of TTH?

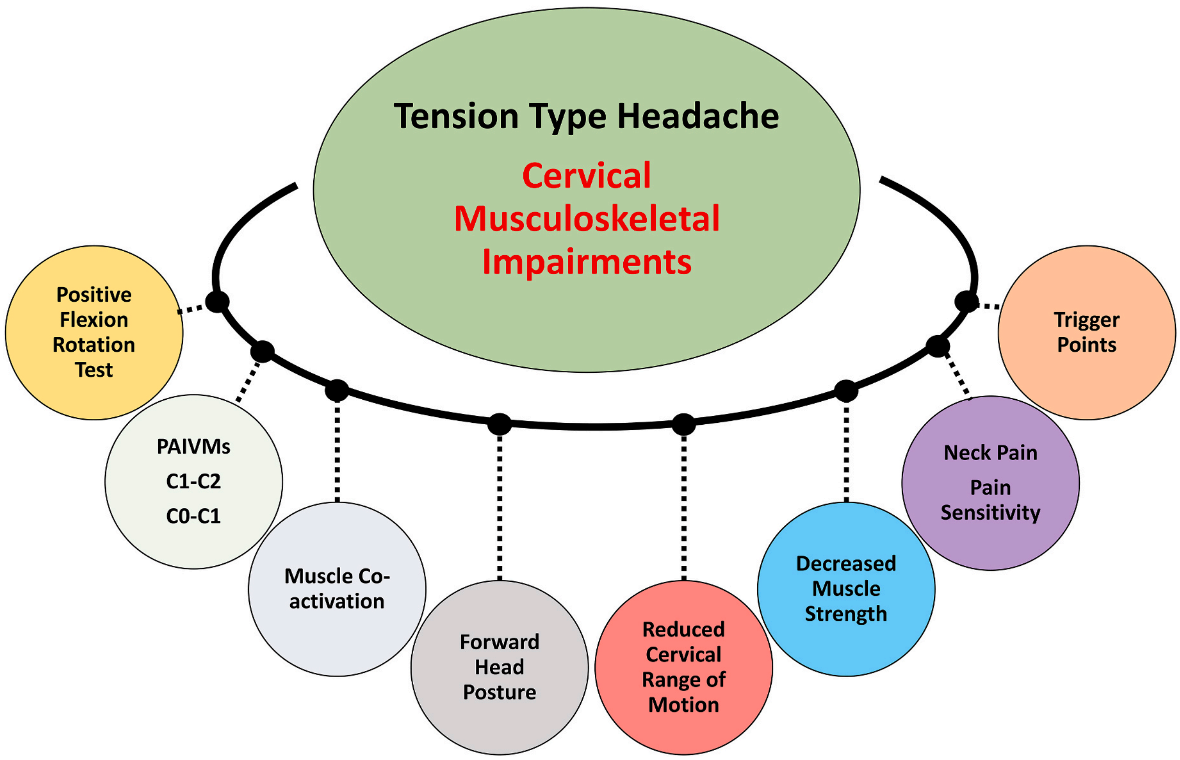

Fig. 5. Musculoskeletal impairments of the cervical spine observed in people with tension type headache.

Fig. 6 graphs a decision tree for examination/treatment of cervical musculoskeletal impairments. According to a Delphi study (Luedtke et al., 2016b), and based on the clinical experience of the authors, the reproduction (during examination) and resolution (after treatment) of the pain symptoms (headache) is the primary step to identify the clinical relevance of musculoskeletal dysfunctions of the cervical spine in individuals with TTH. We propose that identification of muscular TrPs, which reproduces the pain pattern in TTH, should be the first examination step, since their symptoms resemble clinical features of this headache. If TrPs reproduce the headache pain pattern, they should be treated with manual therapy and/or dry needling. Second, identification of upper cervical spine dysfunctions, which referred pain also reproduces a TTH pattern should be the second step, and if identified, treated with manual mobilizations. The third step should include

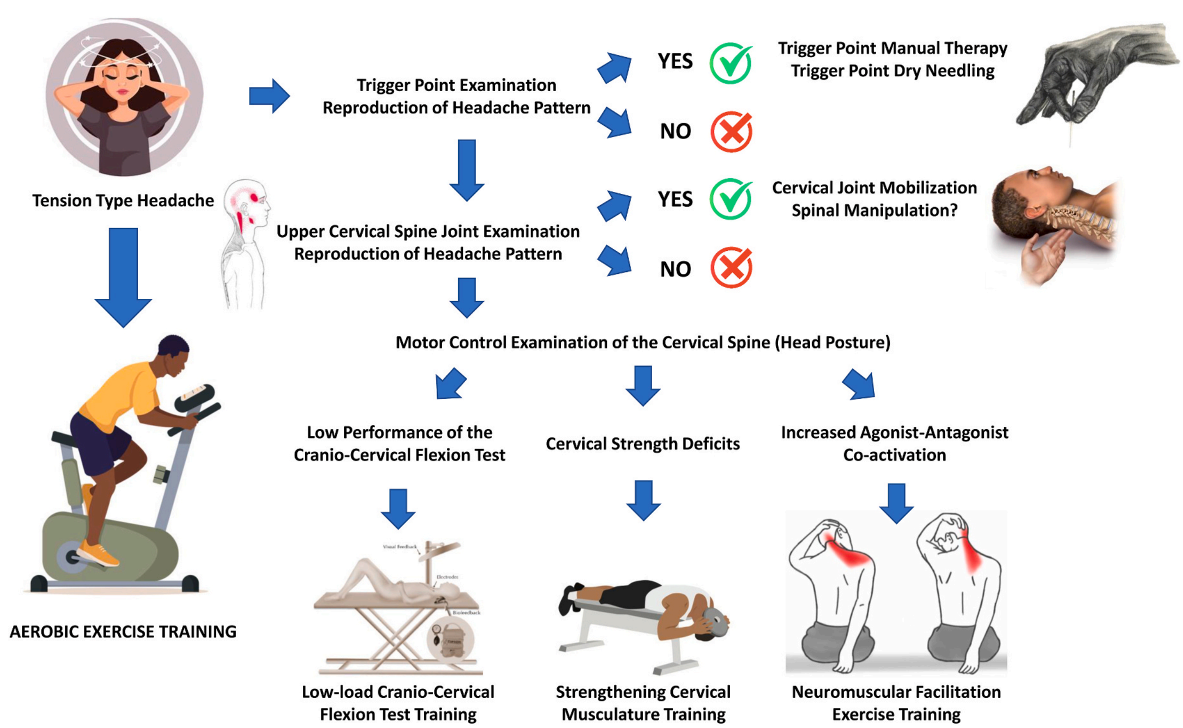

Fig. 6. Decision tree for examination/treatment of musculoskeletal impairments of the cervical spine in tension type headache.

evaluation of the presence of the predominant motor control disturbances of the neck (e.g., strength deficits, low performance of the cranio-cervical flexion test, increased agonist-antagonist muscular co-activation) and, and the application of a personalized exercise programs. In this step, head posture should also be integrated since the dynamics of the cervical spine musculature could be altered if the patient exhibits a forward head position.

We would like to propose the terms "cervical component" and "cervical source" for differentiating CeH. Cervical component reflects an instance in which the cervical spine may be a contributor to TTH. Cervical source suggests that the cervical spine is the cause of the headache, as with CeH. Understanding that there can be two distinct instances of involvement of the neck may improve the likelihood of recognizing the diverse presentations of headaches.

11. Conclusion

The cervical spine has traditionally been linked to CeH; however, evidence supports the presence of cervical musculoskeletal dysfunction also in individuals with TTH. Patients with TTH exhibit concomitant neck pain, cervical spine sensitivity, forward head posture, limited cervical range of motion, positive flexion-rotation test and cervical motor control disturbances; often, these overlap with findings of CeH. In addition, the referred pain elicited by manual examination of the upper cervical joints and muscle trigger points reproduces the pain pattern in individuals with TTH. Based on available evidence, we propose using the terms cervical "component" and cervical "source". In this scenario, in CeH the neck can be the cause (source) of the headache whereas in TTH the neck may have a component on the pain pattern, but it will be not the cause since it is a primary headache.

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