

A Review on Oral and Dental Pain

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Abstract

Orofacial pain (OFP) occurs due to multiple causes, and hence, it is a broad term which comprises of various diseases of orofacial structures, central nervous system or peripheral or psychological abnormality, intracranial pathology, rheumatoid disease, or generalized musculoskeletal disease, or it can be a referred pain from cervical muscles. It is a great challenge for clinicians to deal with all these conditions, as the response to the same noxious stimulus varies from individual to individual. Therefore, to provide an appropriate and optimal treatment, the clinician should acquire a thorough knowledge to make a proper diagnosis. Thereby, this article puts some light on the information related to OFP and an insight into its differential diagnoses.

Introduction

Pain is derived from “Poena,” which is the Latin word meaning punishment from God, and in Greek, it is derived from the word “Poin” which means penalty.

Pain is an emotional and sensory experience, which is of great importance to basic scientists and physicians. It is the most common symptom, for which the physicians are mostly called upon to treat. It is a subjective response and an intense experience, and therefore, pain is very difficult to describe.^[1]

Pain has two universal features:

- It is an unpleasant experience; and
- Pain is mostly evoked by a stimulus which is potentially or actually damaging to living tissues.

Therefore, even though the pain is an unpleasant experience, it mostly serves as a protective mechanism by making the person aware of impeding or actual damage to the body.^[2]

The International Association for the Study of Pain defined it as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”^[2]

According to Bell: “The subject’s conscious perception of modulated nociceptive impulses that generate unpleasant sensory and emotional experiences associated with actual or potential tissue damage or described in terms of such damage.”^[3]

Theories of Pain Perception

The exact influencing factors for pain as well as appropriate perception of pain are not quite well understood. Three theories of pain which are well known are as follows:

- Specificity theory,
- Pattern theory, and
- Gate control theory.

However, all of the phenomena associated with pain perception were not explained by any of the above-mentioned theories.

Specificity Theory (Johannes Muller, 1842)

It is one of the firstly proposed modern theories for pain. According to this theory, the pain signals are transmitted by the specific pain receptors to a “pain center” into the brain that is responsible for the perception of pain.

This theory is valid in the aspect that the separate fibers carry pain signals to the brain eventually.

However, the theory does not explain the mechanism that how the perception of pain can get affected by a wide range of psychological factors. For example, in wartime, the soldiers may report no or little pain in result of a serious wound that would otherwise be excruciating.

Pattern Theory (Goldscheider, 1894)

Pattern theory proposed that the pain signals are transmitted to the brain only when the stimuli are summed together to form a particular pattern or combination. This theory neither postulates the presence of any specialized receptors for transmission of pain nor does it explain that the brain has control over the pain perception.

The brain is merely seen as a recipient of message. Despite having many limitations, this theory had set a stage for the gate control theory that has proved to be the most influential, and so far, it is the best-accepted theory of pain.

Gate Control Theory (Melzack and Wall in 1965)

This theory can be accounted both for “top-down” influences of the brain on pain perception and the effects of other tactile stimuli (e.g., rubbing a banged knee) that can help to reduce the pain.

It is postulated that a control system or “gate” is present in the dorsal horn of the spinal cord, which passes all the information regarding pain before it reaches the brain.

The opening or closing of the gate is controlled by the substantia gelatinosa in the dorsal horn. An “open gate” means that the signals are carried by the transmission cells (i.e., t-cells) to the brain where the pain is perceived, while a “closed gate” stops the firing of the t-cells and no pain signal is sent to the brain.^[3]

Okeson’s classification of Orofacial Pain^[4]

Axis I (physical conditions)

1. Somatic pain

- Superficial
 - a. Cutaneous
 - b. Mucogingival
- Deep pain
 - a. Musculoskeletal pain
- Muscular pain
 - a. Protective contraction
 - b. Local muscle soreness
 - c. Myofascial pain
 - d. Myospasm
 - e. Centrally mediated myalgia
- Temporomandibular joint (TMJ) pain
 - a. Ligamentous
 - b. Retrodiscal
 - c. Capsular
 - d. Arthritic
- Osseous and periosteal pain
- Soft connective tissue pain
- Periodontal dental pain
 - b. Visceral pain
- Pulpal dental pain
- Visceral mucosal pain

- Glandular and ENT pain
- Vascular pain
 - Arteritis
 - Carotidynia
- Neurovascular pain
 - Migraine
 - Tension type
 - Cluster type
 - Neurovascular variant

Other primary headaches

2. Neuropathic Pain

- Episodic
 - a. Paroxysmal neuralgia pain
 - Trigeminal neuralgia
 - Other neuralgias
- Glossopharyngeal neuralgia
- Geniculate neuralgia
- Superior laryngeal neuralgia
- Nervus intermedius
- Occipital neuralgia
- Continuous
- Peripherally mediated (entrapment neuropathy, deafferentation, and peripheral neuritis)
- Centrally mediated (BMS, atypical odontalgia, PHN, CRPS, sympathetically maintained pain)
- Metabolically mediated (diabetic, hypothyroid, alcoholic, nutritional)

Axis II (psychological condition)

- Mood disorder
 - Depression
 - Bipolar disorder
 - Mood disorder resulting from medical condition
- Anxiety disorder
 - Generalized anxiety disorder
 - Post-traumatic stress disorder
 - Anxiety arising from a medical condition
- Somatoform disorder
 - Undifferentiated somatoform disorder
 - Conversion disorder
 - Pain disorder
 - Hypochondriasis
- Other conditions
- Malingering
- Psychological affecting a medical condition
 - Personality traits or coping style
 - Maladaptive health behavior
 - Stress-related physiological response
- Any other mental disorders not mentioned in this classification

Some applied aspects

Otalgia

The pain may refer to TMJ area or ear because of the infection in the posterior teeth may refer to the TMJ area or ear. Similarly,

otitis media/mastoiditis/middle ear infection can also be confused with the pain of odontogenic origin. Infection in the middle ear can cause acute, severe, and throbbing pain which may exacerbate on lowering the head. The ear pain can also be referred to TMJ, tooth, tonsil, throat, tongue, thyroid, and trachea. It is rare for the otitis media/middle ear infection/mastoiditis pain to be exclusively expressed as jaw pain.^[5]

Paranasal sinus pain

In case of acute maxillary sinusitis, the pain can be stabbing in nature, which can cause aching pressure which is severe in nature. Pain is most commonly referred upward in the vicinity of infraorbital rim, while it can also be referred downward over the posterior teeth of maxillary arch. Sinus pain is referred in mostly all the teeth of the quadrant of the same side and it aggravates when the head is placed below the knee.

In case of chronic sinusitis, there is a constant pain which is dull in nature. There can be various sites of the symptoms, i.e., from the maxillary teeth and maxilla in case of maxillary sinusitis; in case of frontal sinusitis, the pain can be localized to the frontal process and upper orbit; and in case of sphenoid sinusitis, near the hard palate- soft palate junction, mastoid process and occipital.^[6,7]

Vasogenic craniofacial pain

The pain is throbbing, deep, pounding, or pulsating, but occasionally it can also manifest as sharp with a history of burning and aching nature of pain.^[7,8]

Classic migraine

Classic migraine headache begins as a chronic pain but commonly changes to throbbing, beating, or pulsating nature of pain. Single episode can even last for several hours to days.

The headache is predominantly on one side or unilateral in the retrobulbar, frontal, or temporal areas, though, sometimes, it may also occur in the face.^[9]

Cluster headache (sphenopalatine neuralgia)

This entity is often mistakenly diagnosed for the acute pulpitis in the maxillary posterior teeth. It has been named as cluster headache because it tends to occur in “clusters” which means that it occurs in a series of 1–8 episodes of 20–180 min attack/day which can last for several weeks or several months. Pain is mostly unilateral, continuous, severe, burning sensation, or intense ache that often occurs in the night. Most commonly affected sites are behind or around the orbit, which radiates to the temple and forehead region; furthermore, it radiates infraorbital in the maxilla. Less likely, it radiates into the tooth/teeth and very rarely to the region of neck and jaw.^[10]

TMJ disorders

These disorders are basically a group of musculoskeletal disorders that affect the structure and/or function of the TMJ, dentition, supporting structures, and masticatory muscles.

Chief complaint of temporomandibular disorder (TMDs) patient is mostly continuous pain in the area of the joint which gets aggravated by functioning of TMJ. Swelling may or may not be evident. The patient may also complain of acute teeth pain and malocclusion. There may be limited jaw opening, clicking of joint, deviation on opening, pain, and crepitus which can be localized directly to the joint area, anterior to the tragus of the ear. TMJ pain is dull ache, but it can be acutely associated by exacerbation on the wide opening of the mouth. Symptoms may progress to even worse and the severity of pain increases. TMJ pain is most commonly referred to cheek, temple, and posterior dental area of the mandible and maxilla.^[11,12] Etiology, pathogenesis, and treatment of TMDs can be categorized under two schools of thoughts; a) depends on the a) Axis I (physical/functional) and b) Axis II (biopsychosocial) according to the research diagnostic criteria for Temporomandibular disorders.

Initially, the TMD diagnosis was based on the history, clinical examination, and imaging if indicated. The diagnosis has been significantly enhanced by the help of various physiologic measurement devices which provide the measurements of the status of functioning of the masticatory system, i.e., dental occlusion and muscles of TMJ. The dental occlusion also plays a significant role in TMD. Hence, occlusion is considered to be of prime importance by most of the dentists treating TMJ disorders.^[13]

Recently, TMD treatment leading to healthy masticatory muscle function and a stable occlusion is most often successful. This has been accomplished using various objective measurement technologies such as T-scan (digital analysis of occlusion), joint tracker, joint vibratography, electromyography, and ultra low-frequency transcutaneous electrical nerve stimulation (TENS). Various literature scientifically validate the functional or physical basis of TMD, the efficacy of measurement devices, and TENS. Successful treatment of TMDs using biometric devices such as EMJ, T-scan, TENS, and JVA helps in diagnostically driven treatment. Thus, it helps in not only relieving the symptoms but also eliminating the cause of the disease. If the etiology is not recognized and treated successfully, the acute physical form of temporomandibular dysfunction may turn into a chronic pain condition. If the treatment is symptomatically oriented, then it can adversely affect the patient and can lead to a poor quality of life.^[14,15]

Myofacial pain

It is the most commonly occurring form of the musculoskeletal pain which affects the head, neck, and face.^[16]

The characteristic features of myofacial pain are as follows:

- Presence of myofacial trigger point.
- Affected muscle has a reduced range of active movement.
- The presence of referred pain in reproducible patterns remote from the site of the trigger point.
- Presence of a jump sign and verbal response or reflex reaction on palpation of the trigger point.
- Presence of deep, dull aching, and provokable pain.

Trigeminal neuralgia

Pain is lancinating and severe, sharp shooting pain into the teeth and bone. Electric shock-like pain is very characteristic and is unlikely seen in infections of odontogenic origin.

The painful episode lasts only 1 or 2 s at a time. Although paroxysmal episodes may occur in rapid succession, there is a trigger zone that exists mostly somewhere on the facial skin and rarely inside the oral cavity.^[7,17]

Postherpetic neuralgia

The lesions of shingles are painful and cause a deep-seated pain, which involves not only the superficial mucosa and cutaneous tissues but also the upper and lower jaw bones. When there is a presence of prodromal pain, the diagnosis may get obscured.^[7,18] Prodromal pain is mostly acute and like an electric shock in nature. The pain is associated with vesicular eruptions are deep. Even when the vesicles are clear, the residual pain persists which is chronic and burning in nature. The clinician might get confused with the odontogenic pain due to the nature of the pain, but, by the help of history of vesicular eruption, the diagnosis can be made.^[19]

Glossopharyngeal neuralgia

It mostly includes unilateral and rarely bilateral. Pain is of stabbing nature and occurs in the tonsillar area, lateral posterior pharyngeal and the base of the tongue, down in to the throat, the ear or Eustachian tube and down the neck.

Sometimes, pain might radiate to the region of vagus nerve and mostly associated with flushing, salivation, cardiac arrhythmias, sweating, tinnitus, vertigo, hypertension, or syncope.^[4,19]

Styloid syndrome/Eagle's syndrome

It has almost similar manifestations as that of glossopharyngeal neuralgia, but it occurs mostly due to the compression in the region of ninth cranial nerve due to the calcified elongation of styloid process of the temporal bone. The factors which precipitate the condition include swallowing, pharyngeal motion from chewing and talking, and fast rotation of the head.

Reversible pulpitis

The reversible pulpitis can be characterized by a sharp, short-acting, shock-like pain, which is felt as a sensation of sudden shock. The pain of reversible pulpitis is never spontaneous.

Dentin hypersensitivity

The pain arises as a response to chemical, thermal, tactile, or osmotic stimuli and mostly is not caused by any other odontogenic pathology or due to any structural defect. This pain is best postulated and explained by the hydrodynamic theory given by Brannstrom.

Periapical abscess

The pain due to periapical abscess has been described as a constant, pounding, and throbbing. The tooth is mostly tender on percussion and mostly also associated with vestibular

tenderness. The pain is most long lasting or persistent, lingering on for a whole day.

Periodontal abscess

The tooth is painful on mastication, but the pain is not so deep or throbbing as in case of periapical abscess. Pain is often sudden in onset, spontaneous, and associated with localized swelling. Almost in all cases, it is associated with the presence of deep periodontal ligament pockets.

Pericoronitis

The pain can be severe, radiating in the posterior mouth region. The patient mostly faces difficulty or inability to comfortably close or open the mouth. The mucosa posterior to the erupting molar is very painful to touch.

Atypical odontalgia

The pain of typical odontalgia can be described as throbbing or constant aching in a tooth/teeth or extraction site. The pain is mostly unremitting and persistent, which is not significantly affected by chewing or biting or by consuming cold or hot food or drink. The local anesthesia might or might not be helpful in this condition. The intensity of the pain may vary from very mild to severe. Mostly, there is no identifiable etiology which can explain the pain, and it often follows or it is often associated with a history of some dental procedure such as root canal therapy or tooth extraction. Sometimes, the pain might even occur without any obvious reason at all. The pain is felt in tooth/teeth and may persist in spite of the treatment aimed to relieve the pain such as a root canal therapy, restoration, or even an extraction.

Conclusion

The feeling of pain is bad, but not feeling pain at all can even be worse. It is rare but not unknown that an individual has congenital absence of pain receptors. Those individuals generally fail to avoid accidental injuries and often inflict mutilating injuries on themselves,^[20,21] due to which they have a short life span. Hence the pain, though is an unpleasant experience but it is a protective sensation and undoubtedly very crucial with enormous survival value. The sensation of pain frequently depends on the past experience of the patient, level of anxiety, and personality of individual. The patients seek care for the reduction or elimination of pain every day. The successful elimination of the pain is the most satisfying to the clinician. The most crucial part to manage the pain is to understand the problem and etiology of pain. The appropriate therapy can only be selected through proper diagnosis.^[21]

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