Diagnosis and Treatment of Dentinal Hypersensitivity

Blaggana A.¹, Vohra P.², Nagpal A.³

Abstract:

This bibliographic review provides a general view of etiology, clinical features, and management of patients of dentinal hypersensitivity, which is a very common dental complaint of several patients. Dentinal hypersensitivity poses a major problem, as many patients are unable to perform adequate oral hygiene in hypersensitive areas, thus leading to further plaque accumulation and degradation in gingival or periodontal health. Effective management must be preceded by proper diagnosis by excluding all other causes of orofacial pain and the hypersensitivity must be controlled by removal of predisposing factors and patient education.

Keywords: Desensitizing, Agent, Dentinal, Hypersensitivity.

Introduction:

Dentinal hypersensitivity is characterized by short, sharp pain arising from exposed dentine in response to stimuli typically thermal, tactile osmotic or chemical and which cannot be described to any other form or dental effect or dental pathology¹,². The external stimuli disturb the ion balance, potassium diffuses out of the cells, and the sensory nerves get irritated and leading to the feeling of pain. Dababneh et al (1999) described dentinal hypersensitivity (DH) as, "An exaggerated response to non-noxious stimuli. It is characterized by pain of short duration arising from exposed dentin in response to stimuli, typically thermal, evaporative, tactile, osmotic, or chemical and which cannot be ascribed to any other dental defect or pathology". The reported incidence of hypersensitive dentin in the dental population ranges from 8.7% to 30% and occurs equally in males and females³. Several theories have been proposed to explain the mechanism of dentinal hypersensitivity. Pashley and Parsons in 1987⁴ suggested mechanisms of dentinal sensitivity:

1. Nerve endings or nociceptors that respond directly when dentin is stimulated, located throughout dentin.
2. Odontoblasts, being chemically or electrically related to nerves, function when depolarized as receptors generating nerve impulses.
3. Stimuli applied to dentin producing displacement of dentinal tubule contents, which could excite mechanosensitive nerve endings near the pulpal end of the tubules (hydrodynamic mechanism).

Correspondence: Dr. Anshu Blaggana, Reader, Dept. of Periodontics, PDM Dental College & Research Institute, Bahadurgarh-124507, Haryana, India. E-mail: dranshublaggana@yahoo.co.in, Tel. no. +91-9953110980.

¹Reader, Dept. of Periodontics, PDM Dental College & Research Institute, Bahadurgarh-124507, Haryana, India.
²Lecturer, ³Reader, Dept. of Oral Medicine and Radiology, PDM Dental College & Research Institute, Bahadurgarh-124507, Haryana, India.

Current, evidence favors the hydrodynamic theory originally postulated in the 19th century and later developed by Brannstrom[4] in 1963. This theory suggested that dentinal tubules act as capillary tubes and the fluid within them obeys the laws of fluid movement. The rapid movement of fluid in the dentinal tubules in response to certain stimuli may cause distortion of intradental nerves and generate a response.

Hypersensitivity at microscopic level:

At microscopic level, dentine is made up of a large number of dentinal tubules. The tubule contains dentinal fluid which when disturbed, pass ripples of stimuli to the nerve endings situated in the pulp. The sensory nerve cell in its inner membrane has a negative charge all over and a positive charge surrounding it. The positive charge around the membrane is maintained by a pool of sodium and potassium ions. In anormal condition, the ion balance is maintained and there is no flow of signals through nerves. The dentinal sensitivity has been a complex phenomenon of disturbance of the dentinal fluid in tubules that cause irritation of the nerve endings in the pulp. The external stimuli disturb the ion balance, potassium diffuses out of the cells, and the sensory nerves get irritated and leading to the feeling of pain.

Diagnosis and Clinical Management of Dentinal Hypersensitivity:

Clinical management of DH is based on proper diagnosis, considering its severity, localized or generalized condition, elimination of other possible causes of pain, elimination or prevention of the causes. This involves patient counseling about hygiene practices (type and hardness of toothbrush, brushing before or after meals), diet (frequency of food and acidic beverage intake) and other harmful habits[3,4].

Correct anamnesis associated with a careful clinical and radiographic examination allows DH to be differentiated from other pathologies that affect the teeth. Correct diagnosis is extremely important, since the history may be clinically confounded with incipient caries, restorations in a poor state of conservation or performed recently, cracks or dental fractures and teeth with reversible or irreversible inflammatory processes of the pulp[5,6]. Post-dental bleaching sensitivity is a major adverse effect of vital tooth bleaching, mainly attributed to the penetration of the bleaching agent into the pulp chamber and it reflects reversible pulpitis. Considering these factors, it is necessary to exclude other forms of pain or dental sensitivity. To obtain a conclusive diagnosis of DH, first carefully evaluate, investigate, and compare among the other teeth, in order to eliminate other possible causes of pain, which could lead to confusion. A good clinical history is essential and questions asked by the professional may help to collect important information that will help in treatment. Traditionally, dentists have used an exploratory probe or jets of air from a triple syringe on the exposed surface to provoke a response from the patient[7]. Desensitizing agents have been classified according to their mode of action, whether they are applied by the patient or professional, according to their chemical or physical properties or by their reversible or irreversible characteristics. They may be found in the form of gels, dentifrices, mouthwashes, or agents to be applied topically, such as varnishes, resin composite, glass ionomer cement, dentinal adhesives, periodontal membranes, and laser applications. Nevertheless, it is difficult to classify them by their mode of action because in the case of some substances, their desensitizing action has not yet been well explained.
Dentifrices:

Dentifrices are the most common vehicles for desensitizing agents. They are widely indicated, particularly because of their low cost, ease of use and home application.

Adhesive Materials:

Adhesive restorative materials and dentinal adhesives are dentinal tubule sealers. Some studies have investigated the role of these materials on the exposed dentin of cervical lesions and the results showed an acceptable durability, except when there are fractures in the material.

Laser Treatment:

Kimura et al. have recommended laser therapy to treat DH with effectiveness between 5.2% and 100%, depending on the type of laser and parameters used. According to the authors, lasers are more effective than other treatments, although the effectiveness diminishes in severe DH.

Recent Progress in the Treatment of DH:

A new proposal presented by Gandolfi et al. suggests the application of a calcium silicate paste, derived from Portland cement, which is effective in tubular occlusion and reduction of dentin permeability, and may be indicated for the treatment of DH. Table 1 presents a surprisingly large number of information in the published literature regarding products for treatment of DH. From a review of the literature, it is noted that an effective treatment must be preceded by proper diagnosis established after the exclusion of any other possible causes of the pain. It is important to manage the cases efficiently, quickly and permanently. The availability of a wide variety of treatments could be an indicator that there is still no ideal desensitizing agent for the treatment of DH, or that it is difficult to treat, irrespective of the options of available treatments. Even with the large number of studies published, it was still not possible to reach a consensus about a product that represents the gold standard in the treatment of DH.

<table>
<thead>
<tr>
<th>S.no</th>
<th>Treatment modalities</th>
<th>Examples/Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nerve desenstization</td>
<td>Potassium Nitrate</td>
</tr>
<tr>
<td>2</td>
<td>Cover or plugging dentinal tubules</td>
<td>Calciumhydroxide,calciumcarbonate,calciumphosphate,AluminiumHexafluorosilicate,SodiumMonofluorophosphate,Formaldehyde,Glutaldehyde,Phytocomplexes,Flouride Intophoresis</td>
</tr>
<tr>
<td>3</td>
<td>Dentine sealers</td>
<td>GfC, composites, varnishes and sealants</td>
</tr>
<tr>
<td>4</td>
<td>Periodontal soft tissue grafting</td>
<td>Soft tissue graft</td>
</tr>
<tr>
<td>5</td>
<td>LASERS</td>
<td>NdYAG lasers</td>
</tr>
<tr>
<td>6</td>
<td>Homeopathic Medication</td>
<td>Propolis, plantago maior</td>
</tr>
</tbody>
</table>

Table 1 Summary of treatment strategies for Dentinal Hypersenstivity.
References:


