National University of Medical Sciences

Bachelor of Science in Osteopathic Manual Practice BSc (OMP)

Title: Clinical Efficacy of Craniofacial Dry Needling

Name: Lai Yann Tyng Aaron
Student number: U2209009

Date: 15 November 2022

Course name: Research Project and Thesis

Course code: TH402

Introduction

Introduction of Craniofacial Dry Needling

What is Craniofacial disorder and facial paralysis

Craniofacial ailments
Myofascial pain,
Bell's Palsy and Facial Paralysis

What is Dry needling

Difference between Dry needling, wet needling and acupuncture

Theory and basis of dry needling
Myofical
Commonly used trigger points and related nerves
TCM Theory and meridance
QI and de Qi
Commonly used acupoints for Facial paralysis

Risk involved with dry needling and acupuncture

General risk of needling

Efficacy of dry needling in treating facial paralysis

Difference between Facial Paralysis and Bell’s Palsy
Symptoms and Trends
Testing and Diagnosis
Treatments and Acupoints
Recovery Rate and Data

Conclusion

References

Introduction

- Introduction of Craniofacial Dry Needling

Craniofacial Dry Needling is a form of treatment that involves using very fine filament needles on a patient's head and face to relieve ailments and disorders. Treatable conditions may vary from mild to severe and depending on their conditions recovery time varies. Conditions such as Trigonocephaly or Pierre Robin Syndrome are birth defects and Craniofacial Dry Needling might not be an ideal treatment. However, other conditions such as Myofascial Pain or Facial Paralysis will be ideal and could achieve good recovery from such a treatment.

Present day stress, anxiety and mental health disorders are contributing factors that can cause Facial Paralysis. Many individuals such as famous performers and politicians have such experiences. By losing control of facial muscles, it is difficult for patients to smile, frown, or make other facial expressions. Being in such a state would negatively affect their confidence and cause them to be more stressed and depressed.

Such a condition could occur for various reasons and the condition could either be permanent or temporary. Facial nerve palsy and Bell's Palsy are amongst the leading types of condition for Facial Paralysis.

What is Craniofacial disorder and Facial Paralysis

- Craniofacial disorder

Craniofacial disorder is a broad term that describes malformations of the face and skull that may be resulted from birth defects, diseases or traumas. Such disorders can be mild or severe but it is especially common in infants.

When infants are affected, it is crucial to determine which parts of the skull are involved as there are usually several telltale facial anomalies such as disproportionate head shape, abnormal skull and facial bones or neck tilt. Apert syndrome, Crouzon syndrome, Pierre Robin syndrome and Torticollis are some examples of Craniofacial abnormalities.

Below are the accompanied definitions:

Table 1: List of Craniofacial disorders

Syndrome	Definition
Apert syndrome	A Craniofacial abnormality, identified by an abnormal head shape with small upper jaw and the fusion of fingers and toes.
Crouzon syndrome	A birth defect, identified by abnormalities in the skull and facial bones with fusion of the coronal suture on both sides of the skull. The fusion would cause the skull to be shorter in the front and back as well as flatter cheekbones and nose.

Pierre Robin syndrome	A birth defect, identified with abnormalities in the facial bones with a smaller and lower jaw or receding chin. Such occurrence would cause the tongue to roll back into the throat, and could cause choking or breathing difficulties.
Torticollis	A condition that Is identified with localised muscle tension on one side of the neck that causes involuntary head twist, rotation and tilt at an odd angle.

- Myofascial pain

Myofascial pain syndrome (MPS) is a chronic pain disorder. It is often caused by stimulus, such as muscle tightness, injuries, repetitive work and stress. As a result, our body compensates for the activities and causes stress points in our muscles. These points are called trigger points (TPs) and could become sensitive or painful. The onset of pain is usually localised but at times it may cause pain to unrelated parts of the body as well. This occurrence is called referred pain.

Other factors that may increase the risk of muscle tension and trigger points includes:

- Muscle injury
- Occupational hazards
- Poor posture
- Degenerative Joints
- Stress and Anxiety

Predominantly, trigger points are a result of prolonged muscular tension, repetitive motions due to work, hobbies or stress. People who frequently experience anxiety or work in a high pressure work environment have a higher tendency to clench their muscles which then encourages the development of trigger points.

Trigger points do not only cause pain and discomfort. Through clinical observations, many have also reported experiencing sleeping difficulties, restricted range of motions and in prolonged case development of fibromyalgia. As the associated symptoms persist and worsen, it is often identified as Myofascial Pain Syndrome.

Treatment for MPS includes physical therapy, soft tissue work, trigger point dry needling, medications and self relaxation techniques.

- Bell's Palsy and Facial Paralysis

Bell’s Palsy is one of the most common forms of facial paralysis. It is often accompanied with temporary weakening or paralysis of facial muscles due to facial nerve impingement or inflammation due to viruses such as Herpes simplex virus (cold sores) or localised swelling. With facial nerves being affected, it prevents the nerves from sending correct signals to the brain and facial muscles, which results in some form of temporary facial paralysis .

In contrast, patients with facial paralysis could also experience weakness of the facial muscles. However, there might be varying degrees of weakness caused by temporary or permanent damage to the facial nerve. Damage could be due to nerve injuries, trauma, infections, tumours or other diseases.

Patients suffering from Facial paralysis cannot move some or all of the muscles on the affected side of their face. Furthermore, this can cause visually disproportionate face, along with other disabilities that makes swallowing, speaking, and chewing increasingly difficult.

Bell's Palsy can occur very quickly, with symptoms and paralysis setting in as soon as 48 hours after onset. Patients suffering from Bell's Palsy have a relatively good prognosis, with approximately 90% of patients completely recovering.

What is Dry Needling

Dry Needling is a physical therapy technique which involves using a Dry Needle. Generally an acupuncture needle or a very thin, fine filament. As the needle is inserted into the skin and to specific trigger points, surrounding muscles might respond with a twitch reflex and after the treatment, patients might feel sore and sensitive for a few days.

The practice of trigger point Dry Needling is based on the thorough understanding of human anatomy and evidence based research of trigger points. Referencing to the study published in the Journal of Manual and Manipulative Therapy. The purpose of Dry Needling is to target myofascial trigger points or segments of peripheral nerves with the intention to relieve pain, promote healing and improve range of motion.

Difference between Dry Needling, Wet needling and acupuncture

The key difference between Dry Needling and wet needling is that Dry Needling involves needles that are thin yet solid, with intention to puncture the skin. Unlike needles used in wet needling, those needles are hollow and used with the intention for fluid transfer. Such needles are used when we need to inject something through the needle like a vaccination booster or when there is a need to draw blood out for samples like venipuncture.

Next, we look at the difference between Dry Needling and acupuncture. Both techniques might seem similar as they both use thin, solid filament needles to puncture the skin. However, each practice has an extremely unique methodology and approach to bring forth healing.

As mentioned above, the theory of Dry Needling is based upon Western medical principles, approaches and anatomy. Unlike acupuncture, which is based on the theory of Traditional Chinese Medicine involving the movement and circulation of "Qi" or "Essence". Which is a theory that dates back thousands of years to ancient China.

When proceeding with Dry Needling, It is crucial to identify and use the precise trigger points. By doing so, the muscle fibres and nerves would be stimulated which in turn causes

a biochemical reaction which could help with muscle tension, inflammation and physiological changes.

Compared to acupuncture, within the theory of Traditional Chinese Medicine, there is a circulation theory called the meridian. This theory is one that explains circulation of the body's energy and blood. When the passageway of the meridian is obstructed, it would then cause pain, numbness and other ailments. In total, there are 12 of such main meridians in the body and acupoints are scattered along these meridians each with specific therapeutic effects. However, there are no modern scientific instruments that can accurately map out meridians and acupoints on a consistent and unbiased basis.

Risk involved with Dry Needling and acupuncture

- General risk of needling

Given the invasive nature of both techniques, side effects such as soreness, bleeding or bruising at the needle insertion site is common. Other side effects such as risk of infection are minimal as single-use, disposable needles are now the practice standards, not forgetting proper skin preparation and disinfection.

Patients who are receiving needle treatment for the first time might experience Fatigue, Drowsiness, Dizziness, Nausea and Sweating. Other times Bruising, prolonged pain and extensive swelling may be observed in the following days after treatment. In rare cases, Pneumothorax, Puncture to other vital tissue or organ or even Systemic infection might occur due to position change of patients during treatment or an oversight caused by the physician.

Proper history taking and diagnosis of conditions should be done to ensure suitability of needle treatment. Patients that have bleeding disorders such as haemophilia or are using blood thinners should avoid such treatments. Other patient groups such as pregnant women, patients with infection, skin disorder or diseases should avoid such treatments as well.

During pregnancy, needling in the abdominal area or lumbosacral region is highly discouraged and should be avoided. It has been shown that needling in such regions could stimulate the reproductive system resulting in the early delivery of the fetus or miscarriages.

Efficacy of Dry Needling in treating Facial Paralysis

- Difference between Facial Paralysis and Bell's Palsy

The biggest difference between Facial Paralysis and Bell's Palsy lies in how the conditions were diagnosed.

When a patient is diagnosed with Facial Paralysis, potential causes for the paralysis could be identified and linked to either growth of tumour, localised infection or nerve damage. However, in most cases of Bell's Palsy there is currently no known reason for the onset of disorder. Physicians often find this frustrating as it's difficult for them to determine the best course of action to aid in a patient's symptoms.

Furthermore, through clinical observation Facial Paralysis tends to be more severe, permanent and less receptive to generic treatment as compared to Bell's Palsy. Symptoms of Facial Paralysis usually persist with patients and could worsen overtime. Having said that, patients that decide to do without treatment can experience Facial Paralysis symptoms that last a lifetime.

Comparatively, patients with Bell's Palsy may recover well without any permanent damage and regain facial function on their own, not requiring any surgical or major treatment. However, if symptoms of Bell's Palsy persist for three months or longer, patients should consider a differential diagnosis and seek treatment.

- Symptoms and Trends

Facial paralysis such as Bell's Palsy is also known as acute peripheral Facial Palsy. It is a condition that causes sudden loss of strength in the muscles on one side of the face. The exact cause is unknown and it could take place at any age. Several experts have hypothesised that the condition could be caused by swelling, inflammation or a viral infection of the nerve that controls the respective muscles on the affected side of the face.

In most cases, the weakness experienced is temporary and progressively improves over upcoming weeks. Symptoms usually start to improve within the first few weeks and full recovery is to be expected in about six to eight months. Despite this, a small number of patients continue to experience Bell's Palsy for life and sometimes the disorder could occur more than once.

A typical onset of the condition is that one side of the facial muscle would experience loss of strength. The affected side might appear droopy, smiles are lopsided and eyes on the affected side would not be able to shut completely.

Other Signs and symptoms of Bell's Palsy may include:

- Rapid onset of weakness to total paralysis on one side of the face
- Facial droop and difficulty making facial expressions, such as closing of eyes or smiling
- Drooling
- Pain around the jaw and ear area on the affected side
- Increased sensitivity to sound on the affected side
- Headache
- Loss of taste
- Changes in the amount of tears and saliva produced

- Testing and Diagnosis

Apart from visual symptoms, comprehensive lab testing can also be performed to diagnose and help determine if a patient is suffering from Bell's Palsy.

Clinical tests such as Ear, Nose and Throat (ENT) evaluation, neurological test which includes Computed Tomography (CT) scans and Magnetic Resonance Imaging (MRI) exam may be used to aid in the diagnosis of Bell's Palsy. Depending on the severity of a patient's symptoms, an ENT or facial nerve specialist might recommend additional tests such as Electroneurography (ENoG).

ENoG aims to assess integrity of facial nerves by the intensity of electrical conductance. It is common to have the test first done on one side of the face. With two electrodes being used, the first is taped over the stylomastoid foramen which is behind and under the ear and second is taped near the nasolabial fold. Results obtained will be the measurement of end plate noises and spikes. The trends and consistency of electrical conductance can directly help with the identification of affected nerves, sites of trigger zones and trigger points. There have been studies showing that End-Plate noises are usually more intense around trigger points (TrPs) with the use of electromyography. These tests are highly useful for patients dealing with severe symptoms of Facial Paralysis or Bell's Palsy and helps with differential diagnosis to eliminate various causes.

In addition, we can use other medical devices such as ultrasound to confirm the diagnosis. Diagnostic ultrasound can also be used to contrast TrPs and the zones with TrPs becoming more hypoechoic compared with the surrounding muscles. These tests can be used in conjunction with other diagnostic tests to identify the root cause of a patient's symptoms.

It is common for Bell's Palsy to result from inflammation of the facial nerve, where it leaves the skull at the stylomastoid foramen. Depending on test results and diagnosis, a custom treatment plan will be developed for the patient. Oral medications such as High-dose steroids (prednisone) and antiviral medications (Famvir or Valtrex) may be used as part of the treatment. Botox injections, neuromuscular retraining and selective neurolysis surgery might also be suitable for patients looking to improve facial symmetry and promote facial nerve regeneration. Alternatively, patients might seek other forms of treatment that are less invasive such as Facial Scraping or Dry Needling.

To track and measure improvement in patients, clinicians might use a list of grading systems such as House-Brackmann Facial Nerve Grading System (HBFNGS), Facial disability index (FDI) and electroneurogram (EnoG) to determine progress. In general, these grading systems evaluate baseline functionalities of facial muscles and determine the degree of Facial Paralysis.

Apart from evaluating muscle functionality, measurement of pain and impression may also be used to track improvement. Pain may be measured with the Visual Analog Scale (VAS) or Pressure Pain Threshold (PPT) scores as the Patient Global Impression of Improvement Scale and the Clinical Global Impression of Improvement Scale would track impressions of patients and physicians.

- Treatments and Acupoints

Clinical Dry Needling treatment for Facial Paralysis and Bell's Palsy, often require patients to maintain muscle contraction (MMC) to help identify myofascial trigger points. During the physical examination, the contraction will help to determine these painful trigger points within the muscles and will be used in treatment later on. The most common locations of trigger points are in the Procerus, Levator Labii, Buccinators Muscle, Zygomaticus Minor, Zygomaticus Major, Depressor Anguli Oris and Mentalis.

Comparing treatment to Traditional Chinese Medicine, common acupuncture points used are extracted from several different meridians. They include points from Gallbladder (GB), Stomach (ST), Liver (LI), Small Intestine (SI), and Large Intestine (LU) meridians. The list of exact acupoints and their anatomic locations are included in the table below.

Table 2: List of Commonly Used Acupoints for Bell's Palsy

Meridians	Point No.	Name	Chinese name	Anatomic location
Gallbladder (GB)	GB1	Tong Zi Liao	瞳子髎	0.5 cun lateral to the outer canthus of the eye in a depression on the lateral side of the orbit.
	GB8	Shuai Gu	率谷	Superior to the apex of the auricle, 1.5 cun within the hairline.
	GB20	Feng Chi	风池	In the depression created between the origins of the Sternocleidomastoid and Trapezius muscles, at the junction of the occipital and nuchal regions. Lateral and level with GV16.
Stomach(ST)	ST4	Di Cang	地仓	Directly below the pupil lateral to the corner of the mouth.
	ST6	Jia Che	颊车	One finger

				width anterior and superior to the lower angle of the mandible, at the prominence of masseter muscle.
	ST7	Xia Guan	下关	Anterior to the ear, with mouth closed, in the depression at the lower border of the zygomatic arch, anterior to the condyloid process of the mandible.
	ST8	Tou Wei	头维	At the corner of the forehead, 0.5 cun within the hairline at the corner of the forehead, 4.5 cun lateral to the midline at GV24.
	ST36	Zu San Li	足三里	3 cun below ST35 one finger width lateral from the anterior crest of the tibia, in the tibialis anterior muscle.
Small Intestine(SI)	SI19	Ting Gong	听宫	Anterior to the tragus and posterior to the condyloid process of the mandible in a depression formed when the mouth is opened.
Large Intestine(LI)	LI4	He Gu	合谷	On the dorsum of the hand, between the 1st

				and 2nd metacarpal bones.
	LI20	Ying xiang	迎香	In the nasolabial sulcus, level with the midpoint of the lateral border of the ala nasi.

- Recovery Rate and Data

By looking at the acupoints used and trigger zones that have been identified. Many of the selected acupuncture points overlie the pathways of affected nerves (trigger zones) which was determined by pain scale such as PPT or tests such as EnoG.

Regardless of the title of treatment, data has been recorded in various research papers. Many of them compared needling treatments to sham and no treatment, or needling treatment compared to electro-acupuncture. Most of the findings have shown outstanding clinical results and presented that needling treatment is crucial to promote early stage recovery while shortening time taken to reach full or satisfactory recovery.

In a study done by Andrew J. Vickers was able to consolidate data from a total of 20,827 patients across 39 trials. He summarises that “Acupuncture was superior to both sham and no acupuncture control for each pain condition”. Furthermore, another randomised controlled trial study done by Ying Li from China, has concluded the best time for intervention is within the first 3 weeks of symptoms being presented and that “ simple filiform needle therapy is recommended in the acute stage”. In addition, rates of improvement in the acute stage and resting stage were 50.1% (223/445) and 52.1% (162/311), which were superior to the recovery stage of (25.9%, 35/135) respectively.

Similarly, Canan Ertemoğlu Öksüz, also conducted a study with forty patients suffering from Bell's Palsy. Results were that “There was a significant difference between pretreatment and posttreatment of the patients within the acupuncture group ($p = 0.036$)”. The study measured compound motor action potential values pre and posttreatment while also measuring SB and HB scores. Both groups of value were of “acceptable value” and were referred to as “safe methods in the treatment of Bell's Palsy”.

Conclusion

In conclusion, Cranial facial Dry Needling is effective in the treatment of conditions such as Bell's Palsy. TrPs and acupoints have high anatomical correlations considering relationships between acupoints to Cranial nerves and peripheral nerves. Localised needling on large peripheral nerves or multiple points on facial muscle zones can be effective in treating said neuropathic conditions.

Also, interventions and treatments should begin as early as possible (acute stage) to achieve satisfactory recovery. Recovery progress could be tracked with House-Brackmann Facial Nerve Grading System or electroneurography measurements. Such a structural approach has led to the development of a standardised protocol for treatment. However, treatment should only be carried out by medical acupuncturists, or professionals that are trained in Dry Needling such as medical doctors or Osteopaths because of its neuroanatomical nature.

Lastly, future studies could explore electrophysiological changes in nerve function and rate of recovery by comparing Dry Needling, Acupuncture and Electro-Acupuncture respectively.

References

Babak Azizzadeh, MD, FACS. Facial Paralysis Institute. (n.d.). Retrieved October 24, 2022, from https://www.facialparalysisinstitute.com/blog/the-difference-between-bells-palsy-vs-facial-paralysis/

Boyce, D., Wempe, H., Campbell, C., Fuehne, S., Zylstra, E., Smith, G., Wingard, C., & Jones, R. (2020, February). *Adverse events associated with therapeutic dry needling*. International journal of sports physical therapy. Retrieved October 24, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7015026/

Chiro. (n.d.). Retrieved October 24, 2022, from https://chiro.org/acupuncture/ABSTRACTS/Acupuncture_Points.pdf

Craniofacial abnormalities. Craniofacial Abnormalities | Johns Hopkins Medicine. (2021, August 8). Retrieved October 24, 2022, from https://www.hopkinsmedicine.org/health/conditions-and-diseases/craniofacial-abnormalities

Dimitrova, A., Murchison, C., & Oken, B. (2018, August 1). *The case for local needling in successful randomized controlled trials of peripheral neuropathy: A follow-up systematic review*. Medical acupuncture. Retrieved October 24, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6106766/

Dunning, J. (2016, November 30). *Dry needling for Bell's Palsy: The Evidence & Management*. Spinal Manipulation Institute. Retrieved October 24, 2022, from https://spinalmanipulation.org/2016/11/30/dry-needling-for-bells-palsy-evidence-management/

Dunning, J., Butts, R., Mourad, F., Young, I., Flannagan, S., & Perreault, T. (2014, August). *Dry needling: A literature review with implications for clinical practice guidelines*. Physical therapy reviews : PTR. Retrieved October 24, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4117383/

Effects of electroacupuncture therapy for Bell's Palsy from acute stage ... (n.d.). Retrieved October 24, 2022, from https://www.researchgate.net/publication/281485730_Effects_of_electroacupuncture_therapy_for_Bell's_palsy_from_acute_stage_Study_protocol_for_a_randomized_controlled_trial

KJ;, C. (n.d.). *Neuroanatomical characteristics of acupuncture points: Relationship between their anatomical locations and traditional clinical indications*. Acupuncture in medicine : journal of the British Medical Acupuncture Society. Retrieved October 24, 2022, from https://pubmed.ncbi.nlm.nih.gov/22002963/

Li Y;Li Y;Liu LA;Zhao L;Hu KM;Wu X;Chen XQ;Li GP;Mang LL;Qi QH; (n.d.). *[acupuncture and moxibustion for peripheral facial palsy at different stages:*

Multi-central large-sample randomized controlled trial]. Zhongguo zhen jiu = Chinese acupuncture & moxibustion. Retrieved October 24, 2022, from https://pubmed.ncbi.nlm.nih.gov/21528591/

Li Y;Li Y;Liu LA;Zhao L;Hu KM;Wu X;Chen XQ;Li GP;Mang LL;Qi QH; (n.d.). *[acupuncture and moxibustion for peripheral facial palsy at different stages: Multi-central large-sample randomized controlled trial]*. Zhongguo zhen jiu = Chinese acupuncture & moxibustion. Retrieved October 24, 2022, from https://pubmed.ncbi.nlm.nih.gov/21528591/

Li, P., Qiu, T., & Qin, C. (2015, May 14). *Efficacy of acupuncture for Bell's Palsy: A systematic review and meta-analysis of randomized controlled trials*. PloS one. Retrieved October 24, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4431843/#:~:text=Acupuncture%20seems%20to%20be%20an,heterogeneity%20of%20the%20included%20studies.

Mediphysio. (2019, October 10). *What is dry needling and how can it benefit me?* MediPhysio. Retrieved October 24, 2022, from https://mediphysio.com.au/what-is-dry-needling-and-how-can-it-benefit-me/

U.S. Department of Health and Human Services. (n.d.). *Acupuncture: What you need to know*. National Center for Complementary and Integrative Health. Retrieved October 24, 2022, from https://www.nccih.nih.gov/health/acupuncture-in-depth

U.S. Department of Health and Human Services. (n.d.). *Bell's palsy fact sheet*. National Institute of Neurological Disorders and Stroke. Retrieved October 24, 2022, from https://www.ninds.nih.gov/bells-palsy-fact-sheet

U.S. National Library of Medicine. (n.d.). *Home - books - NCBI*. National Center for Biotechnology Information. Retrieved October 24, 2022, from https://www.ncbi.nlm.nih.gov/books

Vickers, A. J., Vertosick, E. A., Lewith, G., MacPherson, H., Foster, N. E., Sherman, K. J., Irnich, D., Witt, C. M., Linde, K., & Acupuncture Trialists' Collaboration. (2018, May). *Acupuncture for chronic pain: Update of an individual patient data meta-analysis*. The journal of pain. Retrieved October 24, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5927830/

Zha, M., Chaffee, K., & Alsarraj, J. (2022, January 17). *Trigger point injections and dry needling can be effective in treating long COVID syndrome-related myalgia: A case report - journal of medical case reports*. BioMed Central. Retrieved October 24, 2022, from https://jmedicalcasereports.biomedcentral.com/articles/10.1186/s13256-021-03239-w#:~:text=Wet%20needling%20is%20the%20addition,treatment%20modalities%20for%20myofascial%20pain.

Öksüz CE;Kalaycıoğlu A;Uzun Ö;Kalkışım ŞN;Zihni NB;Yıldırım A;Boz C; (n.d.). *The efficacy of acupuncture in the treatment of Bell's Palsy Sequelae*. Journal of

acupuncture and meridian studies. Retrieved October 24, 2022, from https://pubmed.ncbi.nlm.nih.gov/30946987/