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Chapter 9

Post-Operative Pain Following Non-Surgical and Surgical Periodontal Procedures

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http://dx.doi.org/10.5772/intechopen.78728

Abstract

Post-operative sensitivity may occur following restorative procedures including periodontal therapy affecting both the hard and soft tissues of the oral cavity and can have a major effect on the quality of life (QoL) of the individual. Ideally, the clinician needs to prevent or minimise these effects to reduce any unnecessary discomfort for the patient and this may be accomplished through preventive strategies, the provision of the required information about the procedures both pre- and post-treatment as well as reassuring the patient in the event of any subsequent discomfort. Furthermore, it is important for the clinician to be able to correctly diagnose the exact cause of the patient's discomfort and have the confidence to successfully manage the problem. The aim of this chapter is to provide an overview on the management and treatment of post-operative sensitivity following both non-surgical and surgical periodontal procedures and will be primarily concerned about the discomfort associated with dentine hypersensitivity/root sensitivity following these procedures.

Keywords: post-operative sensitivity, non-surgical and surgical procedures, gingival recession, root surface coverage, quality of life and pain assessment, management strategies

1. Introduction

Traditionally, pain arising from the exposed dentine in response to chemical, thermal, tactile or osmotic stimuli which cannot be explained as arising from any other dental defect or disease has been termed dentine hypersensitivity (DH) [1].

The pain associated with DH is generally considered to be transient in nature and will resolve once the initiating stimulus, such as cold air from a dental air syringe, has been removed.

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Other terminology has been used to describe the condition, for example, cervical dentine sensitivity (CDS) or cervical dentine hypersensitivity (CDH) or dentine sensitivity (DS) and root dentine sensitivity (RDS)/root dentine hypersensitivity (RDH). Although there may be some justification in using these terms to describe the condition, Addy [2] advocated the retention of the term dentine hypersensitivity for traditional reasons and perhaps more importantly to enable the clinician to distinguish between those individuals complaining of DH who have relatively healthy mouths with individuals who complain of DH from the effects of periodontal disease and/or its treatment. The term root (dentine) sensitivity (RS/RDS) or root dentine hypersensitivity (RDH) has been used in recent years to describe sensitivity arising from the effects of periodontal disease and/or its treatment (e.g. non-surgical and surgical procedures) [3]. The basis for recommending this terminology was that any sensitivity following periodontal therapy may be a distinct condition from that of DH occurring following the hydrodynamic stimulation, for example, the penetration of bacteria into the dentinal tubules [3, 4] although there appears to be limited epidemiological data to justify this distinction. The prevalence of RS/RDS/RDH in individuals in periodontal problems appears to be higher than those individuals with DH [5–7]. Post-operative sensitivity following non-surgical and surgical periodontal procedures has been reported to affect both the hard and soft tissues of the oral cavity and can have a major effect on the quality of life (QoL) of the individual [8]. The perception of this discomfort varies from individual to individual and the intensity of the discomfort may range from mild/moderate to severe requiring pain relief (analgesics) [9]. Management of this discomfort may range from the professional applications of varnishes or a desensitising prophylaxis paste following the treatment session to the recommendation of over-the-counter (OTC) products such as desensitising toothpaste/gel formulations [10]. The aim of this chapter is to provide an overview on the management and treatment of post-operative sensitivity following both non-surgical and surgical periodontal procedures.

2. Prevalence, mechanisms, aetiology and clinical features of dentine hypersensitivity/root sensitivity

2.1. Prevalence

Most of the published literature relates to the prevalence of DH and as such there are limited data specifically on the prevalence of root dentine hypersensitivity (RDH) or root sensitivity (RS) following periodontal procedures [4, 6–7]. According to Cuhna-Cruz and Watana [11] a reasonable estimate of the prevalence of DH was 10% with an average of 33% across the published studies. By way of contrast, the prevalence of RS reported in the literature was considerably higher (60–98%) [6]. According to Gillam and Orchardson [6], DH/RS may affect individuals of all ages, although the peak prevalence appears to be between the ages of 30 and 60 years. Females appear to be numerically more affected than males although this difference does not appear to be significant. Evidence from the published epidemiological studies would suggest that the buccal (facial) tooth surfaces in individuals with DH/RS are generally affected. A study by Kamal et al. [12] also reported an association with gingival

recession and DH in a Jordanian population with a prevalence of DH (23.6%) in patients with gingival recession. These findings would suggest that not all patients who exhibit exposed dentine will experience DH. Several systematic reviews have indicated that the prevalence of DH/RS prior to treatment ranged from 9–23% whereas the prevalence increased following non-surgical therapy (54–55%) [4]. A similar study by Lin and Gillam [7] reported that the prevalence ranged from 62.5 to 90% following treatment but decreased progressively to approximately 52.6–55% after 1 week. In a similar fashion, the prevalence of DH/RS following surgical therapy ranged from 76.8 to 80.4% after 1 day and subsequently decreased over time to 36.8% after 1 week, 33.4% after 2 weeks, 29.6% after 4 weeks and 21.7% after 8 weeks, respectively [7].

2.2. Mechanisms involved in dentine hypersensitivity and root sensitivity

The prevailing view in the published literature is that the mechanisms associated with DH are primarily based on the hydrodynamic theory, as proposed by Brännström and Åström [13]. According to Gillam [14] this theory promotes two basic approaches for treating hypersensitive dentine, namely: (a) by occluding the exposed open dentine tubules, which in turn reduce any stimulus-evoked fluid movements within the dentinal tubules and effectively prevent the transmission of the external stimulus (such as a cold stimulus) to the pulp and (b) by the diffusion of the potassium ion from desensitising products such as toothpaste formulations within the dentinal tubule to reduce intra-dental nerve excitability and prevent any nerve activation.

There is, however, some controversy regarding whether the mechanism associated with root sensitivity is also based on the hydrodynamic. Some investigators have suggested that as RS may have a plaque-related aetiology associated with the bacterial penetration of the dentinal tubules, an alternative mechanism must be involved. The relation between bacterial penetration, pulpal inflammatory changes and symptoms arising from DH/RS however is unclear. Furthermore, the existence of plaque covering the exposed root surface does not in itself suggest that other mechanisms of stimuli transmission other than Brännström's hydrodynamic theory are responsible for RS [6].

2.3. Aetiology

The aetiology of DH/RS is multi-factorial in nature and despite an extensive publication record is not fully understood, although it is recognised that the structure of dentine in the affected areas is changed resulting in areas of sensitive dentine with a greater number of open dentinal tubules compared to non-sensitive areas in unaffected teeth. For DH/RS to occur, both the overlying hard and soft tissues must be removed to expose the underlying dentine surface. There are several aetiological and predisposing factors that are implicated in this process and include gingival recession associated with overzealous or incorrect toothbrushing as well as factors associated with the effects of periodontal disease and its treatment (**Table 1**). As mentioned in the prevalence section there is epidemiological evidence of an association between gingival recession and DH. For example, a study by West et al. [15] reported that

• Loss of enamel
• Denudation of cementum
• Attrition
• Abrasion
• Abfraction
• Erosion (intrinsic and extrinsic)
• Tooth malposition
• Thinning, fenestrationand absent buccal alveolar bone plate
• Gingival recession
• Thin gingival biotype
• Restorative factors such as poorly fitting partial dentures, overhanging restorations and subgingival crown margins
• Periodontal disease and/or its treatment (non-surgical and surgical periodontal procedures)
• Plaque-related factors
• Wound healing following treatment
• Self-inflicted trauma—habits such as finger nail stripping
• Physical (over-enthusiastic and/or incorrect toothbrushing) and chemical trauma
• Smoking (risk factor for periodontal disease)

Table 1. Aetiological and predisposing factors associated with dentine hypersensitivity/root sensitivity and gingival recession (modified from Chabanski and Gillam) [16].

there was a link between a healthy erosive diet and lifestyle and toothwear with DH in young adults aged 18–35 years.

2.4. Clinical features

The clinical features of DH have been well documented in several published reviews [6, 16]; however, these reviews primarily deal with the features associated with DH in patients with well-maintained oral hygiene rather than clinical features associated with RS *per se*. It is reasonable to acknowledge that some of the aetiological and predisposing factors will be similar (**Figure 1**).

The intra-oral distribution of teeth in patients with DH generally involves all the buccal (facial) surfaces of canine, premolar and molar teeth although the condition can also be detected in the incisor teeth. The association of DH and gingival recession has been previously noted and approximately one in three teeth may be affected. The distribution of teeth with RS will generally affect the same tooth type but may also affect the palatal and lingual surfaces particularly following periodontal treatment. It is essential that the clinician undertakes a thorough clinical examination together with both medical and dental histories to obtain an overall picture of the history of the condition as well as the presenting clinical features and any precipitating and predisposing aetiological features [14]. For example, a patient who has recently received dental treatment such as the restoration of a tooth or had their teeth professionally cleaned

http://dx.doi.org/10.5772/intechopen.78728



Figure 1. Clinical features of a patient with gingival recession and dentine hypersensitivity (acknowledgement G Belibasakis).

may be experiencing discomfort from these procedures and it would be relatively easy to resolve the problem by obtaining a history that included recent dental treatment. Patients with a more obscure orofacial problem, such as a persistent idiopathic facial pain (PIFP), may require more extensive examination and subsequent referral to an oral medicine/pain clinic.

2.4.1. Clinical diagnosis of DH (including a differential diagnosis)

According to Gillam [17], it is important for clinicians to identify patients with DH correctly by excluding any confounding factors from other orofacial pain conditions prior to the successful management of the condition. It is important to note that the original definition of DH was essentially a definition of exclusion and as such should encourage the clinician to exclude any other potential orofacial condition(s) to determine a definitive diagnosis of DH, for example, from dental disease such as caries, fractures of the tooth due to trauma and mechanical failure of restorations and the effects of restorative and cosmetic treatment such as restorations, whitening procedures and periodontal treatment.

Traditionally clinicians have used a dental explorer probe and air from a triple-air syringe to identify any sensitive areas on the exposed root surface to elicit a response from the patient [6]. This is a relatively simple and straightforward way to examine teeth which may be sensitive as the discomfort from the testing should be transient in nature and should resolve once the stimulus has been removed. The problem arises however, of how the patient can describe this pain since pain is highly subjective and will vary from individual to individual. A simple measure to quantify this response would be the use of a rating score such as a visual analogue scale [VAS (0–10)] and this would provide the clinician with an indication of how the patient rates his/her own pain. Other means of testing are also available such as an ice stick, ethyl chloride, pulp testers, etc., but these may be more relevant in testing for pulp vitality rather than for DH/RS *per se*. More recently quality of life (QoL) questionnaires have been utilised to determine the impact of DH/RS on the patient's quality of life [18]. Although these questionnaires have been mainly used for research purposes in clinical trials, nevertheless, they do provide an insight into how a clinical condition may affect an individual's daily activities

as well as determine whether providing a desensitising product may relieve this impact on their QoL. Once a definitive diagnosis has been determined, the clinician can then formulate a management strategy to treat the condition.

2.5. Clinical management of dentine hypersensitivity and root sensitivity

According to Gillam and Orchardson [6] it is important for the clinician to recognise that a simple 'one-fit-all' solution to resolve a patient's pain associated with DH/RS may not necessarily meet the expectation of both the clinician and patient. Ideally a specific management strategy for the successful management of DH/RS should be based on the presenting clinical features. For example, a patient presenting with DH/RS associated with gingival recession can benefit from the clinician educating them regarding the relevant aetiological causes that may have precipitated their clinical problem as well as identifying the sites where the damage to the gingivae has occurred. In other words, simply providing a professionally applied product or procedure or recommending an OTC product without firstly resolving the aetiological factors responsible for the problem would be inappropriate management. Providing information and advice on the type of toothbrush (soft, medium and hard texture), demonstrating an atraumatic brushing technique (by reducing the brushing force) and modifying their dietary intake to avoid any erosive component in the diet should enable the patient to modify their lifestyle accordingly and reduce any future reoccurrence of the problem. The clinician should be aware of the various in-office and OTC products readily available to treat DH/RS and this information is available from a number of reviews [6, 19] (**Table 2**) but clinicians should be aware that currently there does not appear to be agreement on a universally accepted gold standard product or technique to resolve DH/RS and therefore he/she may need a number of different management strategies to resolve an individual patient's problem such as a combination of in-office and OTC products.

The rationale for the successful treatment of periodontal disease(s) can be accomplished through good oral hygiene measures by the patient and through professionally performed non-surgical mechanical debridement and surgical procedures [20]. Both non-surgical and surgical procedures are equally effective in the treatment of chronic periodontitis in terms of attachment level gain and reduction in gingival inflammation [21]. Reduction in pocket depth (PPD) and a gain in the clinical attachment level, however, are generally obtained through surgical procedures such as open flap debridement [21]. Unfortunately, these procedures may have unwanted side effects including gingival recession following the tissue shrinkage of the periodontal pocket, exposure of the underlying dentine following root cementum denudation with the risk of experiencing DH/RDS to both tactile and thermal stimuli as well as (in the anterior region) aesthetic problems (the so-called black triangles).

2.5.1. DH/RS from non-surgical dental procedures

Several studies have reported on the effects of periodontal therapy in the form of non-surgical and surgical procedures in dental practice, and it is evident that patients often report experiencing discomfort (in the form of DH/RS) immediately following these procedures or once the local anaesthesia has worn off [4, 7, 22]. According to these studies there are limited

Gingival recession

Clinical evaluation

- Clinical measurement of the gingival recession defect
- Take study casts and clinical photographs to monitor the condition over time
- Check and monitor periodontal health
- Identification and correction of predisposing or precipitating factors
- Use of pain scores to assess and monitor DH/RS (e.g. visual analogue scores [VAS])

Patient education (including preventive advice)

- Show patient the affected site(s)
- Explain probable cause for recession.
- Explain factors triggering sensitive teeth episodes
- Encourage patients to modify their oral hygiene regimen in order to reduce damage to gingivae (e.g. reducing brushing forceand correction of toothbrush technique)
- Reduce excessive consumption of acid foods and drinks

Corrective clinical outcomes

- Reduce excessive consumption of acid foods and drinks
- The manufacture of silicone gingival veneers to mask the so-called black triangle appearance following the loss of the interdental papilla/apical displacement of the gingival margin
- Orthodontic treatment
- Restorative correction of recession defect and subgingival margins of fillings and crowns
- Polymers: sealants/varnishes/resins/dentine-bonding agents
- Laser obturation of dentinal tubules
- Use of desensitising polishing pastes
- Pulpal extirpation (root canal treatment)
- For local recession defects soft tissue grafting (root coverage) surgical procedures can be considered (see section under periodontal treatment)

Periodontal treatment

Clinical evaluation

- Periodontal disease or periodontal treatment as the primary cause of exposure of dentine and associated DH/RS
- Check and monitor periodontal health (6-point pocket charting)
- Use of pain scores to assess and monitor DH/RS (e.g. visual analogue scores [VAS])

Patient education (including preventive advice)

- Reinforce the need for good oral hygiene
- Show patient the site(s) affected by periodontal disease and explain probable cause of the exposed dentine
- Guide the patient to improve 'at home' oral hygiene regimen
- Instruction on measures of reducing periodontal risk factors such as diabetes, smoking, obesity

Corrective clinical outcomes

Initial phase

- Non-surgical periodontal procedure(s)
- DH treatment (including desensitising polishing pastes/fluoride varnishes)

Re-evaluation

- Follow-up assessment on periodontal status and DH/RS

Corrective phase

- Surgical periodontal procedure(s), for example, guided tissue regeneration, coronally advanced flap + enamel matrix derivatives with/without root conditioning, connective tissue graft (flap)and free gingival graft (acellular dermal matrix allograft)

Combination therapy of the above techniques:

- DH treatment (including desensitising polishing pastes/fluoride varnishes)

Follow-up management maintenance phase

- Supportive periodontal therapy
- On-going monitoring of periodontal health
- Dentine hypersensitivity treatment (including desensitising polishing pastes/ fluoride varnishes)
- Oral hygiene advice

Recommendations for home use (including toothpaste/mouthrinses)	Recommendations for home use (including toothpaste/mouthrinses)
• Oral hygiene implementation as per recommendation • Strontium chloride/strontium acetate • Potassium nitrate/chloride/citrate/oxalate • Calcium compounds • Calcium carbonate and arginine and casein phosphopeptide+amorphous calcium phosphate • Bioactive glass • Nano/hydroxyapatite • Fluoride in higher concentration (2800/5000 ppm F[prescription]) • Amine/stannous fluoride	• Oral hygiene implementation as per recommendations • Regular brushing with an anti-bacterial toothpaste to aid plaque control • Short period, the use of a 0.2% chlorhexidine solution for plaque control • Use of a desensitising mouthrinse twice daily for DH/RS control (when appropriate) until resolution of the problem

Table 2. Examples of non-surgical and surgical approaches on the management of DH (modified from Gillam [10]).

epidemiological data available in terms of both prevalence and intensity of DH/RS following periodontal therapy (such as scaling, root surface debridement and surgical procedures) as well the lack of data in relation to the impact on the quality of life of those individuals who suffer from DH/RS following these procedures. Although using periodontal instrumentation may remove the biofilm, calculus and subsequently expose the dentinal tubules thereby initiating DH/RS, the same procedures may also create a smear layer on the exposed root surface which can be supplemented by the natural mineralisation processes from the saliva effectively preventing DH/RS. It is evident from the available literature that any discomfort initiated from non-surgical periodontal procedures is relatively short lived and will gradually diminish over time. The clinician is, therefore, in a position to reassure the patient, both prior to and after the treatment, regarding the duration of this discomfort. Several investigators have recommended the application of a prophylaxis desensitising polishing paste (see **Table 2**) immediately following treatment to reduce any discomfort from these procedures [6, 14, 23]. At the same time, the clinician may recommend a desensitising toothpaste as well as implementing a maintenance programme that would include some of the preventative strategies as outlined earlier as well as the monitoring of the condition (**Table 2**). It is also reasonable to suggest to the patient that if the discomfort does not resolve after 2 weeks or that the intensity of the discomfort does not diminish then they should contact the clinician for a re-evaluation of the treatment.

2.5.2. DH/RS following surgical procedures

As mentioned in Section 2.5 both non-surgical and periodontal surgical procedures while providing beneficial outcomes to the patient, including chewing ability, improved aesthetics, and patient satisfaction may also have unwanted side effects such as the exposure of the root surface, gingival recession through over-instrumentation of shallow pockets ≤4 mm or repositioning of the gingival margin following an apical repositioned flap procedure. Tonetti et al. [24] in a multi-centre randomised controlled clinical trial (n = 166 completed subjects)

http://dx.doi.org/10.5772/intechopen.78728

reported on post-surgical outcomes such as post-surgical oedema and hematoma, wound dehiscence, granulation tissue as well as DH/RS. Infection of both the recipient and donor sites or the rejection of the graft material may also occur depending on the surgical techniques used. According to Tonetti et al. [24] the most common post-operative outcome reported in the study was RS which affected 45% of the test and 35% of control groups, respectively, the prevalence of which peaked at 3 weeks and decreased below the baseline frequency by week 6. It should be noted, however, that 40–50% of the subjects in both groups did not report any post-operative sensitivity. In the other reported post-operative complications (post-surgical oedema and hematoma, wound dehiscence and granulation tissue), the prevalence of discomfort was highest at week 1 and rapidly decreased over a 6-week period.

One of the treatment options that have been reported in the literature to resolve the problem of both aesthetics and associated DH/RS was the use of root coverage procedures, which have been shown to reduce or completely abolish DH/RS over time [6–7, 24]. According to Douglas de Oliveira et al. [25] root coverage procedures (both partial and complete coverage) have been reported to decrease pain and improve a patient's quality of life, although currently there appears to be insufficient scientific evidence to associate root coverage procedures with the complete resolution of DH/RS [26].

Patients should, therefore, be warned about the aesthetic outcome anticipated from both non-surgical and surgical treatment, since aesthetic outcome(s) is a primary feature to consider when planning any surgical intervention. Furthermore, it is reasonable to inform the patient that some relapse of the gingival tissues may occur over time [27–28]. For example, the more resective procedures, such as an apically repositioned flap, are more likely to exhibit more exposure of the root surface following periodontal surgery compared to the other surgical techniques. A 14-year follow-up of 10 patients by Pini Prato et al. [28] reported that gingival recession reoccurred in 39% of the treated sites using a coronally advanced flap procedure (CAF).

2.5.3. Specific management strategies for post-operative sensitivity from non-surgical and surgical periodontal procedures

According to Gillam et al. [29], patients who experience DH/RS, as a result of periodontal disease or following treatment, should receive a multi-phase treatment and prevention plan that address both the periodontal health of the patient as well as the associated discomfort from DH/RS. Patient education is therefore an essential component of the strategy and it is vital that the patient understands their responsibility in maintaining their own oral hygiene at home (compliance) as well as recognising the importance of reducing any periodontal risk factors by maintaining good control of systemic disease conditions such as diabetes as well as the need for involvement in smoking cessation programmes (lifestyle and behavioural changes). The clinician also has a responsibility in providing a management strategy that includes the effective monitoring of the patient's periodontal health as well as monitoring any detrimental outcomes following periodontal treatment [24]. It is also important for the clinician to acknowledge that any aetiological or predisposing features that precipitated the clinical problem should be resolved rather than simply providing a desensitising toothpaste, gel or mouthrinse for home use or applying professional products in the clinic.

For patients that exhibit good oral hygiene with minimal or no gingivitis and no evidence of periodontitis but concerned about the appearance of their teeth (aesthetics) showing the root surface, the initial phase of treatment would be by showing the areas in the mouth at risk and discussing ways of how to minimise or prevent further damage to the hard and soft tissues. This may include modifying the toothbrush technique and determining which type of toothbrush would beneficial to the patient, for example, a powered toothbrush. It would also be useful to discuss the impact on the teeth of the frequent consumption of acidic food and/or drink, which may be in association with brushing after consumption. This activity may subsequently remove the protective smear layer on the tooth and expose the underlying dentinal tubules which will instigate DH/RS. One simple recommendation for the clinician would be to use a professionally desensitising polishing paste to any sensitive site both prior to and post-treatment. This will have the advantage of (a) providing instant or reduced relief of the patient's discomfort and (b) helping to reduce the stress associated with the dental procedure as well as the overall patient satisfaction (see **Table 2**).

When developing a strategy for managing patients who require periodontal surgery following the initial phase of non-surgical treatment it is important to recognise (as in the management of DH/RS following non-surgical procedures) to explain that this treatment may initiate a degree of post-therapeutic sensitivity. The evidence from the published literature would suggest that any post-surgical sensitivity is transient in nature and should resolve within 1–2 weeks depending on the extent and severity of the problem. Therefore, it is essential that the patient is made aware of the short nature of the problem, which can be successfully managed by a combination of professionally applied products and home-use toothpastes, mouthrinses and gels (see **Table 2**). One of the key recommendations from Gillam et al. [29] was the implementation of a management strategy that would include the monitoring of both the periodontal tissues and any associated DH/RS from the initial stages of treatment into the maintenance phase [24].

The following case report may highlight some of the elements in implementing a management strategy from the successful resolution of a patient with a periodontal condition with marked gingival recession and associated DH/RS. A 40-year old patient with generalised mild periodontitis and a Miller II gingival recession defect at the lower left central incisor (LL1) was referred for treatment complaining of the poor aesthetics and associated DH/RS. The initial phase of treatment included oral hygiene instruction, modification of the toothbrushing technique and the use of a desensitising toothpaste to relieve discomfort as well as a full-mouth supra- and subgingival debridement (incorporating the use of a prophylaxis polishing paste). Corrective surgery for the LL1 was planned as a two-stage surgery. The initial surgery (**Figures 2–6**) was to relieve the fraenum and deepen the sulcus with the incorporation of a porcine collagen xenograft (Mucograft®) to thicken and widen the band of keratinised tissue. A second-stage surgery using a coronally advanced flap procedure and a connective tissue graft to improve the coverage of the root surface will be completed at a later stage. Following surgery, a desensitising product was applied around the tooth and the patient was provided with a mouthwash. A zone of attached

http://dx.doi.org/10.5772/intechopen.78728

keratinised gingiva of 2 mm was clearly visible after 2 months and no further deterioration of the recession site was noted after 6 months (**Figures 2–6**). A recession defect of 3 mm, however, remained but this will be corrected during the second phase of corrective treatment. Regarding patient outcomes, the patient was happy with the current outcome and noticed a significant reduction in DH/RS which has improved her QoL and also reported that she observed less bleeding on brushing.

The selection and recommendation of desensitising products for the management of post-surgical sensitivity from non-surgical and surgical periodontal treatment should be evidenced based; however, there does not appear to be a universally accepted gold standard product to recommend to clinicians and therefore it may be expedient to use a range and/or combination of professionally applied and at-home products to treat DH/RS (**Table 2**). To some extent this will depend on the extent (localised/generalised) and severity of the problem (mild/moderate or severe) as well as the impact of the QoL of the individual patient. It is important for the clinician to note that it may not always be possible to fully resolve the problem of DH/RS and



Figure 2. Pre-operative appearance of LL1 with a shallow vestibule present.

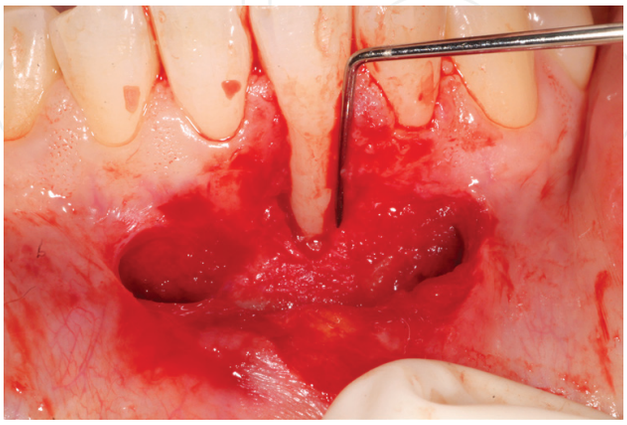


Figure 3. Peri-operative view illustrating the separation of the fraenum and deepening of the vestibule through the horizontal incision. The full extent of attachment loss is clearly evident.



Figure 4. The gingival tissues adjacent to LL1 were de-epithelialised and the placement of the grafting material (Mucograft) with securing sutures was accomplished.

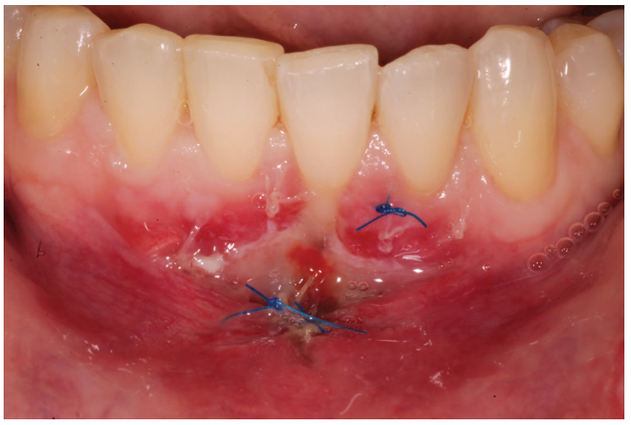


Figure 5. Post-operative view of uneventful soft tissue healing at 2 weeks. Closure of the incision was achieved by secondary intention and the graft was incorporated into the surrounding tissues.



Figure 6. Post-operative view at the 6 months review. Complete healing of the soft tissues had occurred as well as the thickening of the gingiva with a widened band of keratinised tissue.

as such one should manage the expectations of both the clinician and patient. It may be more realistic to accept that if the treatment can minimise the impact of the problem on the QoL of the individual patient to allow them to complete a range of their normal daily activities, then this may be a successful treatment outcome.

3. Conclusions

Both non-surgical and surgical periodontal procedures together with the effects of periodontal disease on the teeth and their supporting structures may have impact on the patient's aesthetics and quality of life due to the pain associated with DH/RS. Ideally the clinician needs to prevent or minimise these effects to reduce any unnecessary discomfort for the patient and this may be accomplished through preventive strategies such as patient education, lifestyle, behavioural changes, the provision of the required information about the procedures both pre- and post-treatment as well as reassuring the patient in the event of any subsequent discomfort. The implementation of a management strategy that utilises a range of professionally applied products and techniques and procedures as well as home-use products depending on the extent and severity of the problemis an essential step to the successful treatment in resolving DH/RS following non-surgical and surgical periodontal procedures. This strategy should include the monitoring of both the periodontal tissues and any associated DH/RS from the initial stages of treatment (following a definitive diagnosis) to the maintenance phase of treatment.

Acknowledgements

The authors are grateful to Professor George Belibasakis and Dr. Hiten Halai for the provision of the clinical photographs in **Figures 1–6**.

Conflict of interest

The authors have no conflict of interest.

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