Lec 10 Dentine hypersensitivity

Definition

Dentine hypersensitivity (DH) is defined as **a short, sharp pain arising from exposed dentine** in response to stimuli, typically **thermal, evaporative, tactile, osmotic or chemical** and which **cannot be ascribed to any other dental defect or pathology**.

Epidemiology

DH can affect **10–20% of adults** at any age but the highest prevalence is among people aged **30– 40 years**. DH could affect as many as **1 in 7** of patients attending for dental treatment with **females** being **more** involved than male.

The most frequently affected teeth are the **canines and first premolars**, followed by incisors and second premolars. **Buccal cervical** regions are affected in 90% of cases.

Etiology and Pathogenesis

Three major categories of diseases and conditions are associated with DH:

• Gingival recession caused by mechanical trauma

• Tooth wear lesions

• Periodontal disease and periodontal treatment

Tooth whitening has also been **associated with an increased risk of DH**. Mild to moderate **transient** dentine sensitivity has been reported in 15–65% of patients using bleaching agents.

Anatomic variations such as **failure** of meeting between enamel and cementum at CEJ could be a contributing factor for DH.

In patients with gingival recession, the cementum covering the surface of the exposed root dentine can be easily removed by physical forces or chemical agents, leading to exposure of the underlying dentinal tubules and therefore an increase in the risk of development of DH.

Tooth wearing conditions i.e., enamel loss may result from

a. <u>Attrition</u> relating to occlusal abnormalities. Attrition is defined as the wearing of the teeth surfaces due to normal or **abnormal function**.

b. Abrasion, which is wearing of the teeth substance through an abnormal mechanical process as **incorrect brushing** which leave a **deep V-shaped cervical** lesion.

c. Erosion which is a chemical process (**as acids**) manifested as a localized progressive destruction of enamel & dentine.

The defects vary in shape from saucer-like depressions to deep wedge-like grooves. **16% of** patients develop DH **following non-surgical periodontal treatment** which peaks during the first week and then often subsides within few weeks; 26% of patients develop sensitivity **6 months to 5 years** after **surgical treatment**.

Different individuals may experience different levels of DH. These variations can be due to patients' pain perception, **local factors and dietary factors**. Foods and drinks with **high**

acidity can cause significant tooth surface loss and erosion, particularly when combined with tooth brushing.

DH can be triggered by various stimuli:

• Cold in the most common stimuli (in about 75% of the patients).

• Chemical stimuli such as acidic foods (mainly fruit), sweets and rarely with salty foods.

• Mechanical stimulus; e.g., tooth brushing, or the air of a triple syringe by dehydration.

Theories of DH

Three main mechanisms of dentin sensitivity are proposed :

A. Direct Innervation (DI) theory

B. Odontoblast Receptor (OR) theory

C. Fluid Movement/Hydrodynamic theory

According to Direct Innervation theory, **nerve endings penetrate** dentine and extend to the dentino-enamel junction. Direct mechanical stimulation of these nerves will initiate an action potential. There are many shortcomings of this theory. There is lack of evidence that outer dentin, which is usually the most sensitive part, is innervated.

Moreover, **pain inducers such as bradykinin fail to induce pain** when applied to dentine, and bathing dentine with local anesthetic solutions **does not prevent pain**, which does so when applied to skin.

Odontoblast Receptor theory states that **odontoblasts act as receptors** by themselves and relay the signal to a nerve terminal. But majority of studies have shown that odontoblasts are matrix forming cells and hence they are not considered to be excitable cells, and no synapses have been demonstrated between odontoblasts and nerve terminals.

Brannstrom (1964) has proposed that dentinal pain is due to ***hydrodynamic mechanism***, i.e., fluid force. Scanning electron microscopic (SEM) analysis of hypersensitiv dentin shows the presence of widely open dentinal tubules.

The presence of wide tubules in hypersensitive dentin is consistent with the hydrodynamic theory. **This theory is based on the presence and movement of fluid inside the dentinal tubules**. This centrifugal fluid movement, in turn, **activates the nerve endings at the end of dentinal tubules or at the pulp–dentine complex**. It has been noted that stimuli which tend

to move the fluid away from the pulp–denitin complex produce more pain. These stimuli include cooling, drying, evaporation and application of hypertonic chemical substances. **This theory is the most accepted one related to the explanation of DH.**

Diagnosis of DH

Relevant aspects of the patient's history with regard to DH include the **nature of sensitivity, dietary factors, tooth-brushing technique, any previous periodontal treatment and other dental treatments, including tooth whitening**.

It is important to **rule out other conditions such as caries, failed restorations, enamel/dentine fracture, cracked tooth syndrome, pulpal disease and gingivitis.**

Air burst test and dentine scratch test by moving a sharp probe on the exposed dentine are two simple diagnostic tests for DH.

Management of DH

1- Management of DHS in Patients with Gingival Recession and/or Periodontal Disease

The treatment strategy for this group of patients includes the following aspects:

• **Oral hygiene instructions and tooth-brushing** advice to avoid aggressive mechanical brushing, including advice against **the use of excessive force, hard toothbrush and abrasive toothpaste.**

• **Single-tufted toothbrushes are recommended for cleaning the recession areas**.

• **Dietary advice** to reduce excessive consumption of acidic foods and drinks.

• **Treatment** of any inflammatory periodontal disease

• Advice on '**at-home' desensitizing therapy**, including the use of desensitizing toothpastes, mouthwashes and chewing gums which often contain agents such as **potassium salts**, **stannous fluoride and strontium chloride**.

• Application of **in-office** desensitizing agents such as **sodium fluoride varnish**

• Regular review and maintenance.

2- Management of DHS in Patients with Tooth Surface Loss

Treatment for this group of patients includes the following aspects:

• Preventive measures including **oral hygiene education**, advice against the use of hard toothbrushes, excessive force and abrasive toothpastes, brushing at least 2 hours after acidic drinks **and advice on reducing dietary acid intake.**

• Appropriate referral to a medical practitioner if there is evidence of **gastric acid reflux** disease or vomiting.

• Application of '**at-home' and 'in-office' desensitizing agents.**

• **Conservative restorative management of worn teeth** with direct adhesive composite restorations if indicated often leads to further reduction and resolution of sensitivity.

• **Regular review and maintenance**.

In extreme cases, **root canal treatment** of the affected tooth may be indicated to alleviate the patient's symptoms