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Orofacial Pain: An Overview

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Abstract: Orofacial pain is one of the most widespread and debilitating diseases condition affecting the head, face, and temporomandibular joint (TMJ), as well as other tissues. It can arise from different aetiologies and occur in different regions. In contrast to neurovascular disorders like primary headache, which can manifest as persistent orofacial pain, trigeminal neuropathic problems are caused by damage from dental treatments, infections, neoplasms, or malfunction of the Peripheral or central nervous system. The sufferers' quality of life is impacted by all these trigeminal system disorders. When choosing a treatment plan for orofacial pain problems, a multidisciplinary strategy that uses both non-pharmacological and pharmacological way should be considered.

Keywords: Headache, Neuropathic, Orofacial pain, Temporomandibular disorders, Trigeminal system.

I. Introduction

The variation among trigeminal pain is in the areas affected. The most recent International Classification of Diagnoses (ICHD-3) defines facial pain as in discomfort beneath the plane of orbit surpassing the neck region supplied by the trigeminal branches of nerve. Sometimes Headache is also due to ocular branch and the cutaneous branches of the occipital nerve [1, 2]. Facial pain generally has secondary causes as opposed to headache issues, wherein primary headache disorders are more common. Face-pain-causing diseases like sinusitis and dentoalveolar disorders usually result from inflammation or infection of the craniofacial components [3].

Orofacial conditions affecting 10% of patients with primary headache issues [4]. Orofacial headache can be divided into two main categories, according to Okeson: somatic (Axis 1) and cognitive (Axis 2) disorders, which also include episodic pains like neuralgia and continuous pains like peripheral/ centralized mediated pain, in addition to vascular problems, are types of physical conditions. Disorders involving the TMJ and musculoskeletal components, such as the muscles of mastication and the cervical spine, are included in temporomandibular disorders (e.g., migraine). Among the psychological diseases are mood and anxiety disorders [5, 6, 7]. Furthermore, it's essential that individuals with orofacial distress receive an early diagnosis and proper, appropriate treatment [8].

II. Pathophysiology

The teeth, gingiva, and oral mucosa are all parts of the orofacial area, which also includes the face, jawbone, and temporomandibular joint. Primary receptive neurons, pathological alterations in the ganglion, nociceptive neurons in the pons, and brain activity that controls nociception are all included in the physiology of orofacial pain pathways [9].

- *Trigeminal Ganglion Pathologic Changes and Primary Afferent Neurons:* The trigeminal nerve, also referred to as cranial nerve is a receptive nerve that triggers this area (CN V).
- First order neurons in the trigeminal nerve will produce more pain signals that are sent to the trigeminal ganglia at the proximal receptors in this area by experiencing repeated perinicious impulse resulting uncontrolled swelling trigeminal ganglia and the dorsal root ganglia are related [10, 11].
- *Brainstem Nociceptive Neurons:* The second order neurons in the brainstem's trigeminal nucleus caudalis region are the recipients of pain signals. Second order neurons are found in the trigeminal nucleus caudalis, which resembles the dorsal horn of the spinal cord [12] [10]. There are three sets of nuclei for the nucleus inside the brainstem. These are pars oralis and the par interpolaris the first and second spinal nuclei of the Cranial nerve, respectively. They both transmit a tactile sense to the orofacial region. The pars caudalis, also known as the trigeminal nucleus caudalis, is the third spinal nucleus of the Cranial nerve and is responsible for carrying pain perception in the affected segment after which the impulses will be transmitted to the thalamic third order neurons through ventral trigeminalothalamic tract [13].
- *Brain Function Regulating Orofacial Nociception:* The somatosensory cortex and the nucleus caudalis are interlinked by a mechanism in pain processing way. Naturally, as ascending sensory data is received, then brainstem sends a command to the thalamus exclusively by delivering somatosensory command to periaqueductal grey, locus coeruleus, and rostral ventro medial medulla, brainstem neurons can also change the pain route.

The central midbrain neurons in the periaqueductal grey indirectly influence pain pathways through the locus coeruleus and rostral ventromedial medulla, two brainstem nuclei. Noradrenergic neurons found in the locus coeruleus project to the trigeminal nucleus caudalis. A sizable portion of the medulla called the rostral ventromedial medulla. The trigeminal nucleus caudalis receives impulses from the descending route [10] [14] [15] [16].

III. Classification

International Classification of Orofacial Pain (ICOP) in 2020 was formed by a group of research communities in order to improve classification of orofacial pain disorders [1] [17].

- Orofacial discomfort caused by dentoalveolar and anatomically related structures
  - Dental pain
  - Oral mucosal, salivary gland and jawbone pains
- Myofascial orofacial pain
  - Primary myofascial orofacial pain
  - Secondary myofascial orofacial pain
- Temporomandibular joint (TMJ) pain
  - Primary temporomandibular joint pain
  - Secondary temporomandibular joint pain
- Orofacial pain distributed to lesion or disease of the cranial nerves
  - Pain located to lesion or disease of the trigeminal nerve
  - Pain located to lesion or disease of the glossopharyngeal nerve
- Orofacial pains resembling presentations of primary headaches
  - Orofacial migraine
  - Tension-type orofacial pain
  - Trigeminal autonomic orofacial pain
  - Neurovascular orofacial pain
- Idiopathic orofacial pain
  - Burning mouth syndrome (BMS)
  - Persistent idiopathic facial pain (PIFP)
  - Persistent idiopathic dentoalveolar pain
  - Constant unilateral facial pain with additional attacks (CUFPA)

IV. Epidemiology

Epidemiology of orofacial pain has been sought to identify in several papers in the scientific literature. Most Americans report having three or four distinct types of pain on average each year, according to the 1986 Nuprin Pain Report 10-16% population experienced pain within a 2-week period [18] [19]. According to James *et al.,* more than 81% of people have had considerable jaw pain at some point in their lives [20].

In 1993, Lipton *et al.* revealed that 22% of Americans had had orofacial pain within the previous six months. Although toothaches are the orofacial pain that patients and oral healthcare professionals face most frequently, it rarely is an individual complaint [21] [22].

Compared to headache problems, the face pain in the generally less. According to a Dutch data. Women are more likely than males to experience (any) facial pain, with an estimated figure rate of 35 per 100,000 person-years [23]. Another UK study found that 1.9% of people in the general population had facial pain, of which 50% had chronic pain. Women had a two times higher risk of being affected than men [24].

V. Diagnosis/Evaluation

Understanding the problem and establishing a correct diagnosis are the most crucial steps in addressing orofacial pain. Only with a proper diagnosis the right course of treatment can be decided. Identifying the precise what, where, how, and why of a patient's complaints is the aim of diagnosis. It is more difficult to diagnose pain because of its characteristics [25].

These are the main processes in determining the cause of a pain complaint [25].

- History
- A medical exam
- Correctly determining the extraction site where the pain is coming from.

Scale for evaluating pain.

Rating scale approaches are frequently employed in the measurement of pain severity, and the most popular techniques include:

- A numerical scale
- Analogue visual scale
- McGill Pain Survey
- Behavior Rating System
  - The Numerical Rating Scale comes first (NRS) - The numerical pain rating scale (NRS), which allows patients to rate their current pain severity from 0 ("no pain") to 10 is the most commonly used instrument for pain screening ("worst possible suffering") [25, 26, 27].
  - Visual Analog Scale (VAS) - The mechanism is a 10 centimetre line with anchor points on both ends [26].
  - The McGill Pain Questionnaire (MPQ), commonly referred to as the McGill Pain Index, was created at McGill University in 1971 by Melzack and Torgerson

as a scale for assessing pain. Twenty groups of 78 pain descriptors are then subdivided into sets of phrases that describe the sensory characteristics of pain [26, 28].

- Behavioural Rating Scale - Patients who are incompetent to self report their pain, a clinical observation is used on a rating scale of 0 to 10 [26].

VI. Other Diagnostic Methods

Other approaches to diagnosing orofacial discomfort:

- *A Neurological Exam:* Finding concurrent headache issues and ruling out secondary aetiologies should be the main goals of the neurological examination. For this reason, the following areas should be considered: In the case of neuralgia, sensory abnormalities include the hyperesthesia, cranial autonomic symptoms and/or associated symptoms, like phosentivity of cutaneous presentation of pain disorders.
- *Imaging Study:* To focus the differential diagnosis, imaging investigations are frequently needed. Cone-beam computed tomography, panoramic tomography (DPT), and intraoral radiography are examples of imaging modalities employed by the dental industry (CBCT). There have been several reviews of these techniques in other places [30].

  There is currently no standard for the indication of neuroimaging in disorders of orofacial discomfort.

  The existence of focal neurological impairments, new or continous headaches, with suspected trigeminal autonomic origins, are all indications for neuroimaging tests in headache disorders. These ideas could be modified to assess orofacial pain.

  The purpose of a neuroimaging study, particularly an MRI, is to distinguish between a few particular secondary causes [29] [30].
- *Laboratory Test:* Laboratory testing should be done to confirm the diagnosis when a clinician is suspicious of serious medical issues. Blood studies help to rule out other diseases or systemic conditions [26].

VII. Management of Orofacial Pain

The following elements are covered by pain management [31]:

- Removing unpleasant stimuli that cause disease.
- Interception of nociceptive neurons [32].

VIII. Physical Therapy

Treatments that make use of an instrument, technology, or substance to achieve the desired effect are referred to as physical therapy modalities. These include deep heat, electrogalvanic stimulation, ultrasound, sensory stimulation, and other techniques [33]. Several kinds of sensory stimulation can be made based on the principle of tissue excitation. These are as under cutaneous, transcutaneous, and percutaneous stimulations among them [26].

Cutaneous Stimulation: The effect is brought about by exciting thick myelinated cutaneous afferents, notably motor neurons. There may be additional inhibitory factors at operation. There are numerous cutaneous stimulants, such as superficial massage over the injury site, which is an effective method for alleviating painby including stimulus such as alcohol.

The application of vaporizer therapy is crucial in the treatment of l trigger zone pain. Despite considered initially as to be a local anaesthetic, it is really a modest stimulant of both receptors and, Fibers, resulting in a strategy for inhibiting discomfort. Schwartz devised the painful mandibular movement treatment with ethyl chloride spray in 1954 [26].

Mechanical vibration is also employed to provide total pain relief for at least one-third of patients, and the duration of the alleviation lasts many hours longer than the stimulation [33].

Muscular origin neck and back pains respond well to hydrotherapy. A fast stream of lower water and agitated circulation of water are therapeutic [33].

Transcutaneous electric nerve stimulation: It is performed by following techniques:

- *Tens (Transcutaneous Electric Nerve Stimulation):* This method employs a very low intensity, high frequency current intended in modulating descending pain inhibitory system without implicating opioid peptides by activating non-nociceptive, cutaneous afferents. Even without phasic muscle contraction, it seems like a tingling or vibratory sensations, though proximal muscles may have a minor tonic contraction.The result is generally fast and mainly confined to the particular zone. The analgesic effect is somewhere between 50 and 70 percentage [34].
- *Electroacupuncture (EP):* In order to treat specific cutaneous sites known as acupoints, a low frequency (2H2) yet moderate frequency electric current is used in electroacupuncture (EP). In order to activate the endogenous antinociceptive response, it is administered to enhance neuromuscular nociception. It requires between 15 and 20 minutes to produce the effect, that does not happen instantly [35].
- *Percutaneous Stimulation:* One such technique is utilised in neurosurgery and involves the implanting of electrodes beneath the skin. Electric current used to stimulate the subcutaneous nerves result in sustained analgesia [35].

IX. Ultrasound

Nuclear medicine, in contrary to sonography used for diagnostic

imaging, uses the propagation of ultrasonic waves to provide energies to deep muscle regions in order to increase core body temperature or induce nonthermal physiologic changes. Ultrasound imaging is one-way energy transfer to generate image of visceral organs [26].

X. Thermotherapy

In the domain of rehabilitation, the use of therapeutically transmitted mild heat to boost blood supply expedite healing, promote soft tissue improvement, and lessen tension is referred to as thermotherapy. The use of superficial heat for such treatment of pain may be advantageous because of its effects on metabolic, cholinergic, and cardiovascular activity [36].

XI. Manual Techniques

- *Massage:* Light stimulation of the skin's sensory nerves inhibits the perception of pain. Pain can frequently be diminished by gently massaging the muscles surrounding the painful location [33].
- *Spray and Stretch Method:* Vapocoolant is a fluorocarbon combination, such as fluori-methane. While the muscle is being stretched, parallel sweeps of vapocoolant are being applied in the direction of the pain source. For optimal effects, moist heat should be provided after the therapy. Myofascial trigger points are treated using it [36].
- *Exercise:* The idea that a forceful contraction of a motor units enables an activator muscle to relax is utilised to treat masticatory muscular spasms [33].
- *Behavioural Modification:* Training and counselling are two forms of psychological therapy that can be used.

XII. Pharmacotherapy

A useful complement in treating the symptoms of intracapsular diseases are medications.

The application of analgesics, nonsteroidal anti-inflammatory drugs (NSAIDs), local anaesthetics, oral and injectable corticosteroids, sodium hyaluronate injections, muscle relaxants, injections of botulinum toxin, and antidepressants are common pharmaceuticals tools which are used to treat orofacial pain problems [37] [40].

NSAIDs: These medications are recommended for use in mild-to-moderate acute inflammatory disorders. Ibuprofen and naproxen are two NSAIDs that are frequently used.

Local Anaesthetics: Myofascial trigger points can be present in many different muscles, including the upper trapezius and splenius capitis, however they are typically found in the mastication muscles.

1% procaine (1 cc) is advised due to its minimal toxicity to muscles, however 1% or 2% lidocaine is also frequently utilised [26]. Due to its low toxicity 1% procaine is also recommended.

TMJ Injections: Corticosteroid injections frequently utilised in reducing the TMJ pain. The implication of triamcinolone or dexamethasone with 2% lidocaine is generally advisable [38]. It is appropriate for painful polyarthritic conditions and acute disc displacements without reduction, as well as for acute arthritic Additionally, administration of dexamethasone or triamcinolone used [37].

Muscle Relaxants: When there is acute muscle tension brought on by TMJ issues, muscle relaxants may be administered. Due to potential sleepiness, they are frequently taken at night before going to bed. Therefore, in addition to their ability to prevent muscle discomfort, these medications are very beneficial for treating insomnia in people with irregular sleep patterns. Cyclobenzaprine is a widely used and efficient muscle relaxant [39].

Antidepressants: For more chronic MFP, tricyclictranqullisers such as amitriptyline and nortriptyline can be administered. Additionally, they might be recommended for TMD patients who have melancholy, tension-type headaches (TTH), poor sleep, or poor eating [39].

XIII. Conclusion

Orofacial pain remains a preferred but incompletely understood disorder in field of oral medicine. Recent years have witnessed a proliferation of theories and evidence in this area, which has led to a diversification of treatment techniques. If orofacial pain is evident, an explanation for the patient's pain complaint will be found. Extensive and generally sufficient diagnostic investigations are conducted; if they are ineffective, one should investigate for merely atypical illnesses. A mental evaluation is occasionally also advised. The accurate patient categorization and disciplinary approach will establish helpful guidelines for the use of ongoing information in order to cure orofacial pain disorders based on a supportive and caring attitude.

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