

Special Communication

TOOTH-ACHE

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The term toothache means pain experienced in a tooth. As a rule the pain is local in origin and corresponds with the site of the lesion, but may be referred in which case the pain produced by stimulation of the dental pulp is often felt in another tooth. The reference is never across the midline but it may be to a tooth either in the same jaw as the affected tooth, or in the opposing jaw (Hockaday and Whitty, 1967; Harris, 1973).

Any pain in the facial area surrounding the teeth is likely to be considered by the patient as tooth ache. He may get relief of pain by removal of the affected tooth or teeth but sometimes the disorder remains unchanged, though the offending tooth is extracted. Pain is felt in the other tooth or teeth, for which the patient tries to get them out till all the teeth are removed leaving the mouth unsightly without any benefit. This particularly happens with the operator who possesses very poor knowledge of the anatomical and physiological aspects of the various organs of the body, because such discomfort may arise in true dental structures (e.g. pulp and periodontal membrane) or a jaw and associated parts.

Pain is a specific sensory experience mediated through nerve structures which are separate from those which mediate other sensations such as touch, pressure, heat and cold. Pain impulses arising from the pain sensitive structures served by the peripheral branches of the trigeminal nerve are carried to the gasserion ganglion into the pons and are conducted by the spinal ganglionic, spinothalamic and thalamocortical neurons. The cerebral cortex is necessary for localization and evaluation of the intensity of the impulses and the thalamus is important in the integration of pain (Adson 1948; Agnew 1956).

Pain is said to be "local" when it is experienced at the site of stimulation of the nerve endings, or "referred" when it is experienced at site other than that in which its cause is situated. Pain arising from damage to the surface of the body is usually well localized but in the case of deep structures the subject may interpret it as being somewhere else in the area supplied by the nerve segment concerned (Parfitt and Herbert, 1962).

Pain is elicited by a stimulus which is sufficient to cause tissue damage and is therefore usually an indication of some underlying pathology. Pain may be produced by stimulation of

nerve endings (neuralgia), by inflammation of nerves (neuritis), or may follow damage or tearing of nerves (causalgia and post-traumatic nerve injuries). Many patients suffer from pain associated with functional disorders of the nervous system (neurosis) in which there is no evidence of injury or inflammation or disease of any tissue (Scott and Dixon, 1972).

The intensity of pain experienced bears little relation to the degree of trauma or the pathological change. Whether or not pain is produced is dependent upon the type of noxious stimulus and the pain sensitivity of the structures involved (Parfitt and Herbert, 1962). Some tissues are much more sensitive than others, e.g., no pain sensations can be elicited from the enamel, but the dentine is somewhat sensitive, and the pulp is extremely sensitive to noxious stimuli.

The sensation of pain arising from the surface of the body is usually sharper in character and more readily localised than that arising from the deeper structures. This is because the special nerve endings for touch and temperature which are to be found on the surface of the body are stimulated at the same time as the pain receptors and assist in localization (Wolff and Wolf, 1958).

The pain threshold depends on the receptor mechanism and may be modified in various ways. When only a mild stimulation is required to cause pain, the condition is known as hyperalgesia, while in other circumstances, when the pain threshold is raised, the condition is known as analgesia. Inflammation of a tissue lowers the pain threshold and produces hyperalgesia possibly as a result of liberation of substances which act on the nerve ending making them more excitable than normal. Pain in this case is largely due to increase of pressure in tissues from the inflammatory exudate and is thus often of a throbbing type, the pulsation corresponding with the heart beat. The pain threshold in some parts of the body may be raised by physical means such as cooling the part or by the administration of drugs which have analgesic or anaesthetic action (Adrian 1950).

The appreciation of pain is also affected greatly by the mental state of the individual (Mumford 1965). Thus a soldier wounded in battle or a football player injured during a match may, in the excitement of the movement, feel no pain. On the other hand a patient who is suffering from illness, fatigue or apprehension, is liable to be unduly sensitive to a stimulus which under normal circumstances would not be very painful (Parfitt and Herbert 1962).

Various conditions which lead to appreciation of pain in the teeth are described as follows:

(a) Pain of Dental Origin

Morbid Conditions of the Pulp: This type of pain is caused by the involvement of the pulp. Pulpal disease is the most common cause of dental pain. A pulp will usually respond painfully to physical or chemical stimuli when exposure of the dentine occurs as a result of dental decay, fracture of the crown of the tooth, attrition, abrasion and erosion; or failure of the enamel to meet the cementum during development (Brannstrom and Lind, 1965). A vital pulp may also react painfully to electrical stimuli (Galvanic action) caused by intermittent contact between two dis-similar metals, like a gold and amalgam filling in opposing teeth (Lain and Caughron, 1936; Mumford, 1957; Mumford, 1960). Pain in the upper or lower jaw, in the absence of swelling, is usually caused by dental caries. The carious area may be concealed under a filling. In this case the pain usually reoccurs with increasing frequency until the exposure and inflammation of the pulp. There are prolonged bouts of pain, which is throbbing in nature and occurs without any obvious stimulus such as thermal changes or stresses of mastication (Baume, 1970a Baume, 1970b Picton 1969).

High Altitude: It was found during the 2nd World War, that airmen at high altitude experienced pain in the teeth which they did not notice at ground level. It was suggested that in some cases, reduced pressure lowered the threshold for pain so that a slight stimulus, such as an incompletely lined metal filling, produced a painful response whereas previously it had not (Harvey, 1943; Joseph et al., 1943). In other cases pain was thought to be due to the production of minute nitrogen bubbles in the blood stream which stimulated the nerve endings in the pulp (Coons 1943). Early in pulpal disease, the pain is manifest as sensitivity to heat or cold; later, it becomes characteristically sharp and pulsating which is difficult to localise.

Morbid Conditions of the Periodontal Membrane: Changes in the periodontal fibers of the involved tooth result in loosening and movement of the tooth which may become hypersensitive. In most cases there is pain on percussion but no pain from applying hot or cold stimuli. In almost all cases pain occurs spontaneously (i.e. without any recognisable external stimulus) and also pain frequently occurs on biting. Pain is described as localised rather than diffused and is accurately localised to tooth eventually found to be the site of the disease responsible. Periodontal pain may be associated with pulpal inflammation or necrosis, as in pericementitis or the formation of a periodontal abscess secondary to pulpal infection. It is well to bear in mind that root caries may be the cause of toothache in patients with periodontal disease without evidence of

coronal decay (Collidge 1931; Noyes 1927; Mumford 1967).

Fractured or Cracked Tooth: A fractured or cracked tooth, visible or invisible can cause dental pain (Hill 1957). In case of invisible fractured or cracked tooth it is frequently impossible for the patient to localise the pain to the involved tooth. A history of biting down on a hard object can sometimes be elicited (Hill 1957). Fracture of the jaw with displacement may stretch the nerve or cause pressure on it; later, union of the fracture in poor alignment may perpetuate these effects resulting in dental pain.

Abscess: A dento-alveolar abscess may cause local or generalised swelling and pain in the jaw and face. In acute apical alveolar abscess pain is severe, the adjacent teeth are elevated and tender, but there is little associated swelling of the mucosa surrounding the tooth. The offending tooth or teeth usually show a carious lesion or a restoration, although they may be intact. With subperiosteal abscess, swelling is present in the gingiva (gums) and adjacent soft tissues of the face. In some instances the abscess may remain latent for a long period without external manifestations. An accompanying pyrexia may seem unexplainable (Mumford 1964; Mumford 1965).

Impacted Teeth: An un-erupted or impacted molar tooth may also be responsible for dental pain. The pain from impacted tooth is a diffuse dull ache, spreading beyond the area of the tooth responsible, and lasting for days (unless controlled by analgesics). It occurs spontaneously and also on biting. There may be pain on percussing the adjacent tooth against which it is impacted. Pressure from the crown of the impacted tooth can cause resorption of the adjacent roots and the pulp may be exposed with increasing pain (Bonica 1954).

Occlusal Trauma: Pain may result from occlusal trauma caused by numerous factors e.g., imperfect adjustment of restoration which lead to malposition of the teeth and faulty occlusion. Occlusal trauma from whatever cause, may lead to changes in supporting tissues and increased tooth mobility. In the presence of inflammation, occlusal trauma may cause inflammation to deeper parts of the supporting tissues (Kawamura, 1968; Schwartz and Chayes, 1968).

Pericoronitis: As the tooth continues to erupt, the overlying gingiva may recede rapidly but in some cases it remains over the erupting tooth where it is bitten, resulting in pain, and may also become infected. In such cases there is usually a dull ache aggravated by biting on it, and sometimes it is worse at the first meal of the day perhaps

because inflammatory discharge accumulates overnight (Smith 1958)

(b) Non-Dental Causes

Here the pain originates in distant structures other than the teeth. There may not be anything wrong with the teeth or its supporting tissues but due to the anatomical relation of the pain sensitive nerves the disorder seems to be in the true dental structures. Such pain is known as REFERRED PAIN. Although referred pain is usually accompanied by concurrent pain symptoms in the site of origin, sometimes the pain is more strongly perceived in the referred region than where it originates (Zegarelli et al., 1969). Local anaesthesia is a helpful diagnostic measure.

Maxillary Sinusitis: Pain in the upper jaw caused by maxillary sinusitis may be described by the patient as tooth ache. In maxillary sinusitis there may be irritation of the superior dental branches of the maxillary nerve during the passage through the walls of the infected sinus giving rise to dental pain. The type of pain sometimes resembles that of pulpitis, but stimulation of the maxillary teeth in that region will reveal that not one but a whole group are sensitive (Stone 1956). Pain may be referred to the maxillary permanent teeth, particularly the premolars and molars where the apices are in close proximity to the floor of the sinus and may become directly involved by infection of the sinus. The pain may be unilateral or bilateral, decreased or increased by postural changes and is of a dull aching character, often at its peak in mid mornings (Fickling 1960). Infra-orbital pressure may reveal tenderness over the involved sinus (Ghani and Khan, 1969). Dental caries and maxillary sinusitis may occur independently, or a dental infection may be the source of a sinus infection. Transillumination and X-rays of sinuses are important aids in diagnosis.

Diseases of the Ear: As the ear region is supplied by a large number of separate nerves including the trigeminal nerve, pain arising in the ear may appear to come from other regions supplied by the branches of the trigeminal nerve and vice versa (Scott and Dixon, 1972). The pain of Otitis media which ranges in character from a dull ache to sharp, lancinating spasm may be felt in the ear (Hall and Colman, 1969) or referred to the face or lower teeth (Grossman 1965). There may be tenderness when pressure is applied over the tragus. Diseases of the external ear, including frunculosis, might be more confusing to the dentist because pain may be localised in front of or below the ear, or may spread into the jaw (Hall and Colman, 1969).

Diseases of the Eye: Diseases of the eye ball (corneal ulceration, glaucoma and visual dis-

turbances) produce pain which may at first be localised in the eye ball, but as the pressure rises, pain radiates to include the entire area of distribution of the ophthalmic division (Smith, 1958; Scott and Dixon, 1972), and the maxillary division of the trigeminal nerve may also be involved (Wolff 1963) resulting in occasional pain in the upper jaw.

Disorders of the temporomandibular Joint: In case of temporomandibular joint disorders the patient usually complains of severe pain about the ear. The pain may be localised to the joint or referred to the masticatory muscles, particularly the temporal (Campbell 1958). It frequently radiates into the ears and tongue, along the side of the head and occipital region and toward the angle of the mandible (Schwartz and Chayes, 1966; Guralnick, 1968). The pain may be constant or recurrent which may be precipitated by movement of the jaw (Zegarelli et al., 1969; Glickman, 1972), or it may occur without provocation. Pain associated with temporomandibular joint disorders, unlike the dental pain is dull diffuse ache and follows its prolonged course. Temporomandibular joint diseases are more common in females than in males (Franks 1964).

Vascular Disorders: Intra-Cranial hemorrhage and thrombosis or injuries within or near the base of the skull can cause disturbances of sensation of the fifth cranial nerve resulting in perception of tooth ache. In cardiac disorders, such as myocardial ischemia due to coronary artery disease exertion causes severe substernal pain which may radiate to the arms, throat or jaws and is relieved by rest or vasodilator drugs. Rarely the substernal element of this pain is missing and the patient may complain only of pain in the jaws or pain in the angle of the jaw may be the first symptom (Taverner 1959; McCarthy 1972), which could be very confusing to the dentist. The patient with such disorder may be obviously very ill, and may be in shock and the cause of pain in the jaw will usually be suggested by the patient's general health.

Osteomyelitis: Disturbances of the sensation of the inferior alveolar nerve is a well recognised complication of osteomyelitis of the jaw and may be due either to direct involvement of the nerve in the infective process or to edema around the nerve causing compression within the mandibular canal. The disease is serious and there is pyrexia, halitosis and trismus as well as severe pain. The associated teeth are sensitive on percussion and may loosen (Moose 1964; Moritz 1954).

Dry Socket: Dry socket or alveolar osteitis is another form of dental pain. The failure of a clot to organise in the socket of a recently extracted tooth leaves the socket walls and its un-

protected nerve endings exposed and responsive to several forms of irritation. Generally, the pain is severe and radiates widely, lasting for several or more days (Birn 1972).

Trigeminal Neuralgia: Trigeminal neuralgia or TIC-DOULOUREUX is a paroxysmal disorder affecting the fifth cranial nerve characterised by bouts of pain and may be responsible for a complaint of toothache, since the maxillary and the mandibular branches of the trigeminal nerve are most often affected. Usually the pain is depicted as sharp, lancinating, shooting, searing, burning, lacerating and stabbing (Guralnick 1968). The pain starts suddenly and lasts for a short time (few seconds to a minute or so). Some patients describe the condition as flashes of lightning, indicating the intensity and short duration of the pain (Monheim, 1969; Stookey and Ransohoff, 1959). Usually in between the paroxysms there is complete relief of pain, the duration of which is prolonged in early stages but becomes shorter later. The pain may start while talking, shaving or washing the face, brushing the teeth, chewing or even swallowing. The patient will describe trigger zones, e.g. infra-orbital and mental foramen which, when touched, lead to initiation of pain. Such areas may also be stimulated by draughts of cold air, cold water, or even undue movements of the jaw. The patient tries to avoid these trigger areas so that lip and face are moved as little as possible giving a "mask-like" appearance (Stones 1966). The face may be unshaven, the teeth may be covered with debris and there may be associated caries and gingivitis.

Trigeminal neuralgia is uncommon in persons younger than 30 years of age. The usual onset is in middle or late life, and the incidence of the illness may be equal or slightly greater in women than in men (Zegarellie et al., 1969; Guralnick, 1968). The recurring bouts of pain seem to have a seasonal element. They occur particularly in the spring and fall of the year (Guralnick 1968).

Psychogenic Pain: Occasionally patients complain of pain in the oral cavity for which no organic cause could be found out. The disorder occurs chiefly in females. The pain is described as deep-seated, with pulling, gripping, burning or boring features. It is poorly localised and does not conform to the distribution of any nerve. When asked to localise the pain, the patient will often press vigorously to indicate the depth of the pain (Engel 1951). Such pain may be due to some functional disorder of the nervous system. The attack is often prolonged, gradually increasing in severity and then subsiding slowly. Reassurance to the patient will usually relieve pain. Gillbert (1946) has described a woman who suffered intractable severe pain of the left upper jaw with no accompanying physical findings.

Gross (1952) found that in a group of patients suffering chronic pain in the teeth or jaws there was an accompanying emotional conflict associated with sexual or social maladjustment. He also found a relatively high frequency of oral pain in menopausal women and that there is characteristically a high degree of guilt, depression and anxiety at the time of menopause. Oral pain, temporomandibular joint pain and glosodynia in menopausal and post-menopausal women have also been reported.

To diagnose the facial pain in the dental structures it is of utmost importance therefore, to utilise all available diagnostic means including complete interrogation of the patient, careful physical examination, investigative measures, such as pulp tests, radiographs and procaine blocks, before embarking on surgically destructive treatment. Having excluded the more common dental causes of pain the other conditions which may give rise to pain, and which have already been mentioned, must be eliminated in the course of a systemic clinical and radiographic examination.

Often an erroneous diagnosis has subjected patients with psychogenic pain to a variety of surgical procedures or habituating analgesics which are invariably unsuccessful in controlling the complaints. A proper understanding of the patients' psychologic situation is essential for therapeutic success.

Psychopharmacologic agents, such as anti-depressants and tranquilizers, can be useful adjunct in the treatment of pain. In chronic pain, the danger of habituation and addiction must always be considered. The patient may become accustomed to the repeated use of a drug not only for the relief of pain but also to gain a feeling of well-being. If forced to abandon the drug, he suffers a psychic craving for it.

The dentist must always be alert to the patient who is already a drug addict and complains of intense or chronic pain in the hope that he will be given drugs. One must also be alert to the silent endurance of great pain by patients, since this may represent a form of punishment.

It is well to keep in mind that most diseases of the dental pulp are progressive and that unmistakable signs and symptoms eventually unfold (Stowe 1955). The diagnosis of obscure pain even in the presence of dental disease should not be made without a complete evaluation of the character of the pain and the possibility of its arising from some source other than dental.

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