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The simple treatment of chronic facial pain due to trigeminal neuralgia with dental occlusal equilibration☆

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ABSTRACT

Background: Trigeminal neuralgia (TN) is the most common cranial neuralgia in adults, with a slightly higher incidence in women than in man. This chronic pain condition affects the trigeminal nerve, also known as the 5th cranial nerve. Antiseizure drugs are the main biomedical treatment of TN. However, TN is not the only source of chronic facial pain (CFP). Background persistent idiopathic facial pain (PIFP) is also a chronic disorder. The underlying pathophysiologies of TN and PIFP are still unknown. Occlusal equilibration appliance (OEA) will stop bruxism by relaxing all mastication muscle especially, The Lateral Pterygoid muscle. The posterior trunk of the mandibular division of the trigeminal nerve normally descends deep to the lateral pterygoid muscle. In three of 52 dissections the three branches of the posterior trunk were observed to pass through the medial fiber of the lower belly of the lateral pterygoid muscle.

Case description: A 70 year-old Thai female with left facial pain was diagnosed by a neurologist with TN 4 years prior to seeking occlusal equilibration. The cause of facial pain was treated with occlusal equilibration appliance.

Conclusion: A complete dissipation of pain was achieved after using occlusal equilibration appliance for 2 weeks and 3 days. The present article is the one of the first to demonstrate the efficacy of occlusal equilibration appliance treatment for chronic facial pain. As the present article shows, OEA treatment affects TN and CFP successfully. However, additional large-scale studies are necessary to validate the efficacy of OEA in TN and CFP treatment.

1. Background and importance

Trigeminal neuralgia (TN) is the most common cranial neuralgia in adults, with a slightly higher incidence in women than in men [1]. This chronic facial pain (CFP) condition affects the trigeminal nerve, also known as the 5th cranial nerve. It is one of the most deeply distributed nerves in the head. Antiseizure drugs are the main biomedical treatment for TN [1]. However, atypical facial pain is not necessarily caused by TN [2]. Background persistent idiopathic facial pain (PIFP) is also a chronic disorder, recurring daily for more than 2 h per day over more than 3 months [2]. PIFP occurs in the absence of clinical neurologic deficits [2]. The underlying pathophysiology in PIFP is still unknown [3]. Nevertheless, neuropathic mechanisms may be relevant in PIFP [2]. CFP is a debilitating and challenging condition for both clinicians and researchers [4]. Despite intense research, it is still not clear why some individuals develop chronic pain while others do not; nor is it clear how to heal this disease [4]. TN and PIFP are considered to be two of the most confusing and difficult to treat facial pain conditions [1]. The pharmacologic and surgical treatment of both TN and PIFP has not been evaluated sufficiently [1]. Although TN is typically characterized by brief attacks of severe pain, each followed by an asymptomatic period, some patients with TN may also have a constant dull background pain [1]. This constant pain sometimes makes differential diagnosis from PIFP challenging [1]. PIFP occurs in the absence of a clinically detectable neurologic deficit identified by clinical examination [2]. Epidemiologic evidence on TN, and even more so on PIFP, is quite sparse, but, generally, both TN and PIFP are believed to be rare diseases [1]. The etiology and underlying pathophysiology of TN and

Abbreviations: AJ, anterior jig; CFP, chronic facial pain; DN, dry needling; FM, facial massage; ICBA, I ching balance acupuncture; LG, leaf gauge; LLLT, low-level laser therapy; MRI, magnetic resonance imaging; OEA, occlusal equilibration appliance; PIFP, persistent idiopathic facial pain; TMD, temporomandibular disorders; TMJ, temporomandibular joint; TN, trigeminal neuralgia; TrP, trigger points

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PIFP are still unknown [1]; however, neuropathic mechanisms might be implicated in PIFP [2]. The present article describes the treatment of TN, using an occlusal equilibration appliance (OEA).

2. Clinical presentation

2.1. History

A 70 years old Thai female attended advanced general dentistry clinic of Faculty of Dentistry, Mahidol University, Bangkok, Thailand. She was suffering from left facial pain and was diagnosed by a dentist as having trigeminal neuralgia (TN). This diagnosis was made shortly after the pain onset, solely based on its character and without any pathologic findings from a magnetic resonance imaging (MRI) scan that the patient had undergone 9 years ago. When she are experienced flank pain. The doctor prescribed MRI only whole abdominal. She just experienced a sharp shooting pain, which was triggered by facial movements, such as chewing, speaking or brushing teeth, and touching certain area of her face. Bouts of pain lasting from a few seconds to several minutes. Episodes of several attacks lasting days, weeks, month or longer. Before she came to attend advanced general dentistry clinic of Faculty of Dentistry, Mahidol University.

2.2. Examination and results

We designed an OEA (Fig. 1) for treatment this patient by inserted this appliance in the mouth for dental occlusal equilibration (deprogram). Patient used this appliance by remain it in the mouth all the time (day and night). Except when she eats food, she removes it out of the mouth. After patient used this appliance for first week, facial pain did not disappear yet. For second week, patient still use this appliance and we prescribed arcoxia (etoricoxib), its action inhibit cyclooxygenase-2 (Cox-2),90 mg, 10 tabs, 1 tab/day after meal for 10 days. After complete dosed of arcoxia, the patient looks freshy, because she can eat normally. After this we will design for oral rehabilitation by keeping verticle dimension in normal. We will follow up the patient next year for this facial pain. Because patient had this facial pain every year for more than 4 years. But every year this facial pain not severe like this year, and the pain disappear about 1–2 weeks. But this year the pain very severe for approximately 6 weeks before treatment. After treatment 2 weeks and 3 days pain disappear.

Fig. 1. Occlusal equilibration appliance (OEA), which is based on Posselt's finding [6], Nerve entrapment in the lateral pterygoid muscle [7], centric relation [8] and vertical dimension [6].

3. Discussion

Before she came here, her neurologist prescribed oral carbamazepine (TegretolR). Because of severe side-effects, this treatment was discontinued without affecting the pain. After that doctor prescribed oral duloxetine Hcl (CymbaltaR). This treatment also caused severe side-effects without affecting the pain and was discontinued. Thereafter, doctor prescribed pregabalin (LyricaR). This pharmacologic treatment was discontinued for the same reasons as the two previous treatments. Given that the patient continued to suffer, doctor suggested acupuncture treatment by using I Ching Balance Acupuncture (ICBA) [5]. Throughout the treatment, patient felt gradual decrease in the intensity of pain. Unfortunately, the improvement was nonlinear. So, she came to advanced general dentistry clinic by suggestion of dentist. And dentist diagnosed that she was TN. Patient reported that she was suffering from left facial pain for approximately 6 weeks.

The present article describes the treatment of TN, using an OEA (Fig. 1), which is based on Posselt's finding [6] (Fig. 2), nerve entrapment in the lateral pterygoid muscle [7] (Fig. 3), centric relation [8] (Fig. 2), and vertical dimension [6]. Posselt's findings can briefly be summarized as follows [6]: The movement area of the mandible in the sagittal and horizontal planes is characteristic of the individual but varies in different persons. However, the border movement paths are reproducible in the same individual. It is suggested that the capsules and capsular ligaments of the temporomandibular joint limit the border movement of the mandible. It is possible for the mandible to perform a posterior hinge-opening and hinge-closing movement. If the opening exceeded 25.8 + −2.2 mm. (Fig. 4), there occurred a forward-downward shift of the condyles. The habitual path of closure follows a course anterior to the posterior path. Positions obtained in habitual closing are farther posteriorly when the head and/or the trunk are reclined.

The rest position (Fig. 5) does not appear to be an extreme posterior mandibular position and the intercuspal position is even more rarely so. Shifting of the mandible from rest to intercuspal position generally involves bodily movement of the mandible. Differences in the limitations of movement of the mandible vary with the difference in degree of posterior bite-opening. This work is recommended to orthodontists, prostheticians, and to practicing dentists in general who are interested in preserving and restoring the human masticatory apparatus.

Normally in maximum contact condyle move downward and forward from centric relation position (slightly in centric) 0.2–2 mm (Fig. 5). The maximum intercuspation make the movement of condyle from centric relation. With this appliance, the anterior raise bite will disclude for posterior teeth. So, the condyle freely move back to centric relation by the release of lateral pterygoid muscle to the completely inactive state (Fig. 1).

It is believed that some case of temporomandibular joint syndrome or atypical facial pain may be due to entrapment neuropathies in the infratemporal fossa [9]. The posterior trunk of the mandibular division of the trigeminal nerve normally descends deep to the lateral pterygoid muscle. The study of nerve entrapment In the lateral pterygoid muscle by “Barry A (Loughner BA)”finding that 3 of 52 dissections the three main branches of the posterior trunk (lingual, inferior alveolar, and auriculotemporal nerves) were observed to pass through the medial fibers of the lower belly of the lateral pterygoid muscle. The mylohyoid and anterior deep temporal nerves also were observed to pass through the lateral pterygoid muscle in other specimens. These nerves entrapments in the infratemporal fossa provides new information concerning the anatomic and clinical relationships between the mandibular nerve and the lateral pterygoid muscle. These findings support the hypothesis that a spastic condition of the lateral pterygoid muscle may be causally related to compression of an entrapped nerve that leads to numbness, pain, or both in the respective areas of nerve distribution [9].

Prosthodontic treatment planning may require articulation dental casts following registration of jaw transfer records. A reproducible and stable jaw relationship is a desirable reference point for cast analysis,

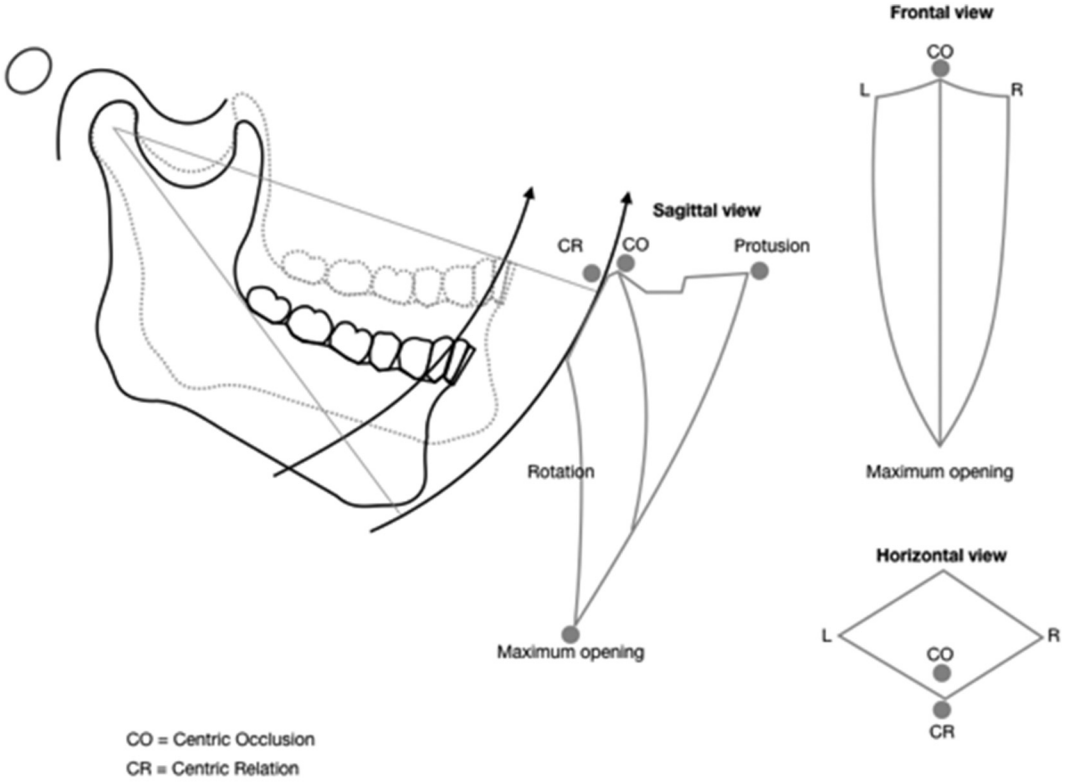

Fig. 2. Posselt's border movement.

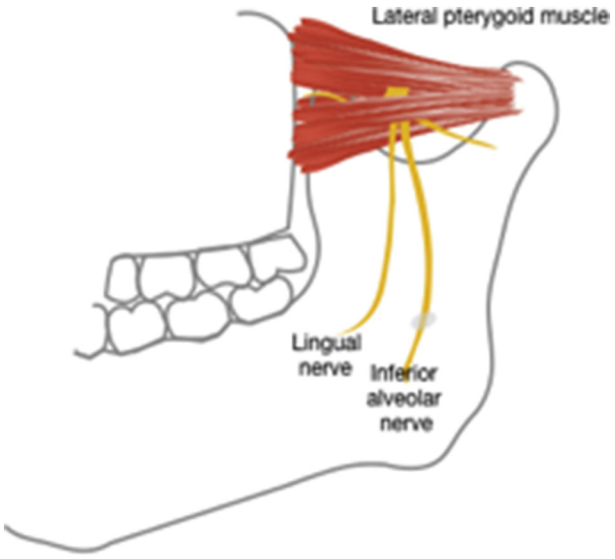

Fig. 3. Nerve entrapment in the lateral pterygoid muscle.

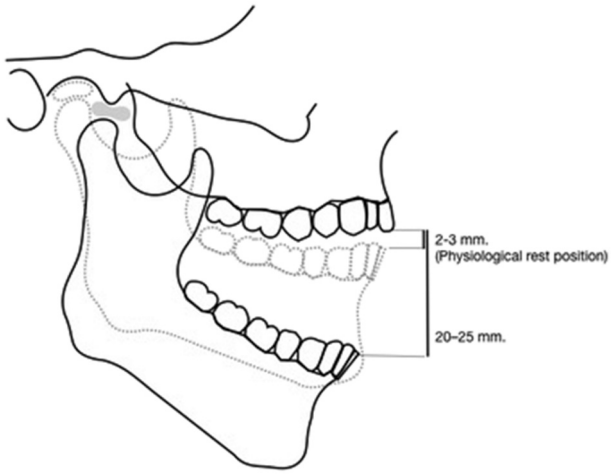

Fig. 4. Translation or gliding movement.
-Translation is the bodily movement of the head of the condyle. It takes place in the upper compartment of the TMJ between the superior surface of the articular disc as it moves with the condyle and the inferior surface of the glenoid fossa.
-If opening of the mandible continues beyond 20–25 mm then translation of the mandible occurs.

case planning and subsequent treatment. The antero-superior condyle position with an appropriately aligned inter-articular disc approximating the articular eminence has been an acceptable reference position for the jaw at a clinically acceptable vertical dimension [7]. It has been suggested that condylar position may be achieved by the co-ordinated activity of the lateral pterygoid muscles during jaw closure and that deflective occlusal interferences may influence the recording of a reproducible jaw position [8,10].

The use of an anterior jig (AJ) [11], Roth's power 'centric relation' registration [12] or a Leaf gauge (LG) [13], are techniques which have been proposed for jaw transfer records to achieve a superior positioning

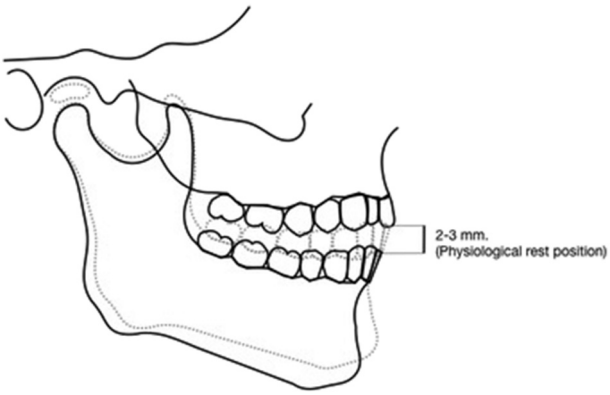

Fig. 5. Physiologic rest position.

of the condyles. These techniques use an anterior stop to disclude posterior teeth and eliminate possible tooth contact interferences. However, there is no consensus on which technique allows the recording of this patient-specific condylar position. Biting on an AJ and an LG effectively removes potential occlusal interferences and separates the posterior teeth. Current understandings of jaw muscle physiology have shown that incisal biting reduces the level of bite-force and alters jaw closing muscle EMG (electromyographic) activity. Jaw recording should allow a consistent position to be obtained as a condylar reference position for each patient. The use of an AJ and an LG should allow a measurable displacement of the condyle, compared with intercuspal clench. Understanding the implications of these clinical procedures and their possible effects on condylar displacement and associated jaw muscle activity should provide objective clinical data to justify the use of a recorded position as a reproducible treatment position (Fig. 6).

Temporomandibular disorders (TMD) are defined as heterogeneous muscoloskeleton and neuromuscular disease that affect the stomatognathic system and are characterized by intermittent pain or discomfort in the temporomandibular joint (TMJ), masticatory muscle, and adjacent tissues. It may also impair the most important orofacial function: mastication, speech and yawning [13,14]. In this respect, a myriad of complex factors may contribute to TMD development and perpetuation. Masticatory muscle pain, joint noise, limited motion range, mandibular deviations, muscular hypertonicity, headache, tinnitus, and vertigo [16] are observed among the signs and symptoms present by TMD patients. Costa et al. [14] point out that myogenic TMD is the most frequent condition among these patients. Myofascial pain is characterized by muscular hyperactivation and reduction in the normal blood flow of the muscle tissues, which leads to the accumulation of metabolism by products in this tissue, causing pain, inflammation, and fatigue [15]. Moreover, hypertonicity and hypersensitivity areas can be observed in a particular muscle zone, which allows identification of the so-called trigger points in a single muscle or in several muscle groups [17]. Furthermore, painful processes cause an intense release of angiogenic chemical mediators-such as phospholipids, which activate nociceptive receptors. With respect to inflammation, a local edema is formed and leukotriene and serotonin are release by virtue of the destruction of platelets [14]. Finally, in fatigue, the lactic acid accumulation that can compromise the musculature relaxation cycle is observed [18].

Currently, several conservative treatment methods are used to treat TMD. They may include use of an occlusal plate, drug routines, physiotherapy, and psychological care, among others. Low-level laser therapy (LLLT) has been widely studies and employed in the scientific and clinical settings with positive results [16] for TMD treatment. The practice of LLLT in TMD cases also favors vascularization, nutrient support, and lymphatic flow increase. As a consequence, it helps to reduce edema and pain to expand mandibular amplitude, among other benefits [14]. Dry needling (DN) has been used by several healthcare professionals in clinical practice for the treatment of TMD [17,19]. It is defined as a method where small-gauge filiform needles are used to stimulate myofascial trigger points (TrP), connective and muscular tissues in order to treat neuromusculoskeletal pain and movement disorders [17,19]. Facial massage (FM), in turn, has been employed as a non-invasive method for treatment of TMD. Holey et al. [20] show that the massage stimulates the parasympathetic center, promoting response in terms of muscle relaxation, where the analgesic effect is associated with activation of the pain gate mechanism [18,20]. Notwithstanding such interventions in TMD treatment, studies associating LLLT, DN, and FM have not been for this purpose yet. Therefore, this case report aims to show the simple treatment of chronic facial pain due to trigeminal neuralgia.

In this case report. We design to release the contraction of lateral pterygoid muscle by using OEA (Fig. 1). This appliance support condyle move back to the centric relation according to Posselt's border of movement theory [6]. The patient reported having these symptoms for approximately 6 weeks. Following examination by a dentist, the patient was diagnosed TN.

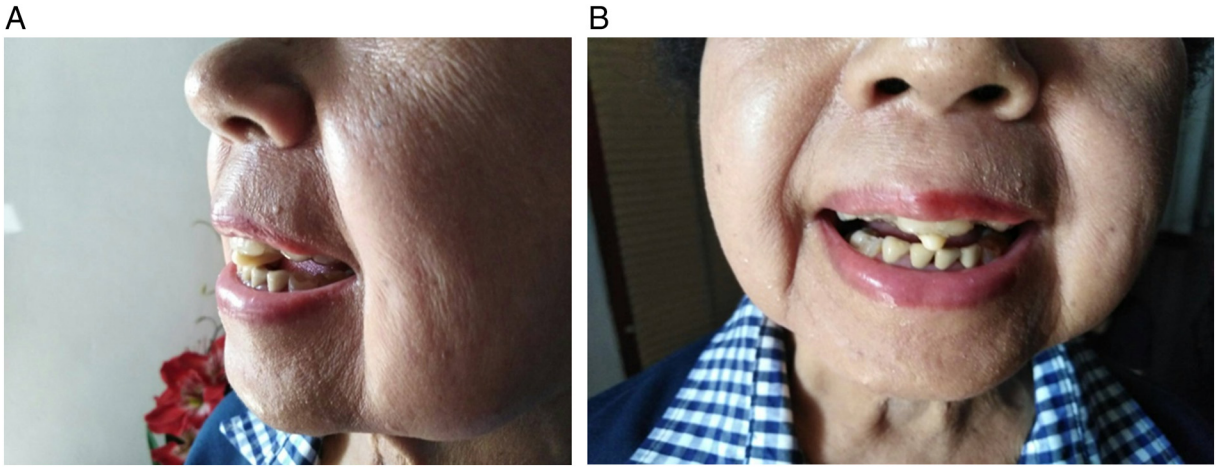

Fig. 6. Patient's picture.
A: Side view.
B: Front view.

4. Conclusion

The present article is the one of the first to demonstrate the efficacy of occlusal equilibration appliance treatment for chronic facial pain. As the present article shows, OEA treatment affects TN and CFP successfully. However, additional large-scale studies are necessary to validate the efficacy of OEA in TN and CFP treatment.

Declaration of Competing Interest

None.

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