Dentine hypersensitivity: challenges of diagnosis and management

Dentine hypersensitivity can have a major impact on quality of life – and every patient must be treated as an individual, says David Gillam

Dentine hypersensitivity (DH) is reported to affect about one person in 10, although anecdotally the incidence may be much higher – possibly as much as 30-40% of the population.

DH has been described as 'rapid in onset, sharp in character and transient in nature', and generally defined as: 'pain derived from exposed dentine in response to chemical, thermal, tactile or osmotic stimuli which cannot be explained as arising from any other dental defect or disease' (Canadian Consensus Document, 2003).

It can present at any age and can have a significant effect on the individual's quality of life, although up to 50% of them do not normally consult their dentist, as they may consider it relatively minor in nature. Clinicians may also consider DH to be a 'nuisance problem.' However, finding out whether a patient suffers from DH depends on the clinician asking the right questions, and listening closely to the patient's reply.

Although both patients and dental professionals may view DH as a relatively minor problem, due to its transient nature, the challenge is nevertheless for the clinician to manage the condition successfully.

There are many obstacles or barriers to patients receiving dental care, especially due to the current restrictions surrounding the COVID-19 pandemic. Patients often self-treat complaints such as DH, but clinicians should be aware of the impact DH can have on their quality of life.

CAUSES

The most common causes of DH are:

- Abrasion
- Abfraction
- Erosion
- Gingival recession
- Quality of the buccal bone
- Periodontal disease and its treatment
- Surgical and restorative procedures
- Patient destructive habits.

DH has also been considered as a tooth wear phenomenon, characterised predominantly by erosion which may open the dentinal tubules on the exposed the dentine surface and initiate the tooth wear lesions. Scaling and debriding in the surgery can cause damage to the tooth surface over time, as can habits such as consumption of acidic drinks, or brushing too soon after drinking.

If the dentine becomes exposed, the dentinal tubules will be patent and, consequently, stimuli such as cold may initiate minute fluid movement within the tubules, initiating sensitivity (Figure 1). It should be noted, however, that not all exposed dentine is sensitive.

DIAGNOSIS

There are three main categories of patients with DH:

- Patients with relatively healthy mouths and DH due to meticulous but perhaps overzealous oral hygiene
- Patients who complain of DH due to periodontal disease and/or its treatment, and may also have aesthetic concerns relating to the loss of gingival tissue (gingival recession)
- Patients who complain of DH due to tooth wear problems.

It is important for clinicians to be aware of how to diagnose DH, as well as how to monitor and treat it by using a combination of over the counter or in-office treatments, depending on the severity of the problem. Many dentists find DH difficult to diagnose,

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although dental hygienists often have a better understanding of the condition and its impact on the quality of life. If you give a patient cold water to rinse their mouth out, they may often give you an indication they have sensitivity.

A full diagnosis of DH should include a thorough history of the complaint, an assessment of the severity and extent of the problem and a clinical examination to rule out any other conditions with a similar presentation, such as cracked tooth syndrome, fractured restorations or teeth, or dental caries etc.

As there are several conditions with similar symptoms to DH, a simple way to check the diagnosis is to blow cold air from a syringe on the affected tooth. If there is initial pain but this gradually diminishes in severity, it is likely to be DH; if the pain persists, you may need to reconsider. Ask the patient to rate the level of the pain, for example on a scale of 1-10. Then apply desensitising paste or varnish and re-test. If the patient does not experience pain now, then a diagnosis of DH is likely (Figure 2).

It is also essential to have a feedback loop to revisit the diagnosis, and to be prepared to change the management strategy if the initial diagnosis appears to have been wrong, or the treatment is not working.

EDUCATION AND MANAGEMENT

Education of the patient is central to the success of the management strategy. They need to change their behaviour, take ownership of their own mouth, and alter their diet, brushing technique, consumption of high sugar energy drinks etc, as required.

Simply giving a patient a desensitising toothpaste is somewhat fruitless unless you deal with the underlying problem in the first place.

There can be a tendency to treat patients in a general way, but each patient is an individual with their own individual needs and concerns – they need to understand the cause of their DH and be involved in its solution.

In short, the clinician needs to realise that there is no single panacea in treating DH and therefore they will need an armamentarium of measures and products for the various presenting features.

Mild generalised discomfort from DH may be treated through a stepwise approach involving:

- Reducing or removing any aetiological or predisposing factors associated with DH
- Preventive measures to reduce the impact of acid food and drink
- Recommending a desensitising toothpaste.

If, however, this does not improve the problem, the guidelines from the Expert Panel on DH (2013) suggest a management scheme based on the three main categories of DH listed above, simplified into clinical evaluation, patient education and preventive advice, and corrective clinical outcomes specific to each grouping.

A simple treatment path is shown in Figure 3.

EFFECTIVE TREATMENT

There are currently around 300 products on the market claiming to improve the problem of DH, but

HOW BIOMIN F WORKS

Biomin F contains an optimum combination of calcium, fluoride and phosphate ions, incorporated into the structure of the bioactive glass.

After brushing with Biomin F, the particles adhere to the tooth surface, where they gradually dissolve over up to 12 hours, releasing these ions to promote effective remineralisation of tooth enamel through the production of fluorapatite, the fluoride analogue of natural tooth mineral.

Fluorapatite is also preferentially deposited onto the walls of exposed dentinal tubules, occluding the tubules, thereby preventing the fluid flow that initiates dentine hypersensitivity.

Biomin F contains fluoride and a higher phosphate content, which aids the effectiveness and speed of fluorapatite production. Fluorapatite is more stable and resistant to acid attack than hydroxyapatite formed by previous bioglass toothpastes.

Another 'smart' feature of Biomin F is that the process starts working more quickly in the presence of acid in the mouth, for example following the consumption of an acidic drink.

For those who want the protection of Biomin but do not wish to use a fluoride-containing toothpaste, Biomin C is available, and fruit flavoured children's variants (Biomin F for Kids) provide the same level of protection for young teeth.

FIGURE 1: *What is dentine hypersensitivity?*

Hydrodynamic theory promotes two basic approaches for treating dentine hypersensitivity:

- Occlude patent (open) tubules and so reduce any stimulus-evoked fluid movements
- Reduce intradental nerve excitability, so that nerves do not respond to stimulus-evoked fluid movements

1
Hot or cold stimuli

2
Fluid moves within dentine tubles

3
Nerve receptors in pulp are activated

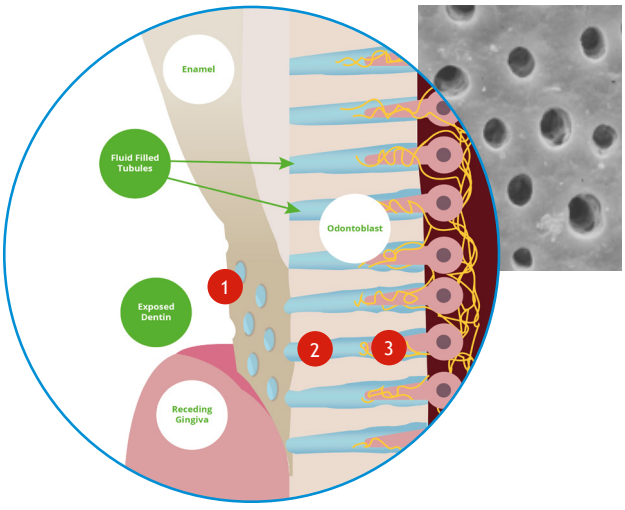


FIGURE 2 *Diagnostic test*

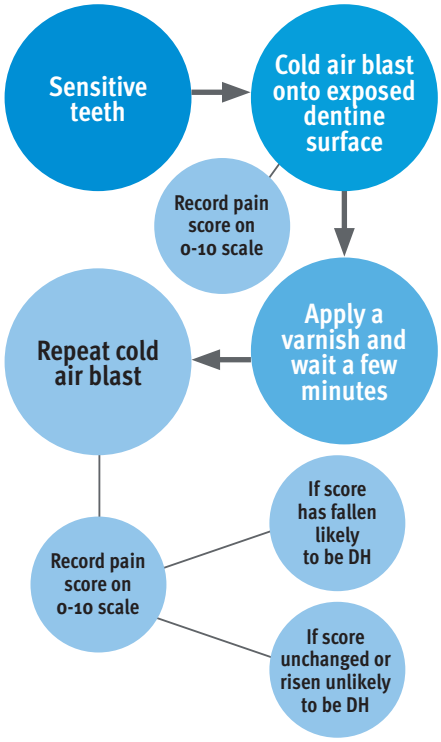
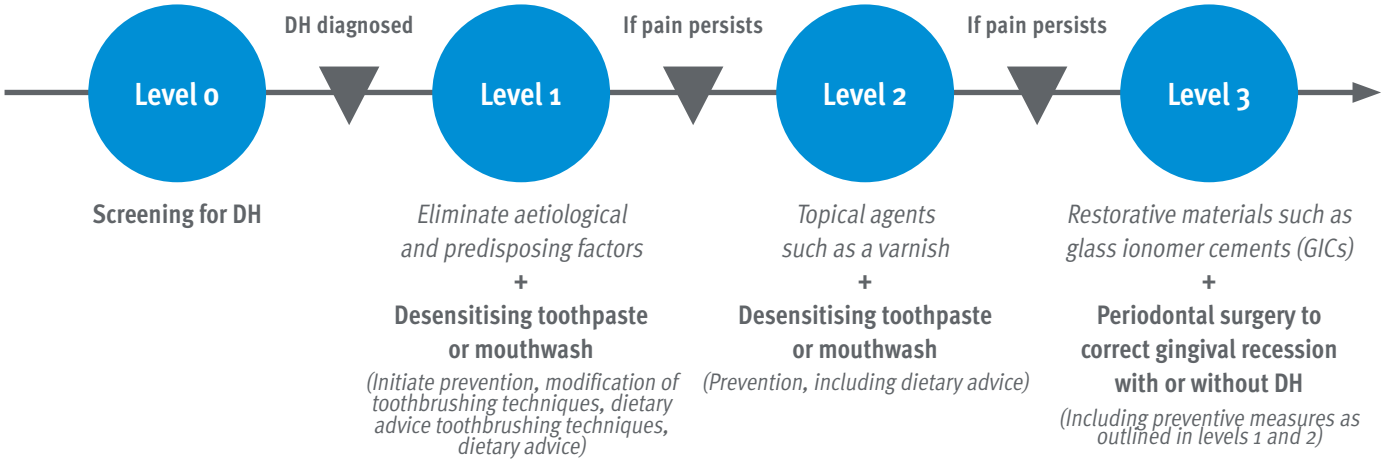


FIGURE 3: *Treatment plan*



* The clinician must assess whether the problem is mild/moderate generalised sensitivity or moderate/severe localised sensitivity. The severity of the problem will determine whether the treatment is more invasive.

many do not live up to their claims.

I have been involved in the development of bioactive glasses for the treatment of DH for many years and have experimented with these materials since the mid-1990s. From 2009 I have worked with materials scientist Professor Robert Hill and his team of researchers at Queen Mary University of London (QMUL), developing bioactive glass materials such as Biomin F, which has been shown to be an effective treatment for DH (see box 'How Biomin F works').

Trials at QMUL have demonstrated that delivering Biomin F's precise combination of calcium, fluoride, and phosphate ions in a slow-release format as the glass dissolves, forming fluorapatite, which is deposited on the tooth surfaces and enters and occludes the dentinal tubules.

Fluorapatite rapidly covers the dentine surface, occluding the tubules and continues to do so over several hours; and it is more stable in the presence of acids than hydroxyapatite, which is a component of several manufactured toothpastes.

Comparative studies have shown that Biomin is more effective than other toothpastes tested at QMUL due to its ability to deposit fluorapatite (which is more acid resistant), provide improved tubule occlusion, stabilise pH and effectively remineralise the enamel surface.

CONCLUSION

Studies have shown that clinicians are not confident in diagnosing and managing dentine hypersensitivity. In a live poll of attendees at the recent Biomin webinar, 57% said they 'sometimes' managed the condition successfully and 32% said they did not do it 'as well as they would wish'.

Offering practical advice via webinars and articles on a troublesome clinical condition, together with access to an effective treatment, should provide clinicians with the confidence to successful manage DH to the satisfaction of both the patient and the clinician.

BIOMIN WEBINAR

Moira Crawford has summarised Dr Gillam's recent presentation at a Biomin Technologies webinar on dentine hypersensitivity. A video of the full webinar is available on Biomin's e-academy at www.biomin.co.uk/e-academy.

Visit www.biomin.co.uk for more details.

REFERENCES

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ENHANCED CPD

GDC anticipated outcome: C
CPD hours: one

Topic: Dentine hypersensitivity

- **Educational aims and objectives:** To explore dentine hypersensitivity diagnosis and management.
- **Clear anticipated outcomes:** Correctly answering the questions on page 118 will demonstrate the reader understands more about dentine hypersensitivity and how to diagnose and manage the condition.