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Review Article

Etiology, Diagnosis and Treatment of Dentin Hypersensitivity

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Abstract:
The hallmark of dentin hypersensitivity is sudden, intense pain brought on by exposed dentin, frequently resulting from gum recession and enamel loss. The hydrodynamic theory explains the symptoms, which connect fluid movement in dentinal tubules to nerve activity and external stimuli. A survey revealed a prevalence of over 60%, primarily affecting the lower incisors. Dental professionals could be misinformed about it. While management entails a customized strategy that includes professional treatments, self-care products, and oral health guidelines, diagnosis necessitates ruling out alternative reasons. Despite several potential interventions, there is no single or widely acknowledged remedy. Therefore, dentists should continue their education to correctly identify and treat dentin hypersensitivity.
KEYWORDS: Dentin hypersensitivity, hydrodynamic theory, exposed tooth, brushing technique, surgical technique

INTRODUCTION

Dentin hypersensitivity (DH) can result in sudden, severe pain When teeth with exposed cervical dentin are affected. Many external stimuli, such as temperature shifts, evaporation of cold air, tactile pressures (like probing), electrical sensations, osmotic effects, or chemical exposures, can cause this pain. No other oral condition, flaw, or illness can cause this pain. The "hydrodynamic theory," first put forth by Brannstrom et al., is a generally acknowledged theory that explains how pain is felt in response to external stimuli. According to this view, pain is caused by the flow of fluids within dentin tubules. Two surface alterations on the tooth—the widening of dentin tubules and exposure and removal of dentin due to receding gums and cementum loss—are required to cause dentin hypersensitivity. Inadequate or excessive brushing methods and periodontal disease can cause recession of the gums and dentin exposure. Dentin hypersensitivity diagnosis requires a thorough dental history and exclusion of other possible causes of orofacial pain, which takes time. Differential diagnosis is essential to differentiate periodontal soreness or pulp inflammation from diseases like DH. While DH is frequently seen in canines and premolars, it can affect any surface

or tooth. Studies show that prevalence can range from 0% to 100%, depending on the population and how it is measured. Additionally, patients may develop dentinal hypersensitivity due to scaling and root planning or during standard, everyday procedures related to therapy, such as air drying a tooth or scraping it with an explorer tip. Additionally, dental work can intensify pre-existing sensitivity (1).

Aetiology

There are various causes of dentinal hypersensitivity. It is critical to properly assess the patient's medical and social history, lifestyle, prescription drugs and supplements, food habits, diet, and dental hygiene. Dentinal hypersensitivity should not be diagnosed until all other oral disorders have been ruled out, such as caries, occlusal stress, poor restorations, broken or cracked teeth, possible irreversible or reversible pulpal pathology, and gingival problems. For example, a fractured and mobile restoration rubbing on the dentin may cause pain during chewing or indicate a broken tooth. First proposed by Brännström, the hydrodynamic theory is the most widely accepted explanation for dentin sensitivity. Under this paradigm, the outward flow of the tubular contents (dentinal fluids) is caused by capillary action, which follows the aspiration of odontoblasts into the dentinal tubules as a direct reaction of physical stimulation to exposed dentin. Alterations to the dentinal surface cause suppression of the A-type nerve fibres surrounding the odontoblasts. Both at the pulp's dentinal border and inside the pulp, the tubules need to be open for a stimulus-response to occur. In contrast to nonsensitive teeth, which showed up to eight times fewer open dentinal tubules per surface area, sensitive teeth responded to all physical stimuli, according to research by Absi and colleagues. Another idea is to change the activity of pulpal sensory nerves. The physiology of the stimulus-response serves as the basis for treating exposed, open dentinal tubules (2).

Dentin hypersensitivity can cause scaling, attachment loss, gingival recession with exposed root surfaces, dentin/cementum are more prone to caries and loss of cervical tooth structures, Enamel loss with exposed dentin due to attrition, opening of the end of the dentinal tubules can also be caused by bulimia, gastric reflux disease, and exposure of the oral cavity to acids, such as through the consumption of acidic foods and beverages or chlorinated pool water (3).

Diagnosis

Due to its subjective character and the existence of complicating factors, diagnosing dentin hypersensitivity (DHS) is difficult. Due to emotional anguish and a dependence on dental specialists, patients may find it difficult to communicate their problems. It might be challenging to get an accurate history, so doctors must use their expertise to provide a precise diagnosis. The development of successful treatment plans that address dental problems as well as related mental suffering depends on successful identification (4).

Once the patient's medical history has been completed, a comprehensive examination is performed using palpation to examine intra- and extraoral tissues. Various investigative tools are used to verify the clinical diagnosis according to the history, such as radiography and vitality tests. When identifying dentin-exposed areas, a dental air syringe blast of cold air or a gentle explorer probe may be used, particularly for Dentin Hypersensitivity (DHS). Clinicians must be aware of various disorders such as pulpitis, dental caries, broken tooth syndrome, and others that might cause similar symptoms. For a definitive diagnosis, further diagnostic testing such as liveliness, percussion, and radiographic examinations would be required (5). Novel techniques that can facilitate diagnosis include the application of Duraphat varnish on exposed root surfaces and evaluating severity both before and after air blasts. Diagnostic infiltrations, dental blocks, or tooth sleuths may be helpful

for fractured tooth syndrome. Prior restorative history is also essential in ruling out potential reasons for tooth pain.

Treatment

1)Oral hygiene education and brushing technique teaching for DHS prevention. 2) Behavioural control and removal of DHS predisposing variables; 3) Non-invasive methods of relieving pain that obstruct dentin tubules and prevent nociceptive transduction/transmission. 4) Dental hard and soft tissue abnormalities can be treated surgically or with restorations (6).

Oral Hygiene Education

Patients should be educated about gingival recession and erosive and abrasive tooth wear to prevent dentin hypersensitivity (DHS). Dentists should emphasise controlling the consumption of acidic foods and beverages and the possible effects of non-acidic foods on mouth PH. Patients are recommended to brush with non-abrasive toothpaste and soft brushes before to consuming anything erosive. Wear is still possible if dentin has been weakened by acid generation mediated by biofilms, even with a gentle toothbrush. Effective management of DHS requires regular dental checkups and customized preventive measures (7).

Tooth Brushing Technique

1. Stressing the value of applying non-abrasive toothpaste and a brush with soft bristles.
2. Advising using a vertical sweeping motion when brushing teeth to reduce damage to the hard and soft tissues of the mouth.
3. Emphasizing that dentin wear can still happen even with the softest toothbrushes if biofilm-mediated acid production has weakened the dentinal surface.

Behavioural Control and Removal of DHS

In order to effectively treat and prevent dentin hypersensitivity (DHS) over the long term, removing the risk factors that lead to dentin exposure is necessary. This includes managing the consumption of acidic foods and drinks, treating disorders like bruxism, and thinking about dentition-compromised patients' therapies. In addition to eliminating mechanical recession reasons or aggressive brushing, periodontal diseases should be predicted and controlled throughout treatment (8).

Dental erosion is a result of medical and mental health issues that need to be recognized and treated. These problems include stomach reflux and mental illnesses associated with binge/purge behaviour. Managing DHS requires a comprehensive strategy that considers systemic and dental issues.

Non-Invasive Treatment

Dentin hypersensitivity (DHS) is primarily treated non-invasively with desensitizing medications. This method is especially appropriate when there is no evident erosive defect or noticeable loss of tooth-hard tissue. Targeting the dentin tubules and the tooth pulp complex, desensitizing agents work mechanically or chemically, blocking nerve impulses. There are two treatment options: in-office therapy (which includes dentin adhesives, glass ionomers, mouthwash, toothpaste, and chewing gum) and at-home therapy (which includes gels, solutions, varnishes, and resin sealers). To manage DHS, it is generally advised to start intervention with non-invasive, reversible, safe, simple, and affordable approaches (9)**.**

Restorative Treatment

Alternative therapies for dentin hypersensitivity (DHS) may involve surgical repair of gingival recession or direct restoration of complex tissue abnormalities, depending on the circumstances. Restorements using materials such as glass ionomer or resin-based composite are considered beneficial in direct and indirect erosion or abrasion-related DHS cases. For DHS associated with

gingival recession, periodontal surgical techniques, including guided tissue regeneration and grafting, are suggested, yet there is disagreement over their long-term outcomes. Covering exposed dentin with mucogingival surgical techniques makes sense, although occlusive restorative procedures should be considered if dental surgery is not feasible or if symptoms persist (10).

Conclusion

High-quality research on the epidemiology, molecular cause, and therapy of dentin hypersensitivity, even though it is a prevalent dental health issue in adults. There are hardly many of this kind. Even though numerous therapy approaches have been put out, no desensitizing substance or strategy has proven to be well-acknowledged or extremely trustworthy (11). A comprehensive clinical examination should be performed to rule out other potential reasons when a patient appears with symptoms that could be related to dentin hypersensitivity before a diagnosis is made and therapy is started. The condition may need to be managed with professional treatment, self-care products, and personalized guidance on good oral hygiene practices.

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