Oral medicine

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Orofacial pain

Pain: - is a sensation of suffering resulting from a noxious stimulus, physical disorder, or mental derangement. It is, an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. The physiologic aspect of pain involves pain receptors stimulation, pain transmission, transduction, modulation and central integration in higher thought and emotional centers. Pain is, an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

Acute pain resulting from injury will generally initiate a reflex withdrawal thus ensuring minimal or no tissue damage (nociceptive pain).

Allodynia: the injured region becomes sensitive to even light touch

Hyperalgesia: over reactive to painful stimuli.

CLINICAL EVALUATION OF PAIN

Clinical evaluation of pain requires an understanding of the patient's subjective perception of the discomfort. To reach such an understanding the following aspects must be studied

A- Onset of pain: A pain of brief duration from its onset to the request for treatment can suggest inflammatory somatic pain and exclude a chronic condition.

B- Localization of the pain: Somatic pain of the oral and perioral region nearly always arises from the affected site which is readily identified by the patient. Inability of the patient to localize pain may indicate somatic pain originating from deep tissues or the pain is not somatic .radiation of pain is the sensation of spreading to the adjacent areas from the primary source which may suggest a neurogenic component to the problem.

C- Characters of pain: The descriptive terms chosen by the patient reflect his perception of pain, these could be sharp, dull, aching, burnning, stabbing, throbbing, pulsating. The severity of pain can be graded as mild, moderate or sever based on its disruption of normal daily activities like sleeping, eating, working.

D- Course of pain: The course of pain often suggests possible causes. Steady increase in the severity of pain is typical of a progressive acute inflammation produced by a bacterial infection. Periods of relief followed by recurrences is a pattern of pain often caused by chronic periapical lesions that episodically undergo acute exacerbations.

E- Factors that alter pain: Alteration of pain following exposure to certain agents or conditions can reveal its nature and possible causes. Application of ice can soothe pain from most superficial inflammatory causes, and moist heat usually relieves the deeper discomfort of muscle spasm.

F- Associated findings: Certain systemic conditions can cause or influence the nature of pain, and a variety of drugs can accentuate pain perception. Emotional stress may exacerbate somatic pain or suggest psychogenic nature.

Orofacial pain:

Orofacial Pain is a complaint that around the world affects millions of people on a daily basis. It constitutes any symptom that occurs from a large number of disorders and diseases that result in a sensation of discomfort or pain felt in the region of the face, mouth, nose, ears, eyes, neck, and head. It is the presenting symptom of a broad spectrum of diseases. As a symptom, it may be due to disease of the orofacial structures, generalized musculoskeletal, peripheral or central nervous system disease, or psychological abnormality; or the pain may be referred from other sources (e.g. cervical muscles or intracranial pathology)

Acute OFP: is primarily associated with the teeth and their supporting structures. Most frequently, dental pain is due to dental caries, although a broken filling or tooth-abrasion may also cause dental sensitivity. Other oral pains are usually periodontal or gingival in origin.

Chronic orofacial pain (COFP): is a term used to describe painful regional syndromes with a chronic, unremitting pattern.

Anatomic consideration

- Cranial nerve V (CN V), the trigeminal nerve, is the dominant nerve that relays sensory impulses from the orofacial area to the central nervous system

- The facial (CN VII), glossopharyngeal (CN IX), and vagus (CN X) nerves and the upper cervical nerves (C2 and C3) also relay sensory information from the face and surrounding area.
- By intense or noxious stimuli. Some are unimodal and respond only to thermal or mechanical stimuli; others are polymodal and respond to mechanical, thermal, and chemical stimuli. Nociceptors encode the intensity, duration, and quality of a noxious stimulus

Clinically COFP may be subdivided into three main symptomatic classes

1- Musculoskeletal

2- neuropathic

3- Neurovascular

Musculoskeletal entities are dealt with Temporomandibular Disorders.

Possible causes of Facial Pain:

- Dental pain
- TMJ
- Neuropathic pain (neuralgias)
- Pathology in related str. (salivary gland , sinus ,eyes , cervical spine, nasopharyns)
- Vascular disorder (headaches)
- Intracranial lesions (neoplasm, MS)
- Referred pain (angina pect.)
- Psychogenic facial pain.

Differential Diagnosis of Orofacial Pain

1- **Intracranial pain disorders** Neoplasm, aneurysm, abscess, hemorrhage, hematoma, edema.

2- **Primary headache disorders (neurovascular disorders)** Migraine, migraine variants, cluster headache, paroxysmal hemicrania, cranial arteritis , tension-type headache

3- **Neurogenic pain disorders** Paroxysmal neuralgias (trigeminal, glossopharyngeal, nervus intermedius)

Continuous pain disorders (neuritis, post herpetic neuralgia, post-traumatic and postsurgical neuralgia)

4- **Intraoral pain disorders** Dental pulp, periodontium, mucogingival tissues, tongue.

5- **Temporomandibular disorders** Masticatory muscle, temporomandibular joint, associated structures

6- **Associated structures** Ears, eyes, nose, paranasal sinuses, throat, lymph nodes, salivary glands, neck

If the cause is intra-cranial; more than one division may be involved. And in advanced lesion there may be signs of elevation in the intra-cranial pressure (I.C.P). If the cause is intra-cerebral; then there may be neurological deficits to be demonstrated.

Clinical features of raised I.C.P.

- Headache.
- Impairment of conscious level.
- Papilloedema
- Nausea, vomiting
- Raised arterial pressure
- Bradycardia

Diagnostic Tests: Any test to select is guided by history & physical examination:

1. CT and/or MRI (to rule out intracranial pathology)
2. TMJ radiography
3. Diagnostic occlusal appliance
4. Cervical spine films
5. Lab. (ESR ,c- reactive protein)
6. Biopsy
7. VAS (visual analog scale)

CHRONIC OROFACIAL PAIN

1- Musculoskeletal

2- Neuropathic Orofacial Pain

Neuropathic OFP includes a number of clinical entities; the most common are :- Trigeminal Neuralgia (TN), glossopharyngeal neuralgia (GN) , geniculate neuralgia,

painful posttraumatic neuropathies, burning mouth syndrome (BMS), facial post-herpetic neuropathy, central poststroke pain

3-Neurovascular Pain includes:-

Cluster headache (CH), migraine, paroxysmal hemicrania (PH), cranial arteritis , tension-type headache

Neuralgias

The classic neuralgias that affect the craniofacial region are a unique group of neurological disorders involving the cranial nerves and are characterized by

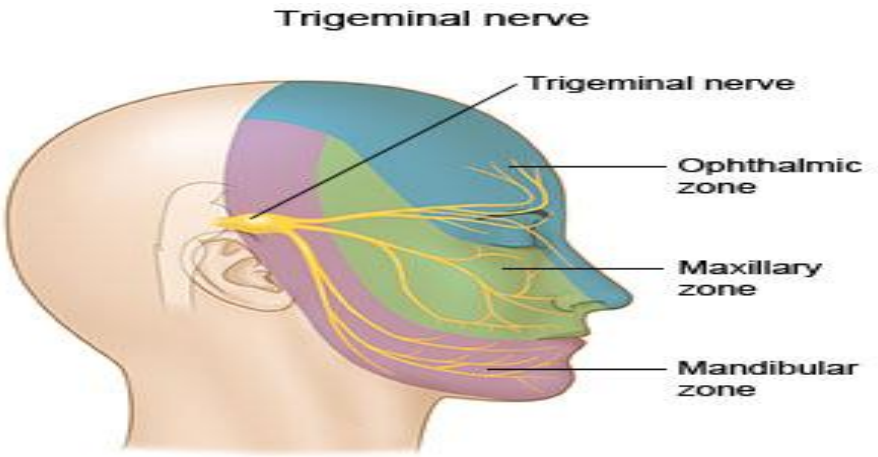
(a) Brief episodes of shooting

(b) Trigger zones on the skin or mucosa that precipitate painful attacks when touched

(c) pain-free periods between attacks and refractory periods immediately after an attack, during which a new episode cannot be triggered

Trigeminal Neuralgia:

It is sever recurrent shooting pain, sharp, stabbing or electrical lasting within seconds or minutes and provoked by talking, eating or touching specific areas called the "trigger zone", is an excruciating, short-lasting, unilateral facial pain.



It is characterized by sever paroxysmal pain in one or more branches of trigeminal nerve. Usually affecting the middle aged and elderly and often women are more affected than men. The most common sites involved are the mandibular mental area and the maxillary canine area. The ophthalmic distribution of the trigeminal nerve is

rarely affected. There is a period of remission but the condition tends to recur or persist throughout the patient's life. The pain can be also an early manifestation of disseminated sclerosis .TN is characterized by spontaneous remissions lasting weeks to years but approximately 20% of TN patients suffer daily attacks. The most common is the

1- **Classical** unrelated to pathology and most probably caused by neurovascular compression of the trigeminal nerve root.

2- **Secondary** forms have been classified separately, and these are related to a variety of clear pathologies including tumors, cysts, viral infection, trauma, and systemic diseases such as multiple sclerosis.

The vast majority (>85%) of TN patients are diagnosed with classical TN (CTN).

Recent evidence suggests that most cases of CTN result from the compression of the trigeminal nerve root by a vascular malformation.

Recognized by the current classification are TN cases that present with a continuous background pain in addition to the typical pain paroxysms.

Up to one-third of patients describe typical paroxysmal attacks on a background of dull persistent pain of varying duration.

There are two attack-related phenomena that are particular to TN.

Latency refers to the short period of time between stimulation of a trigger area and pain onset.

A *refractory period* occurs following an attack and during this time pain may not be initiated.

Attacks begin and end abruptly, lasting from a fraction of a second up to 2 minutes. Longer attacks, increasing with disease duration, have been reported. Most paroxysms occur during waking hours, but may awaken the patient. Pain paroxysms are usually accompanied by spasm of the
ipsilateral facial muscles (hence the name *tic douloureux*).

Etiology:

The etiology of neuralgia is unclear and 10% of cases have detectable underlying pathology such as:

1- Tumors of the cerebellar pontine angle,

2- demyelinating plaque of multiple sclerosis

3- Vascular malformation.

The remainder of cases of TN is classified as idiopathic.

A majority of cases of TN are caused by an atherosclerotic blood vessel (usually the superior cerebellar artery) pressing on and grooving the root of the trigeminal nerve. This pressure results in focal demyelinization and hyper excitability of nerve fibers, which will then fire in response to light touch, resulting in brief episodes of intense pain.

Pretrigeminal Neuralgia (PTN)

An early form of TN termed "pretrigeminal neuralgia" (PTN) has been reported in 18% of TN patients characterized by a dull continuous pain (days to years) in one of the jaws. As PTN progresses it becomes more typical with characteristic flashes of pain. Thermal stimuli may cause triggering at a relatively higher rate, and a throbbing quality to PTN pain is sometimes present mimicking dental pathology. These qualities combined with the success of regional anesthesia have led to misdiagnosis of PTN as pain of dental origin

PTN is however highly responsive to carbamazepine, and careful dental assessment should help differentiate it.

Diagnosis

The diagnosis of TN is usually based on the history of shooting pain along a branch of the trigeminal nerve, precipitated by touching a trigger zone, and possibly examination that demonstrates the shooting pain

MRI of the brain is indicated to rule out tumors, multiple sclerosis, and vascular malformations.

Treatment:

1- Anticonvulsant; Carbamazepine (Tegretol) remains the drug of choice for TN. Initial low-dose therapy (100 mg with food) and a slow increase (by100–200 mg) on alternate days will minimize side effects. In responsive cases, therapeutic effects are observed rapidly or within three days. Titration to final dose (800-1200 mg/d) should continue slowly based on response and side effects. Light-headedness, confusion dizziness, vertigo, blurred vision or diplopia, sedation, vomiting, nystagmus, and nausea are very common and request drug cessation.

Main side effects:
a- Transient elevation in liver enzymes may occur

b- Transient leucopenia

c- Aplastic anemia is a serious effect that may occur.

d- Hyponatremia is observed in carbamazepine-treated cases and requires drug withdrawal.

e- Skin rashes occur in patients and may signal the onset of antiepileptic drug hypersensitivity syndrome. This is a life-threatening syndrome (fever, rash, and lymphadenopathy) associated with some antiepileptic drugs (AEDs) and requires immediate drug cessation.

Patients receiving carbamazepine must have periodic hematologic laboratory evaluations because serious life threatening blood dyscrasias occur. Monitoring of hepatic and renal function is also recommended.

Baclofen has a strong synergistic effect with carbamazepine , making it suitable for combined therapy. Newer anticonvulsants have fewer side effects and have been shown to be effective for some cases either as monotherapy or add-on therapy. Lamotrigine is effective particularly as add-on therapy, and gabapentin may be useful in selected TN cases.

2-Surgical: Surgery for TN is directed peripherally or centrally at the trigeminal ganglion or nerve root. Surgical procedures have a better prognosis when carried out on patients with typical CTN; has the best prognosis when performed within seven years of TN onset.

Peripheral Procedures

Peripheral neurectomy carries the danger of inducing traumatic neuropathic pain and is not recommended.

Cryotherapy of peripheral branches may give pain relief for six months. Pain recurrence is at the original site, repeated cryotherapy often produces better results.

Central Procedures
Percutaneous Trigeminal Rhizotomy

Microvascular decompression of the nerve root at the brainstem

Gamma Knife

Historically, alcohol injections have been used but are painful and cause fibrosis. Alcohol may induce herpes zoster (HZ) reactivation and bony necrosis. Pain control after alcohol block lasts just over one year, and there have been reports of post injection neuropathic pain.

Peripheral glycerol injection has been employed, but success seems short term.

Glossopharyngeal neuralgia (GN):

The location of the trigger zone and pain sensation follows the Distribution of the glossopharyngeal nerve, namely, the pharynx, posterior tongue, ear, and intra auricular, retromandibular area. Although similarities with TN are prominent, GN is characterized by a milder natural history with the majority of patients going into remission. Due to its location and features, GN is a difficult diagnosis and adequate treatment is often delayed for years.

Pain is triggered by stimulating the pharyngeal mucosa during chewing, talking, and swallowing The application of topical anesthetic to the pharyngeal mucosa eliminates glossopharyngeal nerve pain and can aid in distinguishing it from the pain of other neuralgias..
The most common causes of glossopharyngeal neuralgia are intracranial or extra cranial tumors and vascular abnormalities that compress CN IX.

Features:

The glossopharyngeal (IX) nerve has two main sensory branches: the auricular (tympanic) and the pharyngeal.
In pharyngeal-GN, the pharynx or posterior tongue-base are involved. Pain radiates to the inner ear or the angle of the mandible, and may include the eye, nose, maxilla, or shoulder and even the tip of the tongue.
In tympanic- GN, pain predominates in the ear but may radiate to the pharynx.

Bilateral pain occurs in up to a quarter of patients. GN is a paroxysmal, unilateral, severe pain that is sharp, stabbing, shooting, or lancinating . Patients often feel a scratching or foreign body sensation in the throat. Pain intensity is usually milder than TN but may vary and attacks last from a fraction of a second up to 2 minutes.

Trigger areas are located in the tonsillar region and posterior pharynx, and these display a refractory period. Swallowing, chewing, talking, coughing
and/or yawning, sneezing, clearing the throat, and rubbing the ear activate these areas Frequency is around 5–12 every hour, and attacks may occur in clusters lasting weeks to months, then relapse for up to a number of years.

Spontaneous remissions occur in the majority of patients, but some have no periods of pain relief.
GN may induce uncontrollable coughing, seizures, and cardiac arrhythmias, particularly bradycardia, and syncope. TN and GN patients should undergo imaging (computerized tomography [CT] or magnetic resonance imaging [MRI]) at least once during diagnosis and therapy.

Imaging techniques such as magnetic resonance tomographic angiography (MRTA) may more accurately identify neurovascular compression. Imaging of the head and neck to rule out pathology is indicated

Pathologies Mimicking GN

1- A significant association between symptomatic GN and multiple sclerosis has been reported

2- Regional diseases such as infectious or inflammatory processes

3- tonsillar carcinoma

4- Other regional tumors (tongue, oropharyngeal)

5- Cerebello pontine angle or pontine lesion

Pathophysiology of GN

The pathophysiology is uncertain but is considered to probably be secondary to compression of the nerve root by a blood vessel.

GN cases demonstrate nerve compression on MRI and on surgical exposure, and nerve biopsy shows variable myelin damage and patches of demyelinated axons in close membrane-to-membrane apposition to one another. These morphological changes are similar to those observed in patients with TN suggesting shared pathophysiology.

Treatment

Carbamazepine is usually successful and is the favored medication. Alternatives include baclofen (muscle relaxant), gabapentin, lamotrigine, and phenytoin.

Permanent neurological deficits are rare and may include mild hoarseness and/or dysphagia, or facial nerve paresis

Facial Pain Associated With Herpes Zoster

Post herpetic neuralgia:

Acute Herpes Zoster

Acute HZ (shingles) is a reactivation of latent varicella virus infection that may occur decades after the primary infection. HZ is a disease of the dorsal root ganglion and therefore induces a dermatomal vesicular eruption. Definitive diagnosis may be obtained by identification of viral DNA from vesicular fluid employing the polymerase chain reaction. Trigeminal and cervical nerves are involved in up to a quarter of cases. The ophthalmic branch is affected in more than 80% of the trigeminal cases, particularly in elderly males, and may cause sight-threatening keratitis. The vesicles and pain are dermatomal and unilateral and may appear intraorally when the maxillary or mandibular branches of the trigeminal nerve are affected.

Etiology and Pathogenesis

Herpes zoster (shingles) is caused by the reactivation of latent varicella-zoster virus infection that results in both pain and vesicular lesions along the course of the affected nerve.

In a majority of cases, the pain of herpes zoster resolves within a month after the lesions heal. Pain that persists longer than a month is classified as post herpetic neuralgia (PHN), although some authors do not make the diagnosis of PHN until the pain has persisted for longer than 3 or even 6 months.

Clinical Features

Usually begins with a prodrome of regional pain, itching and malaise. Pain precedes typical vesicular eruption by <7 days, usually 2–3 days. The dermatomal vesicular or herpetic eruption will rupture and “dry out” over 7–10 days, but complete healing may last up to one month. Accompanying pain is moderate to severe visual analog scal (VAS 6) and may persist for three to six months. Very rarely dermatomal pain occurs with no rash

Treatment of shingles

Therapy is directed at controlling pain, accelerating healing, and reducing the risk of complications such as meningitis, post herpetic neuropathy (PHN), and local secondary infection.

Antiviral should be initiated within 72 hours from onset of rash, and will significantly decrease rash duration, pain severity, and the incidence of PHN. This is particularly effective in patients >50 years old.

Fever and pain should be controlled initially by mild analgesics; central analgesics may be used (amitriptyline or gabapentin). Use of glucocorticoids is controversial,

but may help reduce acute pain; they should always be used together with antivirals. Amitriptyline may reduce the incidence of PHN. Vaccinating at risk individuals markedly reduces the incidence of PHN among older adults.

PHN

Up to one-fifth of acute HZ patients will suffer persistent pain three to six months after acute HZ. By one year however only 5%–10% suffer pain. Advanced age (>50 year), severe prodromal pain (VAS>5), severe acute pain, and severe rash are risk factors for persistent pain. In patients older than 60 years, 50% or more will continue to suffer pain for more than one year.

Features of PHN

PHN is a dermatomal disease persisting or recurring ≥3 months after the acute HZ stage. Patients relate a previous herpetic (dermatomal) eruption that was preceded by pain usually two to three days but up to six days prior. PHN is characterized by fluctuations from moderate Back ground pain to excruciating, superimposed lancinating pains. Pain quality is burning, throbbing, stabbing, shooting, or sharp. Burning pain is significantly higher in patients not treated with antivirals for acute HZ. Itching is very common and prominent in trigeminal dermatomes and may be subjectively graded as worse than pain.

Pale, sometimes Red/purple, scars that are usually hypoesthesia or anesthetic (but with allodynia and hyperalgesia) may remain in the affected area. Patients with PHN experience persistent pain, paresthesia, hyperesthesia, and allodynia, months to years after the zoster lesions have healed.

Treatment

Early treatment of established PHN improves prognosis. Ophthalmic PHN per se seems to have the worst prognosis. Evidence-based treatment options for PHN include tricyclic antidepressant (TCA) drugs, gabapentin and pregabalin (lyrica) , tramadol, and topical lidocaine patches.

Invasive therapies include epidural and intrathecal steroids and a variety of neurosurgical techniques. Central nervous system stimulation may also provide some relief.

The best therapy is prevention .Use of antiviral famciclovir 500 mg 3 times daily for 7-10 days or Acyclovir 800mg 5times 7-10 days.

Short course of systemic corticosteroid during the active phase of the disease. Topical therapy includes the use of topical anesthetic agents, such as lidocaine, or analgesics

The use of tricyclic antidepressants such as triptyline ,nortriptyline, is a well method of reducing the chronic burning pain that is characteristic of PHN.

NERVOUS INTERMEDIUS (GENICULATE) NEURALGIA

Nervous intermedius (geniculate) neuralgia is an uncommon paroxysmal neuralgia of CN VII resulting from herpes zoster infection of geniculate ganglion and nervous intermedius of CN VII characterized by pain in the ear and (less frequently) the anterior tongue or soft palate.

The location of pain matches the sensory distribution of this nerve (i.e., the external auditory canal and a small area on the soft palate and the posterior auricular region). Pain may be provoked by the stimulation of trigger zones within the ipsilateral distribution of the nerve.

The pain is not as sharp or intense as in TN, and there is often some degree of facial paralysis, indicating the simultaneous involvement of the motor root.

A condition referred to as **Ramsay Hunt syndrome** (also termed Hunt's Syndrome and herpes zoster oticus) is a herpes zoster virus infection of the geniculate ganglion of the facial nerve. It is caused by reactivation of herpes zoster virus that has previously caused chickenpox in the patient.

Ramsay Hunt syndrome results in paralysis of the facial muscles on the same side of the face as the infection. So, the virus infects the facial nerve that normally controls the muscles on one side of the face. Ramsay Hunt syndrome is typically associated with a red rash and inflamed vesicles in or around the ear and the tympanic membrane and some times on the roof of the mouth or tongue.

Ramsay Hunt syndrome is defined as an acute peripheral facial neuropathy associated with erythematous vesicular rash of the skin of the ear canal, auricle and/or mucous membrane of the oropharynx.

Treatment

1- Short course (2 to 3 weeks of high-dose steroid therapy is beneficial.

2- Acyclovir significantly reduces the duration of the pain 200mg 5 times daily for 10-14 days.

3- Patients with geniculate neuralgia are also treated with carbamazepine and antidepressants.

Patients who do not respond to these medications may undergo surgery to section the nervus intermedius.

Burning Mouth Syndrome (BMS)

Is a poorly understood pain condition that is most probably neuropathic. The condition is also known as stomatodynia and is characterized by a burning mucosal pain with no significant physical signs and is common in postmenopausal women.

BMS may be subclassified into:-

1- "Primary" or idiopathic BMS for which a neuropathological cause is likely and cannot be attributed to any systemic or local cause

2-"secondary BMS"(SBMS) resulting from local or systemic pathological conditions.

BMS is characterized by resistance to a wide range of treatments and is one of the most challenging management problems in the field of OFP.

Clinical Features

The primary location of the burning complaint is the tongue, usually the anterior 2/3. However, usually more than one site is involved and in addition to the tongue, hard palate, lips, and gingiva are frequently involved. Pain is most commonly described as burning or hot and intensity varies from mild to severe. BMS is typically of spontaneous onset and lasts from months to several years. Pain pattern may be irregular, but some patients may complain that pain increases toward the end of the day.

Although a chronic unremitting pattern is usual, partial remission has been reported in about one half to two-thirds of patients, six to seven years after onset. Spontaneous remission is very rare.

Common aggravating factors include personal stressors, fatigue, and specific foods (acidic, hot, or spicy). More than two-thirds of the patients complain of altered taste sensation (dysgeusia) accompanying the burning sensation, in many cases described as a spontaneous metallic taste. Abnormal sensations, such as feeling of dry mouth, are common but true hyposalivation is less common and should be considered under secondary or symptomatic BMS.

Oral and perioral burning sensation as a result of local or systemic factors or diseases is classified as SBMS.

1- Local factors and diseases known to induce SBMS include oral candidiasis , lichen planus, and allergies.

2- Systemic disorders that induce SBMS include hormonal changes, deficiencies of vitamin B12, folic acid or iron, diabetes mellitus, side effects of medications, and autoimmune diseases.

Successful treatment of the primary disease will usually alleviate the burning sensation in SBMS patients.

Treatment

Topical therapies may be effective and are useful in elderly, medically compromised patients. The most established is clonazepam (tranquilizers) (1 mg) which should be sucked and subsequently spat out three times daily. Topical anesthetics may decrease or increase pain and are therefore unpredictable.

Systemic therapies include paroxetine (antidepresant) (20 mg/d) and sertraline (50 mg/d) or other selective serotonin reuptake inhibitors (SSRIs). These may reduce pain and improve anxiety and depression.

A two-month course of 600 mg daily of alpha-lipoic acid may be beneficial. A combination of alpha-lipoic acid (600 mg/d) and gabapentin (300 mg/d) results in greater improvement of the burning symptoms compared to these medications taken alone.

Pharmacotherapy-resistant BMS has been associated with underlying psychological distress, and these patients may particularly benefit from cognitive behavioral therapy.

Painful Posttraumatic Trigeminal Neuropathy (PTTN)

Some patients develop chronic pain following negligible nerve trauma such as root canal therapy or following considerable injury to nerve bundles, such as in fractures of the facial skeleton. Following dental implant surgery 1%–8% and following orthognathic jaw surgery 5%–30% of patients may remain with permanent sensory dysfunction but the incidence of chronic pain is unclear. Third molar extractions may lead to disturbed sensation in the lingual or inferior alveolar nerve for varying periods. Patient complaints of tongue dysesthesia after injury may remain in a small group of patients (0.5%). Persistent pain after successful root canal therapy may occur; also surgical root therapy may resulted in chronic neuropathic pain.

Features:- Chronic pain issues are possible risk factors for the Features Following identical injuries, onset of neuropathic pain and its characteristics vary from patient to

patient. Such variability is probably due to a combination of environmental, psychosocial, and genetic factors.

The presence and duration of pain in the tooth, tenderness to percussion, female gender, previous painful treatment in the orofacial region, and concomitant chronic pain issues are possible risk factors for the development of chronic pain following successful root canal therapy.
Pain is unilateral and occurs in the area of injury, or at the distal dermatome of an injured nerve. Initially pain may be precisely located to the dermatome of the affected nerve, but it may become diffuse and spread across dermatomes. Pain is of moderate-to-severe intensity (VAS 5–9), usually burning in quality but also stabbing during exacerbations.
Positive or negative local neurological signs include clinically demonstrable sensory dysfunction, usually allodynia, hyperalgesia, or parasthesia.
Most cases are continuous, but some report superimposed paroxysmal pain attacks.

Less frequently there may be short-lasting pain with associated mechanical trigger areas, mimicking TN. Rarely, a subjective feeling of swelling, foreign body, hot or cold, local redness or flushing may be reported but these may not always be clinically verifiable.

Treatment

Topical

Topical anesthetics may be successfully employed in the management of painful neuropathies. Some benefits have been observed using topical capsaicin (active component of chili peppers) in patients with oral neuropathic pain. topical medication as single treatment or in combination with systemic medications can reduce the severity of orofacial neuropathic pain.

Systemic Pharmacotherapy

Available data confirm that antiepil. Drugs AEDs and tricyclic antidep.TCAs are most effective. For many of the drugs used in the therapy of traumatic neuropathies, response is dose dependent and subsequently accompanied by significant side effects.

Therapy of neuropathic pain with any one of the established drug groups,lile Antidepressant, anticonvulsants medications leads to improved quality of life, sleep, and mood. However, pain intensity is reduced in only a subset of responders and is usually accompanied by significant side effects, particularly at the higher doses often required in neuropathic pain.

Neurovascular Pain

Cluster Headache (CH)

Cluster headache (CH) is a distinct pain syndrome characterized by episodes of severe unilateral head pain occurring chiefly around the eye and accompanied by a number of autonomic signs (AS), with severe pain and major autonomic activation. The precise genetics of CH are unclear but is likely to involve an autosomal dominant gene with low penetrance.

First-degree relatives of CH patients are up to 14–48 times and second-degree relatives 2–8 times more likely to have CH than the general population. CH typically appears between the ages of 20–29 years, is more common than previously thought, and seems to affect men more than women.

Episodic CH: commonly occurs at least once daily for a period of weeks, at the same time of day or night. Active periods (or "clusters" of 6–12 weeks) are followed by a temporary remission that may last from weeks to years

Chronic CH: repeated attacks recur over more than a year without remission or with remission periods lasting less than one month.

CH active periods are seasonal, occurring around spring or autumn.

Features

Pain in CH is usually periorbital or ocular but varies. In "upper CH" the forehead, temporal, and parietal regions are involved, whereas in "lower CH" the temporal and suboccipital regions are affected with radiation to the teeth, jaws, neck, and cheeks.

Pain is unilateral and in 20% of cases may change sides.

Severity is excruciating and rated as 8–10 on a visual analog scale. Quality is nonspecific and is variably described as throbbing or boring, burning, stabbing or a "stabbing" feeling in the eye. Individuals with CH frequently describe the pain as a hot metal rod in or around the eye.

CH attacks last 15–180 minutes reaching peak intensity very rapidly—within 3 minutes (up to 9–10 minutes). Longer attacks lasting from 3 to 48 hours are rare and frequency is one every other day to 8/d. Pain is most usually accompanied by at least one ipsilateral autonomic sign (AS); conjunctival injection/lacrimation, nasal congestion/rhinorrhea, eyelid edema, forehead/facial sweating, miosis, and ptosis.

The vast majority (>80%) of patients are markedly restless during an attack. Patients appear agitated; continually move around, particularly during more severe attacks; in sharp contrast to the quiet-seeking behavior observed in migraine.

Additional Features

A considerable number of CH patients report nocturnal attacks that wake them. Pain typically awakens patients within 90 minutes coinciding with the onset of rapid eye

movement sleep. Additionally, CH patients significantly suffer from obstructive sleep apnea. Alcohol is a common precipitant of CH attacks during active cluster periods.
Premonitory symptoms may predict CH days before onset.
CH prodromes include AS, blurred vision, sensitivity to smells, nausea, dyspepsia, hunger, irritability, tiredness, tenseness, and mild pain or non-painful sensations in the area that subsequently becomes painful.
Migrainous features are common in CH and may confuse diagnosis. Photophobia, phonophobia, nausea, and vomiting are reported in up to half of cases. It is important to note that phono- and photophobia are unilateral while in migraine these are bilateral.

Differential Diagnosis and Secondary CH
CH is often misdiagnosed as dental or maxillary sinus pathology

CH Treatment
Based on attack patterns, patients should avoid daytime naps, alcoholic beverages, and other triggers.
Pharmacologic Treatment may be abortive, transitional, or preventative or prophylaxis.
1-Abortive symptomatic relief may be rapidly attained with oxygen inhalation. Subcutaneous sumatriptan (neuro active alkaloids)

2- Rapid transitional prophylaxis may be attained with corticosteroids that may be continued only for a limited period in selected patients.

3- Prophylactic or preventive (In both episodic and chronic CH.)
is usually with verapamil (calcium channel blockers)and topiramate (anticonvulsant) as second-line therapy.
Remission periods may increased with time beyond the age of 65–75 active CH is rare.

Paroxysmal Hemicrania (PH)
PH is rare with an estimated prevalence of 2–20 per 100,000.
Mean age of onset is usually 34–41 years, but children aged 6 and adults aged 81 years have been reported

Features
PH is a unilateral, severe orbital, or periorbital pain.
Majority of attacks do not change sides, but strong pain may cross the midline and very rarely becomes bilateral.
It may occur in temporal, periauricular, maxillary, and rarely occipital areas. Referral to the shoulder, neck, and arm is quite common.

Patients usually report 8–30 attacks/24 h that last 2–30 minutes, but may last nearly an hour. Pain onset is rapid and mostly peaks in less than 5 minutes. Quality is mostly sharp but may also be throbbing, stabbing, or boring and its severity excruciating.

Accompanying ipsilateral AS:- include conjunctival injection / lacrimation, nasal congestion/rhinorrhea, eyelid edema, forehead/facial sweating, miosis (constricted pupil), and ptosis (droopy eyelid).

AS may occur bilaterally but are more pronounced on the symptomatic side.

Treatment:

Most cases respond to indomethacin within 24 hours and this response to indomethacin is part of its classification criteria.

Indomethacin should be initiated for 3 days at 75mg, followed, if needed, by 150 mg for a further 3 days is recommended. High and persistent dosage requirements may indicate the underlying pathology. Prognosis in PH is good and long-term remission has been reported.

Migraine

Migraine is the most common headaches, which may occasionally also cause pain of the face and jaws. It may be triggered by foods such as nuts, chocolate, and red wine; stress; sleep deprivation; or hunger.

Migraine is more common in women. Migraine typically presents as an episodic "sick" headache that interferes with normal daily activities. The migraine headache is frequently accompanied by nausea, vomiting, photophobia (aversion to light), phonophobia (aversion to sound), and osmophobia (aversion to odors). It may be preceded by an aura of neurological dysfunction, such as visual disturbances, vertigo, numbness, or weakness. The pain may be moderate or incapacitating. Migraine frequency varies considerably. In many patients, migraine is triggered by specific factors, such as menses, weather changes, irregular sleep, alcohol, or certain foods. Migraine is also often relieved by sleep. The life time prevalence of migraine is estimated to be near 35%, and it affects greater than 17% of women and 6% of men.

Etiology *and Pathogenesis*

1- There appears to be a genetic and familial risk as more than half of all migraineurs report having other family members who suffer from migraine. In addition, specific mutations leading to rare causes of vascular headache have been identified.

A strong familial influence in migraine has long been apparent and this has been demonstrated in twin studies. The concordance for migraine in monozygotic twins is greater than that for dizygotic twins.

Attacks are initiated when internal or environmental triggers are of sufficient intensity to activate a series of events which culminate in the generation of a migraine headache.

2- Vascular Theory

The aura of migraine was once thought to be caused by cerebral vasoconstriction and the headache by reactive vasodilation, which explained the throbbing quality of migraine and the relief of pain by ergots. It is now believed that the aura is caused by neuronal dysfunction rather than ischemia. Migrainous fortification spectra (an aura consisting of zigzag figures of bright luminous geometric lines and shapes) experienced by many patients corresponds to cortical changes in metabolism that begin in the visual cortex and spreads across the cortex at 2–3 mm/min and continues as the headache phase begins.

Clinically, the aura phase consists of focal neurological symptoms that persist up to one hour. Symptoms may include visual, sensory, or language disturbance as well as symptoms localizing to the brainstem. Within an hour of resolution of the aura symptoms, the typical migraine headache usually appears with its unilateral throbbing pain and associated nausea, vomiting, photophobia, or phonophobia. Without treatment, the headache may persist for up to 72 hours before ending in a resolution phase often characterized by deep sleep.

3- Neuronal Theory and the Trigeminovascular System

Migraine aura is believed to result from a slow-moving, spreading depression of cortical activity that liberates potassium and is preceded by a wave front of increased metabolic activity, suggesting that dysregulation of normal neuronal function is a cause of migrainous attacks. Migraine probably results from pathologic activation of meningeal vessel nociceptors combined with a change in central pain modulation. Both headache and the associated neurovascular changes are served by the trigeminal system. Activation of the trigeminovascular system results in vasoactive polypeptide release, including substance P and calcitonin gene–related peptide (CGRP).

These neuropeptides and other cytokines interact with the blood vessel wall to produce dilation, plasma protein extravasation, and platelet activation producing a sterile inflammation that activates trigeminal nerve nociceptive afferents leading to further pain production.

4- Role of Serotonin and Dopamine

Pharmacologic data point to a strong role of the neurotransmitter serotonin in migraine, the “triptan” class of drugs has renewed interest in the role of 5-hydroxytryptamine (5-HT) in migraine because of their ability to stimulate selectively a crucial subtypes of 5-HT receptors. Biologic, genetic, and pharmacologic evidence includes the following: (1) most migraine symptoms can be induced by dopamine, (2) there is dopamine receptor hypersensitivity in migraineurs, and (3) dopamine receptor antagonists are effective agents in treating migraine.

Clinical Findings

The clinical features of migraine are separated into two types of headache:

1- Migraine without aura (common migraine)

2- Migraine with aura (classic migraine).

Classic migraine starts with a prodromal aura that is usually visual but that may also be sensory or motor. The visual aura that commonly precedes classic migraine includes flashing lights or a localized area of depressed vision (scotoma). Sensitivity to light, hemianesthesia, aphasia (impairment of language), or other neurologic symptoms may also be part of the aura, which commonly lasts from 20 to 30 minutes.

The aura is followed by an increasingly severe unilateral throbbing headache that is frequently accompanied by nausea and vomiting.

The patient characteristically lies down in a dark room and tries to fall asleep. Headaches characteristically last for hours up to 2 or 3 days.

Common migraine

Is not preceded by an aura, but patients may experience irritability or other mood changes. The pain of common migraine resembles the pain of classic migraine and is usually unilateral, pounding, and associated with sensitivity to light and noise. Nausea and vomiting are also common.

Treatment

Generally, migraine management is divided into three specific components:

(1) Prophylactic or preventative therapy

(2) Abortive therapy

(3) Palliative or rescue therapy.

Patients experiencing more than three migraines per month are candidates for prophylactic therapy.

Patients with migraine should be carefully assessed to determine common food triggers.

Attempts to minimize reactions to the stress of everyday living by using relaxation techniques may also be helpful to some patients.

Drug therapy may be used either prophylactically to prevent attacks in patients who experience frequent headaches or acutely at the first sign of an attack.

Drugs that are useful in aborting migraine include **ergotamine and sumatriptan,** which can be given orally, nasally, rectally or parenterally.

Ergotamine Initial dose: Oral, Sublingual: 2 mg ergotamine in fixed combination with caffeine given as quickly as possible after the first symptom of headache. Additional 1 mg doses can be given every 30 minutes until the headache has been aborted or until a total dose of 6 mg has been reached or 10 mg/week.

These drugs must be used cautiously since they may cause hypertension and other cardiovascular complications.

Drugs that are used to prevent migraine include propranolol, verapimil, and TCAs or monoamine oxidase inhibitors such as phenelzine can be used to manage difficult cases that do not respond to safer drugs.

Atypical Facial Pain (AFP)

Is a persistent facial pain that does not follow any anatomical pattern, and not responding to any treatment,

The major manifestation of AFP is a constant dull aching pain without an apparent cause that can be detected by examination or laboratory studies. It occurs most frequently in women in the fourth and fifth decades of life, and most studies report that women make up more than 80% of the patients.

Symptoms may remain unilateral, cross the midline in some cases, or involve both the maxilla and mandible. The pain is described as a constant dull ache, instead of the brief and severe attacks of pain that are characteristic of TN. There are no trigger zones, and lancinating pains are rare.

The patient frequently reports that the onset of pain coincided with a dental procedure such as oral surgery or an endodontic or restorative procedure. Patients also report seeking multiple dental procedures to treat the pain; these procedures may result in temporary relief.

MANAGEMENT

Once the diagnosis has been made and other pathologies have been eliminated, it is important that the symptoms are taken seriously

Patients should be reassured that they do not have an undetected life-threatening disease and that they can be helped without invasive procedures.

When indicated, consultation with other specialists such as otolaryngologists, neurologists, or psychiatrists may be helpful.

TCAs such as amitriptyline, nortriptyline, and doxepin, given in low to moderate doses, are often effective in reducing or (in some cases) eliminating the pain.

Other recommended drugs include gabapentin and clonazepam.

Some clinicians report benefit from topical desensitization with capsaicin, topical anesthetics, or topical doxepin.

Vascular Pain

Pain originating from vascular structures may cause facial pain that can be misdiagnosed and mistaken for other oral disorders, including toothache or TMD. The pain is dull, pressing or throbbing.

CRANIAL ARTERITIS

Cranial arteritis (temporal arteritis, giant cell arteritis) is an inflammatory disorder involving the medium-sized branches of the carotid arteries. The temporal artery is the most commonly involved branch.

Etiology and Pathogenesis

Both cranial arteritis and polymyalgia rheumatica are caused by immune abnormalities that affect cytokines and T -lymphocytes, resulting in inflammatory infiltrates in the walls of arteries. This infiltrate is characterized by the formation of multinucleated giant cells. The underlying trigger of the inflammatory response is unknown.

Clinical Manifestations

Cranial arteritis most frequently affects adults above the age of 50 years. Patients have a throbbing headache accompanied by generalized symptoms including fever, malaise, and loss of appetite. Dull temporal pain, fatigue of the masticatory muscles, joint pain, and headache of recent onset that is chronic and possibly progressive.

Moderate-to-severe headache, polymyalgia, and claudication of the masticatory muscles may be present. There may be a swollen and tender scalp artery, usually the superficial temporal artery, pain radiate to face, neck, maxilla and mandible.

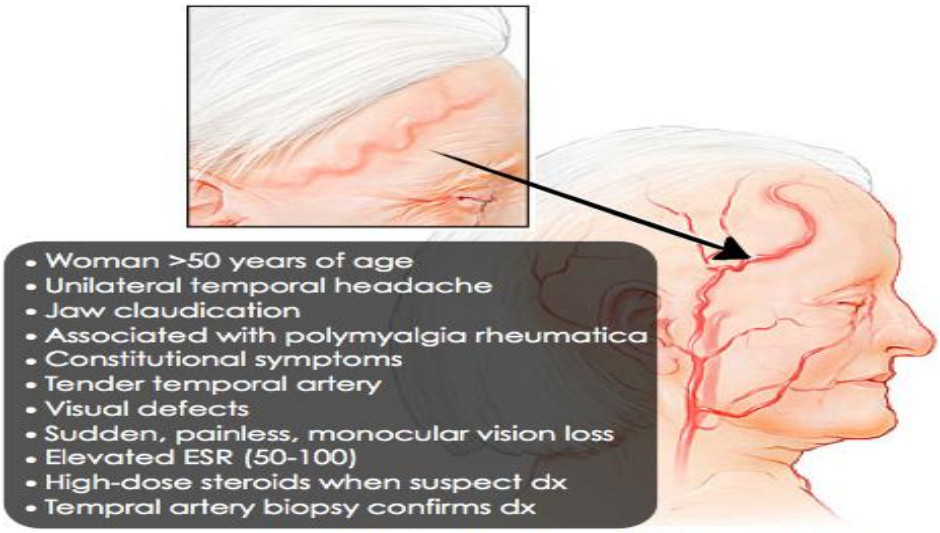
Blindness may develop in 50% of patients. Examination of the involved temporal artery reveals a thickened vessel with burning sensation over the artery

Differential Diagnosis:

Masticatory muscle myalgia

myofascial pain

temporomandibular disorder



Temporal (Giant cell) Arteritis

Laboratory investigations:

Laboratory abnormalities include an elevated erythrocyte sedimentation rate (ESR) and anemia. Abnormal C-reactive protein may also be an important early finding.

The most definitive diagnostic test is a biopsy specimen (from the involved temporal artery) that demonstrates the characteristic inflammatory infiltrate.

Treatment

Individuals with cranial arteritis should be treated with systemic corticosteroids as soon as the diagnosis is made.

The initial dose ranges between 40 to 60 mg of prednisone per day, and the steroid is tapered once the signs of the disease are controlled.

The ESR may be used to help monitor disease status. Patients are maintained on systemic steroids for 1 to 2 years after symptoms resolve.

Steroids may be supplemented by adjuvant therapy with immunosuppressive drugs, such as cyclophosphamide, to reduce the complications of long-term corticosteroid therapy.

Cardiac Toothache (referred pain)

Angina pectoris or acute myocardial infarction, refer pain to the shoulder, arm, the jaw and to the teeth. Associated with chest pain (substernal), Tooth ache increases with exercises and decreased with medication specific for the heart (nitroglycerin).

Treatment is directed to the underlying heart problem, after dental evaluation

When pain occurs after exertion, cardiogenic etiology should be suspected. If patients are experiencing a cardiogenic toothache give them an aspirin, and make sure they get to a hospital emergency room immediately .

Sinusitis and orofacial pain

Acute sinusitis, also called acute rhinosinusitis, is a short-term infection or inflammation of the membranes that line sinuses. It prevents mucus from draining from nose.

Symptoms of acute sinusitis include:

- nasal congestion
- thick, yellow, or green mucus discharge from the nose
- sore throat
- a cough (usually worse at night)
- drainage of mucus in the back throat (post nasal drip)
- headache
- pain, pressure, or tenderness behind eyes, nose, cheeks, or forehead
- earache
- toothache
- bad breath
- reduced sense of smell
- reduced sense of taste
- fever

- fatigue

Dull pain, aching or throbbing in several upper teeth, associated with pressure below the eyes and worsen by bending down, applying pressure in the sinuses, coughing, sneezing, Chewing, cold, percussion, worsen the pain, with history of upper respiratory infection, nasal congestion, or sinus problem.

Acute maxillary sinusitis and acute allergic sinusitis cause actual toothache pain in the maxillary teeth particularly when the roots of the teeth extend into or near the anteroom. When fluid pressure caused by infection or inflammation builds up, the patient will experience tenderness in the cheekbone, facial swelling, throbbing headache, fatigue, runny nose and/or increased pain when the patient tilts his or her head in a downward position. It rarely involves just one tooth, and should be suspected when multiple teeth test positive to biting and percussion tests.

In addition, about 2% of headaches are secondary to abnormalities or infections in the nasal or sinus passages, and they are commonly referred to as sinus headaches