

Pain Pathway in TMD

Fahad Alsulaimani, *DDS, MS, OFPD, DCs*

Introduction

- The field of orofacial pain includes pain conditions that are associated with the hard and soft tissue of the head and neck, and all the intraoral structures

● The diagnosis include

1. Headache
2. Musculoskeletal pain
3. Neurogenic pain
4. Psychological pain
5. Pain from major disease like AIDS, Cancer

Clinician Role in Orofacial Pain

- Must have a current knowledge in basic clinical science of orofacial pain
- Proper clinical examination (physiological testing, neurologic testing, range of motion, radiological evaluation and laboratory evaluation)
- Develop a treatment plan and able to refer the patient to other clinician

Epidemiology of orofacial pain

- 3 or 4 of American people experienced different kind of pain per year (Nuprin, 1985)
- Crook et al 1984 reported 16 % of population experienced pain in the last 2 weeks and 81% had experienced pain in their live time
- Brattberg et al 1989 reported that 66% of 827 random people had experienced pain in different part of their bodies, 10 % of them had experienced pain in the head and neck area

Neuroanatomy of The Orofacial Structure

- Sensory nerves
- Motor nerves
- Autonomic nerves

Pain Definition

- Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in term of such damage
- Pain or the unpleasant feeling that associated with the damage is what makes patients seek treatment

Psychological and Behavioral Factors That Influence Response to Pain

- Cultural Differences
- Learning behaviors
- Previous exposure
- Fear and anxiety
- Attention and distraction
- Marital problems
- Financial rewards for expressing pain
- Controlling other with pain
- Personality disorders
- Drug dependence
- Depression and grief

Acute vs. Chronic Pain

- Acute pain is almost always caused by an identifiable tissue injury and serves a protective function by warning the body of imminent danger
- Sudden onset, Self limiting, No diagnostic problem
respond well to NSAID, and narcotics
Respond well by removing the source of injury and disappear after healing
If not treated it will change to chronic pain

Acute vs. Chronic Pain

- Pain of more than 3-6 months is considered to be chronic pain
- Persist beyond the course of the disease even after tissue healing
- It might reemerge and recur for months even for no identifiable cause
- It appear to be permanent
- It will interfere with all aspect of patient life till it will over laps with depression, sleep disruption, loss interest in social gathering. Etc....

Acute vs. Chronic Pain

- In order to relive the pain patient will go for many procedure such as surgery, extensive dental procedure
- NSAID fail to reduce pain level
- It is complex pain, so it need a multidisciplinary team approach

Pain Processes

- Most sensations of pain are produced by
Mechanical stimuli
Thermal stimuli
Chemical stimuli
- They are capable to make tissue injury of varying degrees
- The type of pain result from noxious stimulation is classified as SOMATIC PAIN

- Somatic pain is similar as trauma, surgery and infection
- It require the stimulation of the normal neural structure unlike the neurogenous pain which is due to abnormality in the neural component that innervate an area and does not require noxious stimulation

Pain events

- Both the electrical and chemical events process in to
 1. Transduction
 2. Transmission
 3. Modulation
 4. Perception

Transduction

- Occurs when noxious stimulation act on the free nerve endings (pain receptors) which are located in various tissue leading to electrical activity (depolarization) and resulting in the generation of nerve impulse (action potential)

Transmission

- It involve conveying the massages (verve stimulus) to the Central Nervous System (CNS)

Modulation

- Central neural activity that dampens and controls the incoming pain signals

Perception

- The final pain process
- It occurs when the pain signal reached the higher center and suffering and pain related behavior begins
- Pain management may involve inhibiting or influencing any of these processes

Pain Systems

- Peripheral Pain system
Which conduct the electrochemical nerve impulse to the spinal cord
- The central nervous system
Which relays the pain impulse to the brain

Peripheral Pain System

- It is complex transmission lines that subserve a variety of functions, including motor and autonomic control as well as sensory transmission
- The main structural unit of that system is the Neuron (nerve cell) which is composed of nerve cell body and its process (axon) that conduct impulses to and from the cell body

- An afferent neuron conduct the nerves impulse toward the CNS, while an efferent neuron conducts the impulse peripherally through the respective axon
- The detection and subsequent transmission of the noxious event is called nociception (receptors and their afferent nerves)
- They respond to mechanoreceptive (crush), thermal (burn), chemoreceptive (toxic substance)

Peripheral Pain Mediators

- During tissue injury, various compound are released or activated such as Arachidonic acid (released from cell membrane upon exposure to phospholipase A₂ then it is acted upon by Cyclooxygenase to form a group of chemicals known as Prostaglandins (PG)
- PGE₂ is one member of this group and play an important role in inflammation and pain

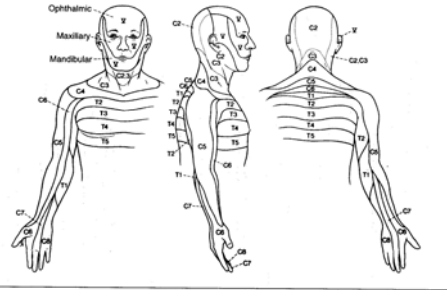
- PGE₂ them self will not cause pain but however they sensitize the nerve ending and lower their threshold to other substance so they can induce pain
- From these mediator such as histamine, bradykinin, hydrogen, and potassium ions that leaks from cell, serotonin or 5-HT which are a product of platelets in the periphery

- Release of substance P and calcitonin gene related peptide (CGRP) from the free nerve ending will result in vasodilatation and edema (neurogenic inflammation)
- Capsaicin (from red chili pepper) reported to deplete substance P

CNS Pain System

It is divided into two functionally different units

1. Pain pathway which carry the nociceptive message to the higher center of the brain
2. Pain control pathway which modulate the pain message



Neuropathic Pain

- Somatic pain, which is related to noxious stimulus and tissue damage, will subside after completion of healing process
- In contrast, neuropathic pain which is caused by a functional abnormalities of the nervous system may persist long after the normal healing process has run its course
- It may not start for weeks or months

- Patient may suffer from many different kind of neuropathic pain sensation varying from continuous pain and aching type to episodic electrical shock-like paroxysmal pain
- Pain will start for a very mild stimulus such as light touch, breeze this is called allodynia
- If patient is exposed to noxious stimulus (hyperalgesia)
- This type of pain is difficult to manage
- Diabetes is an example of that condition

Deafferentation Pain

- It is partial or total loss of sensory nerve supply to an organ
- Normally this will result in loss or decrease of pain in that area however, spontaneous pain or unpleasant sensation (dysesthesia) may develop in that area
- Neuroma is an example which they become hypersensitive to stimulus

Summary

- Pain is complex constellation of neurophysiological, biochemical, and psychological events