Tooth Sensitivity

**Aim:** To provide information on tooth sensitivity, its causes, treatment and prevention.

**Objectives:** Through completion of a multiple choice questionnaire the participant will be able to demonstrate the ability to:

- Identify the main causes (aetiology) of tooth sensitivity.
- Identify the prevalence of tooth sensitivity.
- Identify factors that can reduce tooth sensitivity.
- Identify the hydrodynamic theory of tooth sensitivity.

Tooth sensitivity (also known as dentine hypersensitivity) is a painful condition of the permanent dentition, which affects oral comfort and function. It is characterised by short, sharp pain arising from exposed dentine that cannot be attributed to any other form of dental defect or pathology. It is often a reaction to temperature changes, pressure, sweet and acidic food or drinks.

Other than tooth sensitivity caused by tooth bleaching or other dental pathology, the most common cause of sensitivity is exposed dentinal tubules and loss of cementum on the root surface. When the tooth roots have become exposed for any reason and they are no longer covered by enamel, thousands of tiny channels (dentinal tubules) leading to the tooth's nerve centre (pulp) are exposed. When heat, cold or pressure touches these channels, the patient feels pain.

People whose teeth are sensitive often feel pain when they eat or drink things, which are very cold. The classic example is eating ice cream, but simply being out in the cold weather is sometimes enough to set off the problem. Sensitivity to touch may also mean that tooth brushing is uncomfortable. Pain is the only sensation that can be elicited from the pulp and dentine, and in this respect the tooth is probably unique among the body tissues with the possible exception of the cornea in the eye.

This article will provide information on the possible causes (aetiology) and prevalence of tooth sensitivity, outline a possible theory of tooth sensitivity, and outline the treatment and preventative measures available to reduce tooth sensitivity.

**Aetiology (cause) of Tooth Sensitivity**

When diagnosing tooth sensitivity it is important that the dentist identifies that the tooth sensitivity is a result of exposed dentine rather than being due to dental caries, loose or missing fillings or crowns or cracked teeth. Figure 1 shows a cross section of a molar showing exposed dentine.
Causes of tooth sensitivity that cannot be attributed to tooth sensitivity or other dental pathology may be categorised as follows:

1) **Gingival Recession**

When the gingiva (gum) recedes, the dentine on the root surface of the tooth is exposed and this may lead to tooth sensitivity. Gingival recession can be caused by:

- **Poor oral hygiene** - Leaving deposits of plaque around the gingival margin (gum line) can result in gingivitis which can progress to cause attachment loss and result in recession. Conversely, overzealous brushing can lead to abrasion and recession.
- **Occlusal trauma** - Grinding the teeth may lead to gingival recession.
- **Anatomy of labial alveolar bone** - Thin or missing areas of labial alveolar bone can cause gingival recession. Tooth anatomy and position of teeth can affect the thickness of the alveolar plate of bone. One example of this may be a tooth that has been moved during orthodontic treatment which has been moved through the plate of bone.
- **Frenal attachment** - The frenum can be described as “a fold of tissue or muscle connecting the lips, cheek or tongue to the jawbone.” If the frenum is attached too high it can cause gingival recession or spaces appearing between the teeth. Figure 2 shows an image of a prominent frenum.
2) Enamel Loss

Tooth substance loss that may lead to sensitivity may be caused by:

- Abrasion - This can be caused through overzealous brushing. Once dentine is exposed it can abrade 25 times faster than enamel.\(^1\)
- Erosion - This can be caused by patients with eating disorders due to erosion caused by vomiting/acid reflux and also by an acidic diet. For example the consumption of frequent acidic foods or carbonated or fruit drinks.
- Abfraction - Occlusal forces can result in the loss of cervical tooth structure.

Fig. 3 Potential sensitivity due to wear on incisors and at the neck of LR 4 and 5\(^6\)
Who Suffers From Sensitive Teeth?

Research has shown that the prevalence of tooth sensitivity may be between 4 and 57% depending on the population studied, and between 60 and 98% in patients with Periodontitis (gum disease). Dentine hypersensitivity can affect people from the ages of 15 to 70 years and above, however the age group when it occurs most is between 20 and 40 years. It has been reported that the incidence of tooth sensitivity actually decreases with age which is partly attributed to the formation of reparative dentine and reduction in the size of the pulp chamber as well as changes in vascularity and nerve fibres.

The Theory of Tooth Sensitivity

The most widely accepted theory of how pain occurs during tooth sensitivity is Brannstrom’s Hydrodynamic Theory of dentinal hypersensitivity. Based on this theory, stimuli such as heat, cold or touch causes rapid movement of the fluid contained within the dentinal tubules. This movement of fluid activates nerve endings near the pulp and is interpreted by the patient as pain.

How Does the Patient Treat Their Sensitive Teeth?

First and foremost, the patient should tell their Dentist or Hygienist. The Dentist will carry out a thorough full examination of the patient’s mouth and discuss the symptoms with them. They will ascertain the most likely cause of the patient’s sensitivity and try to find the best way of treating it.

Preventing and Treating Tooth Sensitivity

This can involve a two fold approach in the surgery by the clinician and aftercare at home by the patient. The object of the various treatments is to in some way:

- Block the ends of the exposed dentinal tubules either by calcification or mineral ions.
- Denaturation of the dentine protein, by means of a chemical which alters the nature of the dentine protein, such as an obtundent (any remedy or agent which lessens or relieves pain)
- To create a surface barrier over the exposed dentine by means of vanishes/plastic etc
- To physically ‘plug’ the tubule ends by the particles, which are commonly used as abrasive agents in toothpastes.
**Mode of Action** | **Examples of desensitising agent**
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Nerve inactivator | Potassium nitrate
Dentinal tubule obtundent | Fluorides
Oxalates
Calcium compounds (including CPP-ACP)
Sodium citrate
Strontium chloride
Protein precipitants | Strontium chloride
Silver nitrate
Formaldehyde
Glutaraldehyde

(Table reference)

**The Dentist or Hygienist:**

- May treat the affected teeth with special de-sensitising products to help relieve the symptoms.
- Fluoride gels, rinses or varnishes can be applied to sensitive teeth. These can be painted onto the teeth at regular appointments to build up some protection.
- The dentist may seal or fill around the neck of the tooth, where the tooth and gum meet, to cover exposed dentine.
- It may be necessary to correct any bite abnormalities to help reduce the wearing of enamel.
- A bite-raising appliance (mouthguard) may be constructed by the Dental Laboratory to wear at night.
- In some very serious cases it may be necessary to root-fill the tooth.
- Sensitivity can take some time to settle, and the patient may need to have several appointments.

**The Patient:**

- Use desensitizing toothpaste. Potassium Nitrate is a common choice of desensitizing agent that is contained in toothpastes such as Sensodyne and Colgate Sensitive toothpaste. A patient may be instructed to place a small amount of desensitizing toothpaste onto the affected area and leave on overnight.
- Use a fluoride mouthwash.
- Avoid frequent intakes of acidic foods and drinks as sensitivity can be increased or initiated by dental erosion. The diet should be analyzed, perhaps through the use of a diet sheet, and alternative foods and drinks should be recommended if this is the problem.
- Should brush their teeth thoroughly twice a day for two minutes and clean interdentally. The presence of plaque and plaque products may provoke localised pulp inflammation and increase sensitivity.
- Avoid brushing from side to side, use a gentle circular motion or electric oscillating toothbrush

**Conclusion**

Tooth sensitivity can be a painful condition which can affect oral comfort and function. The cause of the sensitivity should be established and depending on the severity treatment may involve a combination of treatment by a dental professional and home care performed by the patient.

**Fig.4 Cross-section diagram of dentition**

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**Non Verifiable CPD tip**

In the non verifiable CPD section from the member’s page you can now access non-verifiable CPD to further enhance your knowledge on tooth sensitivity. Don't forget to update your non-verifiable CPD chart accordingly.
References