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Dentinal Hypersensitivity

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Abstract

Dentinal hypersensitivity, though a commonly encountered clinical condition, is challenging in terms of arriving at a correct diagnosis and subsequently management. This is because of its multifactorial etiology and diverse signs and symptoms. It is a significant clinical problem. It is defined as "pain arising from exposed dentine typically in response to thermal, chemical, tactile or osmotic stimuli". Its management requires a good understanding of its completely, as well as its various treatment modalities.

Keywords: Tooth hypersensitivity; Sensitivity; Theories; Prevention; Management.

Introduction

In one form or the other pain is the major reason for patients to visit the dentist. Most often it may be related to dental caries, traumatic injuries, etc., which can be correctly diagnosed and treated successfully. However, there is a small percentage of cases where the exact reason for sensitivity cannot be easily identified or satisfactorily managed.[1] These patients complain of a sharp pain in response to various stimuli like heat, cold, chemicals, etc. This condition is called *dentin hypersensitivity* and it usually affects adults in the age group of 30 to 40 years most frequently. Many theories have been proposed and several treatment options suggested, dentin hypersensitivity is still a vexing clinical problem to diagnose and manage.[2]

Definition

The International Workshop on Dentin Hypersensitivity (1983) has proposed the following definition for this condition.[3]

"Dentin Hypersensitivity is characterized by short, sharp pain arising from exposed dentin in response to stimuli typically thermal, evaporative, tactile, osmotic or chemical and which cannot be ascribed to any other form of dental defect or pathology".[4]

Distribution:[6]

Buccal cervical area of teeth

Reasons – site of pre-dilection for gingival recessions and the area where enamel is the thinnest.

Most commonly affected are canines and Ist premolars, then incisor and 2nd premolars, least often molars.

Show a negative co-relation with plaque scores recorded by site.

Significantly greater proportions of left side tooth sensitivity compared with their right contralateral tooth types.

Etiology of Dentin Hypersensitivity: [12]

Several predisposing factors lead to dentin hypersensitivity, rather than a single identifiable cause.

Table 1: Etiology of dentin hypersensitivity

Enamel Loss	Cemental Loss
Occlusal wear	Gingival recession
Toothbrush abrasion	Periodontal disease
Dietary erosion	Root planning
Abfraction	Periodontal surgery
Parafunctional habits	

Development:[10]

There are two phases in the development of dentinal hypersensitivity:

Lesion localization: This requires exposure of dentin, occurs by gingival recession, abrasion, erosion, etc.

Lesion initiation: This requires removal of cementum or smear layers, occurs due to periodontal procedures or by the action of abrasion or erosive agents.

Theories of Dentin Hypersensitivity[14]

Tooth sensitivity to various stimuli is a peculiar problem faced by many adult patients. The exact mechanism of dentin hypersentivity is not very clear but several theories have been proposed to explain this phenomenon. They include:

Direct Innervation Theory

According to this theory the dentinal tubules innervated by nerves, which extend upto 100 microns along the dentinal tubules.

Whenever there is injury to these dentinal tubules, the stimuli reach the nerve ending in the inner dentine.

The stimulated nerve causes hypersensitivity.

Since histological examination shows the dentinal tubules does not contain any nerve endings, this theory is not accepted.

Transduction theory

Membrane of the odontoblast process is excited by the stimulus and the impulse is conduct to the nerve ending in the inner dentine i.e. pre-dentine, odontoblast zone and pulp.

Not popular theory since there is no neurotransmitter vesicles in the odontoblast process to facilitate the synapse or synaptic specialization.

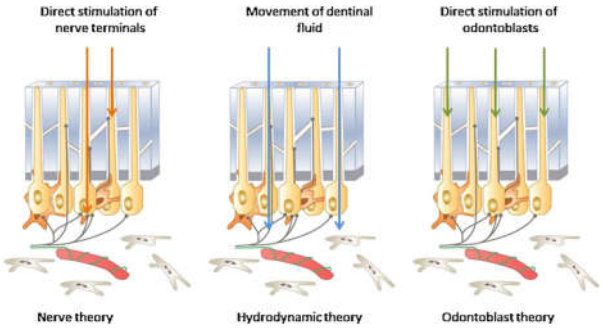

Fig. 1: Theories of dentin hypersensitivity

Hydrodynamic theory[5]

(Ist proposed Gysi – 1900,) (Brannstrous 1963,67)

Rapid shifts of the fluids within the dentinal tubules, following stimulus application, result in activation of sensory nerves in the inner dentin region of the tooth.

Clinical Features:[2,10]

Pain is the primary symptom of hypersensitive dentin. The patient usually experiences a short, sharp pain in response to heat, cold, tactile stimuli, sweet or sour foods. The pain is considered to be an exaggerated response of the normal pulp-dentin complex and is only felt on application of the external stimulus. However, there is no lingering discomfort once the stimulus is removed.

Diagnosis:[13]

When a patient presents with the symptoms of dentin hypersensitivity, the first step is to diagnose the condition accurately. This requires a careful history and clinical examination.

Case History – Elicit the following information:

History and nature of pain (sharp, dull, etc.)

Number and location of sensitive teeth and whether it is the same teeth that are always involved.

Intensity of the pain (mild, moderate or severe).

Stimuli which initiate the sensitivity.

Frequency and duration of sensitivity.

Clinical Examination – includes following test sand observations:

Evidence of dentin exposure (gingival recession, loss of enamel).

Sensitivity or pain on tactile examination of the suspected teeth.

Percussion sensitivity

Pain lingering after the stimulus is removed.

Vitality test to rule out pulpal involvement.

Radiographic examination to check for caries, pulpal or periodontal involvement.

Signs of fractured, leaky or poor restorative margins.

Differential Diagnosis:[7]

Cracked tooth syndrome

Fractured restorations

Chipped teeth

Dental caries

Post-restorative sensitivity

Teeth in acute hyper function

Prevention:[11]

For patients who are suffering from dentinal hypersensitivity, dentists can provide valuable advice to prevent or reduce the clinical symptoms. This includes the following measures:

Diet Counselling especially regarding the consumption of acidic foods and beverages.

Correction of brushing techniques in order to prevent damage to the cervical enamel and supporting tissues.

Care during operative procedures and while restoring teeth to avoid iatrogenic damage to tooth structure.

Care during periodontal procedures like scaling and root planning.

Table 2: Management Of Dentinal Hypersensitivity

Desensitization by occluding dentinal tubules[9]	Formation of smear layer over exposed dentin. Use of topical agents to occlude the exposed tubules: Calcium hydroxide paste Calcium phosphate paste Silver nitrate Strontium chloride Fluorides Fluoride iontophoresis Potassium oxalate Varnishes Dentin adhesives Placement of restorations Glass ionomer cements Composite resins Use of lasers CO_2 laser Nd: YAG, Er: YAG lasers He: Ne laser
Desensitization by blocking pulpal sensory nerves[8]	Potassium nitrate toothpastes

Management:[8,9]

There are two basic mechanisms by which dentin hypersensitivity can be managed:

Conclusion

Dentin hypersensitivity is a matter of growing concern in the present times due to the increased life expectancy and consequent longer retention of natural teeth by patients. Hypersensitivity arises following loss of enamel or root denudation which exposes the underlying dentin. The hydrodynamic theory is the most accepted mechanism to explain this phenomenon. The ultimate goal in treating this condition is to provide immediate and long-lasting relief of the associated painful symptoms. For this, the clinician must pay proper attention to diagnosis, prevention and selection of the appropriate treatment modality.

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