National University of Medical Sciences - Spain

Doctor of Osteopathy (DO) degree program

"Effectiveness of the Jugular Foramen Release Technique versus Osteopathic High Velocity Low Amplitude (HVLA) Techniques in the treatment of tension headaches."

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2. THANKS.

First of all, I would like to thank my family for always being so incredibly supportive of my life choices and for helping me in my journey. Thanks for all the words of encouragement, particularly when I needed it the most.

Second, I would like to thank Align Health for giving me the life-time opportunity to start working in Abu Dhabi, United Arab Emirates and for giving me the right platform to make Osteopathic and Naprapathic treatment known in a country where Osteopathy and Naprapathy are not wide-spread and well-known.

Then, I would like to thank Dr. Pourgol and the National University of Medical Sciences for the support.

Also, I would like to thank Cristina for everything she means to me.

Last but not least, I would like to dedicate this thesis to my grandparents, they have been great role models during my life and I wish they were here one more time to make them proud once again.

3. INTRODUCTION.

Before explaining the subject of study of my thesis, let me give you a small introduction to why I chose to talk about this specific field.

I became interested in the treatment of headaches many years ago, during my very first years in university as a Physiotherapy student. I remember that some of the highly respected professors of my faculty would talk about the treatment of headache as something very difficult that could be performed only by very specialised practitioners. That sparked my interest in this field.

My university used to invite to the faculty different practitioners and experts in different fields in order for us student to learn more and increase our knowledge and skills. One time, they had invited a so-called expert for the treatment of headache.

Back then, I was a good and aspiring student and I would ask questions when something did not seem right. That one time, the more I asked, the more this expert could not answer my questions and had started getting angry and nervous; people could tell this person was getting exposed.

I remember precisely how disappointed I was after that seminar. That moment, I decided that I was going to study more about this niche area and find my own and effective way to treat headaches.

About 8 years later, here we are.

4. ABSTRACT.

Tension headaches are the most common type of headache among those who suffer from them all over the world. Understanding what they are is essential for improving the lives of those who suffer from them as they can lead to chronic pain, anxiety, depression, and reduced overall functioning. Also, they can have a significant economic impact, due to the costs related to medical treatment, missed workdays, and decreased productivity.

Studies and researches on this topic have been uncovering the underlying mechanisms and triggers, leading to more effective prevention and tailored treatment options and alleviating the suffering of millions of individuals by reducing the burden of lost productivity and healthcare costs associated with tension headaches. Therefore, through scientific investigation, we can gain valuable insights into tension headaches, ultimately leading to better management and a higher overall standard of health for individuals.

These are some of the reasons why investigating about the treatment of tension headaches is important and why this study aims to give some more information and shed a light on such topic. The management of tension headaches has been researched and studied mostly from a pharmacological point of view, with evidence of Physiotherapeutic treatment being mostly focused on machine based rehabilitation and the use of physical agents, not necessary through the use of manual therapy techniques.

In Osteopathy, there is some evidence on the treatment of tension headaches with multiple techniques but there is a lack of studies that compare multiple specific options for the same concern.

That is the main goal of this study, create and show evidence of Osteopathic Techniques in the treatment of tension headaches while comparing them at the same time in patients suffering from the same issue and with the same aggravating factors.

Specifically, the focus of this study will be on the treatment of a specific area at the base of the skull, the Jugular Foramen. This Foramen gives passage to the Cranial Nerve IX also known as the Spinal Accessory Nerve and to the Cranial Nerve X also known as Vagus Nerve, therefore playing an important role in how these Nerves are able to send the right stimuli to the tissues and structures they innervate.

5. OBJECTIVE(S).

The main goal of this cohort study is to show how effective the Jugular Foramen Release Technique can be in tension headaches.

Secondary, the effectiveness of each treatment will be compared in order to understand which one is more effective.

Also, it will be studied and compared which technique decreases the symptoms of tension headache faster.

Furthermore, treatment effects will be compared in order to show which treatment gives longer-lasting benefits.

At last, any other effect that can be linked to the treatments performed will be reported in order to give more evidence about each technique.

6. COHORT STUDY EXPLANATION.

First of all, a cohort study is a type of observational research used to investigate the association between exposure to a specific factor and the development of a particular outcome or condition over time. This type of studies are valuable for studying cause-and-effect relationships and assessing the incidence of health-related events within a defined group of individuals.

In this study, patients were randomly divided into two groups, one was treated using HVLA techniques and the other with the Jugular Foramen Release Technique. All patients in both groups were assessed and their symptoms were evaluated on their first consultation, at the follow-up consultation within a period of five days and then a month after the first consultation. Later, patients were asked to comment on their improvement, through a questionnaire, at sixty days after the first consultation.

Patients were included in this study if they presented tension headache that was generated by musculoskeletal problems but patients who were medically diagnosed with any aggravating factors like cardiac problems, respiratory problems, depression and other emotionally altering conditions were not considered part of this study. The study was aimed for those people that suffer from tension headache because of muscle spasms, poor posture, teeth grinding, etc…

It was evaluated which group had the better outcomes, which one had the biggest decrease in the symptoms and which one had longer lasting effects from the treatment.

7. THE CONDITION: TENSION HEADACHES.

Tension headaches are one of the most common complaints suffered from people all over the world. It is the most common type of headache and it can be quite debilitating, creating major discomfort in people's life. It is generally a mild to moderate pain that is often described as feeling like a tight band around the head.

They are often referred to as stress headaches and they can be underestimated by many healthcare professionals worldwide. Therefore, understanding the causes, symptoms, and available treatments is essential for individuals who experience these headaches, as it can lead them to a better management of their pain and improve their overall quality of life.

The most common signs and symptoms of a tension headache include: dull or aching head pain, sensation of tightness or pressure across the forehead or on the sides and the posterior part of the head, and tenderness in the muscles of the scalp, neck and shoulders.

Tension headaches can be both episodic and chronic; episodic headaches can last from 30 minutes to a week and usually occur for less than 15 days a month during a period of three months; chronic tension headaches are considered so if they last hours, are continuous, occur more than 15 days a month and for more than a three-month period.

Sometimes, it is possible to confuse tension headache with migraine but the latter is usually associated with blurred vision, nausea, dizziness and gets worse with increased physical activity.

Tension headaches occur when the muscles in the neck and the scalp become tense or contract; this muscle tension and contraction can also be a response to stress, depression, head injury, or anxiety. They can occur at any age, but are most common in adults and older teens. There are many other triggers that may contribute to the onset, including poor posture, prolonged screen time or eye strain, sleep disturbances, and physical fatigue.

8. THE JUGULAR FORAMEN.

8.1. Anatomy and Physiology.

The Jugular Foramen is a very specific region of the base of the skull which, by acting as a conduit, gives passage to some very important and essentials structures of our body. It is a crucial structure within the skull that facilitates the functions of the nervous and circulatory systems for which it has significant impact in neurological, vascular and auditory processes.

At the base of the skull, lateral to the Foramen Magnum, we can find two Jugular Foramina that allow the passing of blood vessels and nerves. Through these Foramina, the Internal Jugular Veins, which drain blood from the brain and intracranial tissues, make their way out of the cranium and terminate at the Subclavian Veins joining the Brachiocephalic Vein. Additionally, Cranial Nerves IX (Glossopharyngeal), X (Vagus), and XI (Spinal Accessory) pass through this Foramen, allowing them to send stimuli to multiple extracranial targets. The description and the role of the aforementioned Nerves will be given in the next paragraphs.

The anterior part of the Jugular Foramen is formed by the Petrous Part of the Temporal Bone while the posterior part of this Foramen is composed by the Occipital Bone. From an inferior to superior extracranial view, each Jugular Foramen is lateral to the Occipital Condyle of the same side and it sits directly posterior to the Carotid Artery. Also, the External Acoustic Meatus, which can be found in the Temporal Bone, sits superior and lateral to the Foramen.

Figure 1. Inferior extracranial view

Intracranially, the Jugular Foramen lies at the proximal end of the Sigmoid Groove, a structure of the Occipital Bone that accommodates the Sigmoid Sinus, which forms the Jugular Vein. Superior to the Sigmoid Sinus, at the superior margin of the Petrous part of the Temporal Bone, lies the Superior Petrous Sinus. Within the Petrous portion of the Temporal Bone lies the Internal Auditory Meatus, which sits superiorly and slightly medial from the Jugular Foramen. Also, medial to the Jugular Foramen sits the Hypoglossal Canal, which runs laterally to the Foramen Magnum on both sides. At last, posterior to the Jugular Foramen and the Sigmoid Sinus is the Posterior Cranial Fossa, which accommodates the Occipital Lobe of the Brain.

The Intra-jugular Process is a notch that divides the Foramen into a larger posterolateral compartment and a smaller anteromedial compartment. The anteromedial compartment of the Jugular Foramen, the Pars Nervosa, contains the Glossopharyngeal Nerve (CN IX), Jacobsen Nerve, and the Inferior Petrosal Sinus. The posterolateral part of the Foramen, the Pars Vascularis, contains the Jugular Bulb, the Vagus Nerve (CN X), Arnold Nerve, and the Spinal Accessory Nerve (CN XI).

It is worth mentioning that, depending on the way the Jugular Foramen is described by each author and anatomy book, it can be considered in three separate compartments with their respective contents. The anterior compartment contains the Inferior Petrosal Sinus, the middle

compartment contains and transmits the Glossopharyngeal Nerve, Vagus Nerve and the cranial part of the Spinal Accessory Nerve, while the posterior compartment contains the Sigmoid Sinus and transmits meningeal branches of the Occipital and Ascending Pharyngeal Arteries.

Embryologically, the Petrous Part of the Temporal Bone and the Occipital Bone derive from the Paraxial Mesoderm and they both develop via endochondral ossification. During our development, the Bones ossify and form rigid fibrous joints called Sutures and the joining of the Temporal and Occipital Bones create various structures that hold vital functions, including the Jugular Foramen.

Intracranially, the Major Venous Sinuses that drain blood from the Brain meet at an area posterior and medial to the Occipital Bone known as the Confluence of Sinuses. Specifically, the Transverse Sinuses extend laterally from the Confluence of Sinuses and become the Sigmoid Sinuses as they begin to descend toward the Jugular Foramina. The Superior and Inferior Petrosal Veins join the Sigmoid Sinus as it nears the Jugular Foramen and, as the Inferior Petrosal Vein joins the Sigmoid Sinus, these pass through the Jugular Foramen as a singular structure becoming the Internal Jugular Vein. In some variants, the Posterior Meningeal Artery, which supplies the Dura in the posterior portion of the cranium, can enter the cranium via the Jugular Foramen.

Cranial Nerves IX, X, and XI, originate from the Medulla, the most inferior part of the Brainstem, and exit the cranium via the Jugular Foramen.

Cranial Nerve IX, also known as the Glossopharyngeal Nerve, runs laterally and anteriorly away from the Superior Medulla and exits the Jugular Foramen. Right after it exits, it creates a Superior Jugular Ganglion, and further branches to innervate its target tissues. Also, it briefly enters the carotid sheath at its superior portion.

Its primary target tissue is the Parotid Gland, where it supplies parasympathetic innervation. It is primarily sensory, receiving general visceral and special sensory input from tonsils, larynx, middle ear, posterior one-third of the tongue, and carotid bodies; it innervates the Stylopharyngeal muscle, which plays a role in elevating the larynx and pharynx, but also helps to dilate the pharynx to assist with swallowing and deglutition.

Cranial Nerve X, also known as the Vagus Nerve, is the major parasympathetic controller throughout the body. It runs laterally and anteriorly away from the middle segment of the Medulla and exits the Jugular Foramen. Then, it extends inferiorly creating multiple different branches that reach many areas and structures of our body, therefore generating many

connections throughout the body. The major descending branch of the Vagus Nerve will enter the carotid sheath and run alongside the Carotid Artery and Internal Jugular Vein.

Within its many target tissues we can include vocal cords, heart, two-thirds of the gastrointestinal tract, up to the transverse colon, where it contributes to the Auerbach's plexus, which controls gut motility. Additionally, the Vagus Nerve plays a significant role in controlling the heart rate via parasympathetic innervation and it has inputs in the intestinal musculature in order to assist with peristalsis and digestion.

Cranial nerve XI, also known as the Spinal Accessory Nerve, runs laterally and anteriorly away from the most inferior segment of the Medulla and exits the Jugular Foramen just like the Vagus Nerve. As it exits the Jugular Foramen alongside the Vagus Nerve, it enters the carotid sheath briefly in its superior portion and passes around the Jugular Vein via its anterior wall in most cases.

The Spinal Accessory Nerve innervates the Trapezius and the Sternocleidomastoid muscles. The Trapezius has many actions, including shoulder shrugging, neck movement, and overall stabilization of the scapula. The Sternocleidomastoid primarily acts to rotate the head to the opposite side and flexion of the neck.

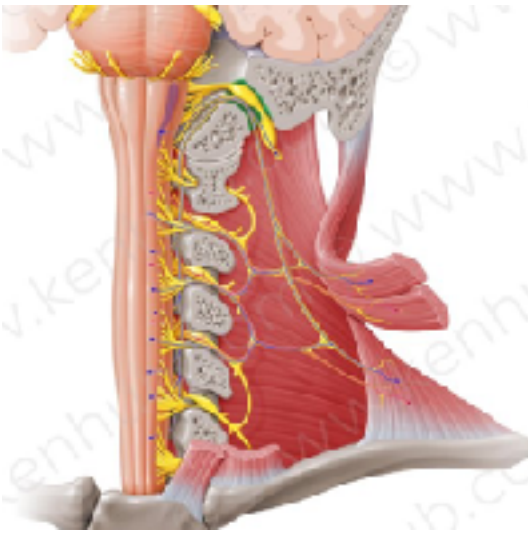

Figure 2. Innervation

8.2. Clinical Significance.

Any traumatic injury to the base of the skull may result in a compromise of structures passing through the Jugular Foramina. Possible complications may result in haemorrhage or air embolism due to damage to the Jugular Vein. Additionally, there could be damage to the three Cranial Nerves causing associated issues.

Damage to the Glossopharyngeal Nerve (CN IX) may result in impaired taste in the posterior one-third of the tongue, as well as cause dysphagia. The Glossopharyngeal Nerve (CN IX) has several important clinical implications. For example, along with the Vagus Nerve (CN X), it is responsible for the gag reflex, which is a protective reflex that prevents a person from choking by initiating a gag response when foreign objects come into contact with the back of the throat. Also, any damage or dysfunction of the Glossopharyngeal Nerve (CN IX) can result in taste disturbances or difficulty swallowing.

As the Glossopharyngeal Nerve (CN IX) contains sensory fibres that monitor blood pressure in the Carotid Sinus, an abnormal stimulation of these can lead to the Carotid Sinus Reflex, which may cause a sudden drop in the heart rate and blood pressure, potentially leading to syncope.

Damage to the Vagus Nerve (CN X) can result in a myriad of dysfunctions, including dysphagia, speaking issues, gastrointestinal issues, and cardiac issues. In fact, the Vagus Nerve (CN X) is a primary component of the Parasympathetic Nervous System, which counterbalances the Sympathetic Nervous System. It regulates involuntary processes such as heart rate, digestion, and respiratory rate.

The Vagus Nerve (CN X), when stimulated by physiological or external factors, can lead to a decrease in the heart rate, a relaxation of the smooth muscles of our airways, and increased gastrointestinal activity. Its overstimulation can result in a condition known as vasovagal syncope, characterized by a sudden drop in heart rate and blood pressure, potentially leading to fainting.

As mentioned before, the Vagus Nerve (CN X) controls the function of many digestive organs, including the esophagus, stomach, and intestines; therefore, its dysfunctions can lead to conditions like gastroparesis, in which the stomach does not empty properly resulting in symptoms like nausea, vomiting, and abdominal discomfort.

Excessive stimulation of the Vagus Nerve can lead to bronchoconstriction and potentially cause breathing difficulties. And, at last, the Vagus Nerve has been associated with emotional regulation and has been found to have connections to various brain regions involved in our mood and emotional state.

Damage to the Spinal Accessory Nerve (CN XI) primarily results in muscular pain in the shoulder, and neck, as well as weakness, affecting the sternocleidomastoid and trapezius muscles. Dysfunctions of this nerve can lead to weakness or paralysis of these muscles, affecting head and neck movement. It can result in muscle weakness or atrophy in the sternocleidomastoid and trapezius muscles which can lead to neck pain, stiffness, and difficulty in turning or tilting the head.

It is quite common to have an associated torticollis, which is a condition characterized by abnormal neck posture and muscle spasms. Also, the trapezius muscle plays a significant role in shoulder movement, therefore its dysfunction may cause weakness and difficulty in elevating the shoulder or shrugging the shoulder blades.

Jugular Foramen Syndrome, also known as Vernet syndrome, refers to the paralysis of the Cranial Nerves IX, X, and XI when passing through the Jugular Foramen.

The following etiologies of Jugular Foramen Syndrome have been described in the literature:

- Congenital
- Vascular (asymmetry and enlargement of the Jugular Foramen, high or protruding Jugular Bulb, Internal Jugular Vein thrombosis, aneurysms of the Extracranial Internal Carotid Artery or Vertebral Artery)
- Inflammatory
- Infectious (Varicella-Zoster virus infection, herpes virus infection)
- Neoplastic (benign or malignant)
- Traumatic

Any restriction in the passage of one of the many structures through this foramen may create problems in the innervated and targeted extracranial structures. That is because the nerves that

come out of the foramen are not able to send the right stimuli and impulses to their target organs, muscles etc…

For example, Jugular Foramen restrictions may lead to a dysfunction of the Vagus Nerve (CN X), which means that the peristalsis could be affected and so the rhythm of the heart; in some cases it could even lead to vasovagal issues and vagotonia, which is a state of the Autonomic Nervous System in which the equilibrium between the Sympathetic and Parasympathetic Nervous System is biased towards the Parasympathetic leading to low blood pressure, low heart rate, cold hands and feet, severe fatigue, syncope, myosis and more…

Jugular Foramen restrictions may also cause the Spinal Accessory Nerve (CN XI) to send wrong stimuli to the sternocleidomastoids and the trapezii, leading to stiffness, increased muscle tension and muscle spasms. This can lead to neck pain and tension headaches.

Therefore, because of the effects that a restriction of the Jugular Foramen can generate, in this study we want to explore how treating this area can release the passage of the nerves in order to send better stimuli to the muscles in order to release tension and stiffness in them which will ultimately decrease and stop the symptoms of the tension headaches.

9. CONSIDERATIONS ON OSTEOPATHY.

Osteopathy has been around for quite some time and has slowly become part of the healthcare or alternative medicine systems in multiple countries worldwide. Overtime, multiple Osteopaths have helped the profession grow and thanks to their research they were able to bring more information about the techniques and their effects to the practitioners and to the common person. That being said, most techniques still lack clinical evidence, particularly in the cranial field.

Cranial Osteopathy has been and still is a field of Osteopathy that creates debate and doubt in many practitioners all over the world. The works of J.P. Barral, P. Mercier, T. Liem, H.I. Magoun have improved and added something to the books and techniques explained by W.G. Sutherland in his first books and they made an enormous difference in the way Osteopaths use cranial techniques nowadays.

The main problem with Cranial Osteopathy techniques is the high level of light-touch sensitivity that the Osteopath needs to have in order to perform most, if not all, techniques. This ability is something that each practitioner can develop but it must be trained in the right way in order to know how to use it.

As Sutherland used to say, we treat “with thinking fingers”; meaning that our fingers and hands can detect microscopical and millimetric movements in our body by listening to the stimuli given by the body to our fingers.

This is not something easy to achieve, and lots of Osteopaths struggle to get a grip of these elusive techniques. That is one of the reasons why Cranial Techniques are not mentioned as much as other techniques and why there is less clinical and scientific evidence about their effects. Therefore, the aim of this study is to shed some light on a specific and not well-known Cranial Technique and bring some clinical evidence about its effects.

In this cohort study, the effectiveness of the Jugular Foramen Release Technique versus the Osteopathic Manipulative Treatment will be compared in order to understand the short-term effects of each treatment, to show the ability of each one to decrease the symptoms of the patient and to show which treatment presents longer-lasting effects.

The Jugular Foramen Release Technique is a very specific Cranial Technique that can be considered one of the best kept secrets or hidden gems of Osteopathic Treatment.

On the contrary, Osteopathic Manipulative Techniques, also known as High Velocity Low Amplitude techniques (HVLA), are the most known and utilized techniques in Osteopathy and Chiropractic.

10. TECHNIQUES EXPLANATION.

10.1. Jugular Foramen Release Technique (Cranial Technique).

There are two main ways to release the Jugular Foramen. For information purposes, both will be explained but only one of these has been performed during this study.

In the first method, the patient is supine and the head is slightly turned to the side that is to be treated. The practitioner places a finger in the anterior part of the External Acoustic Meatus by sliding the opposite hand under the skull and placing the index finger in it and drawing it medially and anteriorly. Then, the practitioner positions the index and middle fingers of the other hand on the Jugular Process of the Occiput and draws it posteriorly and medially. Finally, the side of the skull that is being treated is placed in convexity and the patient's head can be turned to the same side in order to increase the stretch in the structures treated.

In the second method, the patient is supine and the head can be placed in neutral position or it can be turned slightly towards the dysfunctional side. The practitioner places one hand on the same side of the dysfunction by cupping and sustaining the Temporal and Occipital Bones. The other hand is placed on the opposite Mastoid Process and applies slight to moderate pressure towards the side that needs to be treated with the base of the palm or the thenar eminence. The skull can be placed in convexity to increase the effectiveness of the technique and the head can also be turned to the same side. The position is held until a release of tension in the dysfunctional side is achieved. This technique has been performed during this cohort study.

10.2. Osteopathic High Velocity Low Amplitude (HVLA) Techniques.

Osteopathic High Velocity Low Amplitude (HVLA) Techniques, also known as spinal adjustments or joint manipulations, are a category of manual therapy techniques used by Osteopaths and other healthcare professionals, such as Chiropractors, Naprapaths and Physiotherapists in order to restore normal range of motion and alignment in a joint through fast, precise and controlled movements. HVLA techniques involve a rapid, short-duration thrust applied to a specific joint or vertebra which is thought to help release joint restrictions and promote proper alignment. It is important to remember that HVLA techniques come with certain contraindications; therefore, the practitioner should make sure there are no red flags and should evaluate the possible yellow flags before carefully performing the adjustment targeted for the specific joint or area that requires it. Also, the positioning of the joints during these techniques is crucial to ensure their effectiveness and safety because there are many important vascular and neurological structures in the cervical spine.

In the cervical spine, it is possible to divide the techniques into Closing and Opening Techniques or FRS (Flexion, Rotation and SideBending) and ERS (Extension, Rotation and SideBending) techniques. Closing Techniques or FRS Techniques are characterised by a rapid closing motion in a horizontal or oblique trajectory. They are used when the vertebrae do not accept extension movements and do not close the intervertebral space during normal physiological movements. Opening Techniques or ERS Techniques are the most known adjustments as they are characterised by the classic quick rotational movement that opens the joint that was previously stuck in a closed position. These techniques are performed when the vertebrae do not accept flexion and opening movements between adjacent vertebrae.

11. METHOD(S).

All patients who were included in the study were assessed on the first consultation. Cervical spine joint play and thoracic spine joint play were performed to evaluate the existence of possible dysfunctions in their spine and in the tissues closely related to their tension headache. ROMs testing was performed to evaluate any restriction in the movement of their head, neck and thoracic spine. Specifically, in the muscle testing and palpation were done as well to note any loss of strength, or the existence of trigger points, stiffness and tightness in the muscles that could lead to tension headache.

The Temporomandibular Joint was assessed to understand if there could be any aggravating factor from that structure and therefore treat that and its related symptoms. Also, patient were assessed for any Cranial dysfunctions, with Sphenoid, Occipital and Temporal being taken into more consideration due to their anatomical connections to the Jugular Foramen and other structures related to tension headache.

According to the findings, each patient was then treated with general and/or specific spinal mobilizations (cervical or thoracic or both), soft tissue techniques (trigger point release, active release techniques, etc…), and stretching techniques depending on their case.

Then, some patients were treated with the addition of the Jugular Foramen Release Technique while others were treated with the HVLA Technique needed for their specific dysfunction. Also, if found dysfunctional, the Sphenoid, Temporal and Occipital bones were treated with the Cranial techniques specific for the dysfunction.

A total of sixteen patients were included in the study. All of them reporting tension headache. To make the study as fair and equal as possible, half of them were treated using the HVLA approach and the other half was treated using the Jugular Foramen Release Technique.

All sixteen patients were treated for a total of five times which included the first consultation, the follow-up consultation within five days from the first, another follow-up consultation a week after the second, a fourth consultation another week after the third and then a fifth and final consultation at exactly four weeks/one month from the first consultation performed at the beginning of the study.

Then, patients were asked to comment through a questionnaire about their symptoms and possible improvements at eight weeks/sixty days after the first consultation.

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Here are the examples of how two different patients were treated with each approach according to the dysfunctions found during the physical examination.

Jugular Foramen Release approach: female patient, fifty-three years old, complains of tension in the neck, tension in the jaw, neck pain and episodic tension headache. No other important medical history or yellow and red flags were mentioned.

At physical examination:

- There is tightness and muscle spasms in the muscle of the base of the skull, neck, traps and sternocleidomastoids (SCMs)
- Trigger points in traps
- Cervical Spine joint play is +ve, both sides
- Temporomandibular Joint (TMJ) joint play is +ve, both sides
- ROMs are slightly restricted
- Sphenoid Bone dysfunctional in Internal Rotation on the right side. Temporal Bone and Occipital Bone on the same side are slightly restricted as well.

Treatment: suboccipital release, general Cervical Spine joint mobilizations to improve joint mobility, trigger point release in the traps, myofascial and fascial release in the SCMs, Sphenoid release, TMJ bilateral fascial release, Jugular Foramen release Technique.

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HVLA approach: female patient, thirty-three years old, complains of neck pain, tension in the neck and suffers from episodic tension headache. No other important medical history and no yellow or red flags.

At physical examination:

- ROMs are restricted and there is discomfort during active movement
- There is tightness in the neck, base of the skull and traps; trigger points can also be found in the traps
- Cervical Spine joint play is +ve in both sides and there is more tenderness on the left side
- Specifically, C1, C2, C5 are dysfunctional. C1, C2 dysfunctional on the left side (C1L, C2L); C5 dysfunctional on the right side (C5R)
- Thoracic Spine joint play is +ve in both sides
- Some referred pain and tightness in the left traps and left shoulder.

Treatment: general Thoracic Spine joint mobilizations and general Cervical Spine joint mobilizations to improve joint mobility, trigger point release in the traps, suboccipital release, HVLA techniques for C1L, C2L and C5R.

12. RESULTS.

On the follow-up consultation performed within five days from the first one, all patients reported some improvement in their symptoms. In this first assessment of the results of the study, those treated with the Jugular Foramen Release Technique reported less stiffness and tightness in their muscles and less tension or discomfort but not necessarily a better Range Of Motion (ROMs) in their movement. On the other hand, the patients treated with the HVLA approach showed better ROMs but not less tension, discomfort or a decrease of the symptoms related to the tension headache.

After the follow-up session, two more treatments were done before the fifth and final consultation in which the second assessment was performed.

In the second assessment of the results of the treatment, done in a follow-up consultation a month after the initial one, all the patients had significantly improved their symptoms. All of them reported less pain and discomfort, less stiffness and tightness in their muscles, less tenderness in the neck and suboccipital area and better ROMs.

The main difference was that those treated with the Jugular Foramen Release Technique mentioned that the tension headache and its symptoms were completely gone while those treated with the HVLA Technique still had episodes of tension headache and symptoms of it even if they made great improvements.

At the last assessment, done through a questionnaire at the eight weeks/sixty days since the first session, patients were simply asked to explain which were the differences they noticed in their condition since the treatment started.

All those treated with the Jugular Foramen Release Technique confirmed the improvements mentioned on the previous assessment a month prior and reported that they did not have any relapse of tension headache or any of its symptoms. The treatment seemed to have completely fixed the problem.

On the other hand, those who received HVLA treatment, did not have long lasting effects; while they did show improvements on the second assessment, on this third and final, most of them reported that the tension headache did not go away completely and that symptoms were starting to increase again. They still thought the treatment was successful because it had improved their condition but it did not fix it completely.

Other effects that were reported by the patients treated with the Jugular Foramen Release Technique were: improved digestion, better mood accompanied, in some cases, by a feeling of calmness and stillness and better sleep.

At last, the patients treated with HVLA Techniques did not have any other effects than those mentioned previously.

Here are the tables of results from the two Groups.

Table 1. Group 1 results.

Group 1: Jugular Foramen Release Technique	**1st assessment** (five days since 1st treatment)	**2nd assessment** (one month since 1st treatment)	**3rd assessment** (two months since 1st treatment)
Decreased tension and tightness	**X**	**X**	**X**
Improved ROMs		**X**	**X**
Decreased pain and discomfort	**X**	**X**	**X**
Recovery from symptoms of headache		**X**	**X**
Other noticeable effects			**Improved digestion, better mood, better sleep.**

Table 2. Group 2 results.

Group 2: HVLA Techniques	**1st assessment** (five days since 1st treatment)	**2nd assessment** (one month since 1st treatment)	**3rd assessment** (two months since 1st treatment)
Decreased tension and tightness		**X**	**X**
Improved ROMs	**X**	**X**	**X**
Decreased pain and discomfort		**X**	**X**
Recovery from symptoms of headache			
Other noticeable effects			

13. DISCUSSION.

The results obtained in the study show that both the Jugular Foramen Release Technique and the HVLA Techniques can give positive effects when treating tension headaches. Both techniques are effective and give good outcomes but only one of them was able to produce long-lasting effects.

It is believed that the Jugular Foramen Release Technique was able to give better results because it acted directly on the Spinal Accessory Nerve (CN XI) and Vagus Nerve (CN X); it is a technique that enhances the abilities of these two nerves by freeing their pathway out of the Jugular Foramen and by balancing their efferent stimuli.

For example, the Trapezii muscles, which are directly innervated by the Spinal Accessory Nerve, if they can receive the right stimuli from it, then they can contract and release as they are supposed to, without being in a constant state of tightness and tension as when there is deficiency in the nerve signal.

Therefore, by resetting these nerves and their pathways and by allowing them to reach their targets without being obstructed by other tensions or structures, the nerves are able to perform their duty correctly.

Also, the fact that people treated with the Jugular Foramen Release Technique felt a state of calmness and improved mood or digestion shows that the Vagus Nerve function was improved as well. A well-functioning Vagus Nerve will have positive effects on our digestion but also on our mood as the guts and internal organs are closely linked to our emotional state and can dictate changes in it.

The improvement in ROMs, pain levels and symptoms can be found in both groups. On one side, it was already explained how the long-lasting results were possible thanks to the Jugular Foramen release; on the other hand, HVLA techniques were still effective but only for a short amount of time.

It is believed that these results were given because of the fact that HVLA Techniques did not act on the nerves themselves but acted mostly on the dysfunctional joints and the spasms muscles without actually treating the origin of the problem.

Just because we treat the muscle and the joints, it does not mean that we are treating the origin of the problem; most of the time the origin tends to be neurological as the nerves have a bigger role in most musculoskeletal pathologies and dysfunctions since it is thanks to them that the muscles can contract and therefore move the joints.

14. CONCLUSION(S).

In conclusion, evidence from this study shows that the HVLA Techniques showed good outcomes in the treatment of tension headache, improved ROMs, decreased pain and a slight decrease of symptoms of headache. However, the results, even if positive, were not long-lasting and patients reported an increase of the symptoms about 1 month after the end of the treatment.

On the other hand, the treatment of tension headache with the use of the Jugular Foramen Release Technique gave overall better results. The patients reported decrease pain, improved ROMs, important decrease of the symptoms of headache but also improved digestion, better mood and a sense of calmness.

All these improvements were long lasting as all patients mentioned in the sixty days follow-up questionnaire. The fact that this technique was also able to give more benefits to the patients in different areas of the body suggest that it should be considered as part of the treatment protocol for other disorders, pathologies and dysfunctions. For example, it could be helpful when treating digestive issues such as Irritable Bowel Syndrome (IBS), constipation and gastric reflux; or when treating emotional state disorders like depression and anxiety.

Finally, it is possible to say that even if both techniques were effective in the treatment of tension headaches, the Jugular Foramen Release is the technique that gives the better and more long-lasting results and, therefore, it should be the most recommended and applied technique when treating this kind of disorder.

15. REFERENCES.

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16. TABLES, FIGURES AND ABBREVIATIONS

HVLA: High Velocity Low Amplitude
ROMs: Range(s) of Motion(s)
TMJ: Temporomandibular Joint
FRS: Flexion, Rotation and Side-bending
ERS: Extension, Rotation and Side-bending
SCMs: Sternocleidomastoid(s)
IBS: Irritable Bowel Syndrome
CN: Cranial Nerve
C1: 1st Cervical Vertebra
C2: 2nd Cervical Vertebra
C5: 5th Cervical Vertebra