



Melissa Shemie



Mira Shah

Ian Dunn

# Step 2 for the Treatment of Periodontal Diseases

**Abstract:** This article discusses the modalities of treatment involved in step 2 of periodontal therapy, including exploring looking at the evidence-based recommendations produced by the S3 stages I–III periodontal treatment guideline.

**CPD/Clinical Relevance:** Step 2 of periodontal therapy is essential for removal of the subgingival biofilm and reduction in the bacterial load.

**Dent Update 2024; 51: 312–314**

Step 2 of therapy, also known as cause-related therapy, aims to control (by elimination or reduction) the subgingival biofilm and calculus by carrying out subgingival professional mechanical plaque removal (PMPR) on the root surface.<sup>1,2</sup> This is implemented after successful step 1 therapy in all periodontitis patients regardless of the severity of periodontal disease. Step 2 is usually performed after a detailed periodontal assessment and successful implementation of step 1, which looks to educate the patient regarding their disease, address individual risk factors and improve oral hygiene.

## Step 2 of therapy

Periodontitis is an inflammatory disease initiated by bacteria, specifically their endotoxin. This is identified by the host and the resulting inflammation is largely

responsible for the bony destruction that we observe.

The aim of step 2 of therapy, subgingival PMPR, is to reduce the bacterial load, associated endotoxin and calculus, and in turn, reduce gingival inflammation, probing pocket depths, and the number of diseased sites.<sup>3</sup> During subgingival instrumentation, there may be associated removal of the cementum (endotoxin-associated root surface) although cementum removal is no longer considered necessary in the management of periodontitis.

Subgingival PMPR may be supplemented with the use of adjunctive physical or chemical agents. These may be delivered locally or systemically depending on patient-specific factors. The current S3 guidelines provide guidance for practitioners with regards to the use of adjuncts during periodontal treatment. This is discussed later in this issue of *Dental Update*.

Subgingival PMPR is an all-encompassing term for the treatment modalities that were formally known as:

- Subgingival scaling;
- Subgingival debridement;
- Subgingival instrumentation;
- Root surface debridement;
- Root surface instrumentation.

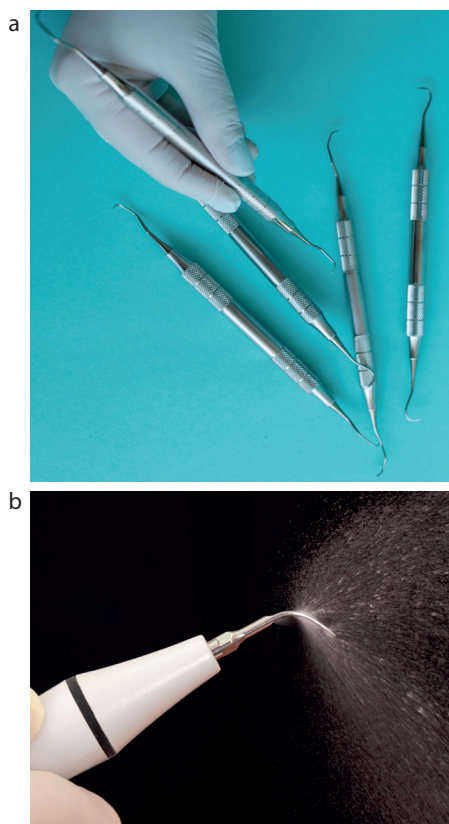
## Instrumentation methods

The use of ultrasonic versus hand instrumentation versus a combined approach has been a topic that has been the centre of debate and controversy for many years (Figure 1). There have been no definitive guidelines as to which method may be superior, and thus the use of instrumentation varies, and is usually defined by operator preference.

The current S3 guidelines looked to address this issue and the question was asked: 'Are treatment outcomes of subgingival instrumentation better after use of hand, powered (sonic/ultrasonic) instruments or a combination thereof?'

The systematic reviews by Suvan *et al* produced the following recommendation: 'We recommend that subgingival periodontal instrumentation is

**Melissa Shemie**, BDS, MFDS RCS (Eng), Specialist Trainee in Periodontology, King's College London. **Mira Shah**, BEng (Hons), BDS, MFDS RCS (Ed), Specialist Trainee in Periodontology, King's College London. **Ian Dunn**, BChD, FCGDent, MSc (Perio), Specialist Periodontist, Rose Lane Dental Practice, Liverpool.  
email: melissa.shemie@nhs.net; mira.shah1@nhs.net



**Figure 1.** (a) A selection of hand instruments and (b) a sonic instrument.

performed with hand or powered (sonic/ultrasonic) instruments, either alone or in combination.<sup>1,3</sup>

This is based on evidence from four randomized controlled trials, showing that the type of instrumentation did not affect treatment outcomes. The use of any instrumentation depends on the technique used, the operator's training and experience and the quality of instruments used.<sup>1,3</sup>

Sonic/ultrasonic devices are less destructive when compared to hand instruments. They are less traumatic to both soft tissues and the tooth structure or root.<sup>3</sup> It has been suggested that the use of these instruments is less operator dependent and may result in shorter treatment times, providing more comfort to the patient. However, use of sonic/ultrasonic instruments alone may result in rougher root surfaces.<sup>3,4</sup> In contrast, hand instruments have been shown to remove more calculus deposits and result in a smoother root surface.<sup>3,5</sup> It is worth noting that the quality of instrumentation, whichever approach is picked, is crucial to the clinical outcome.

## Use of local anaesthetic

There is a lack of evidence to suggest local anaesthetic must be used when performing subgingival PMPR. However, if anaesthesia provides comfort to the patient and allows the operator to be more efficient in subgingival PMPR, it can be administered.<sup>1</sup>

## Full mouth versus quadrant subgingival PMPR

The next question addressed was the debate around full-mouth treatments versus quadrant treatment. Again, there have been many claims and preferences stated, but the studies show no significant differences in the treatment success between the two treatment approaches.<sup>6,7</sup> When treatment planning for a patient for step two of non-surgical periodontal treatment, multiple factors must be considered. These factors include:

- Operator time available;
- Sustainability. There is the added advantage of reduction in PPE used, fewer sterilization and repackaging cycles;<sup>8</sup>
- Number of diseased sites. If there are many sites present, it may be more challenging to treat every site effectively in one sitting;
- Number of visits. Some patients may prefer a full-mouth approach, with fewer visits, less time off work, reduction in travel (also part of sustainability) and associated expenses.<sup>9</sup> In addition, full-mouth treatment modalities may be more time efficient and eliminate the risk of delays in treatment due to multiple postponed or cancelled appointments;<sup>9</sup>
- Operator experience. Speed and efficiency of treatment depends on operator experience and knowledge;
- Types and effectiveness of instruments used. It is important to use sharpened instruments when using hand instruments so as to prevent burnishing of calculus. Burnished calculus is a deposit where the outer, rough layer has been removed and what remains is a smooth surface overlying the tooth. This can be very challenging to identify and remove clinically, and requires an experienced operator. In addition, as mentioned above, the use of sonic/ultrasonic instruments can be carried out more readily and are less operator dependent;
- Medical history. Elderly or medically complex patients may find it more challenging to be in a dental chair for a long period of time, and there may be compounding factors which influence treatment planning.

The most recent Cochrane review found that there was no evidence suggesting benefits of full-mouth instrumentation compared to quadrant scaling on changes in probing pocket depth (PPD), bleeding on probing (BOP) or gain in clinical attachment level (CAL).<sup>10</sup>

## Systemic influences

Periodontal disease is associated with raised systemic inflammatory markers, in particular C-reactive protein (CRP), interleukin-6 (IL-6) and fibrinogen.<sup>11</sup> Raised CRP levels can increase the risk of developing atherosclerosis and are in turn associated with increased risk of an individual developing coronary heart disease (CHD).<sup>12,13</sup> IL-6 is involved in regulating host response to bacteria, and fibrinogen is indicative of higher risk of cardiovascular disease.<sup>14,15</sup>

Long-term resolution of periodontal disease shows a decrease in the circulating levels of CRP and IL-6; however, there are studies showing sharp, short-term increase in acute systemic inflammation within 24 hours post-treatment.<sup>3,13</sup> Therefore, in patients with CHD, it may be preferable to stage treatment into quadrants, aiming for 30–45 minutes per visit in order to minimize the systemic impact.<sup>8</sup>

## Clinical endpoints

The endpoint of the second step of therapy should be assessed once the periodontal tissues have healed and aims for no periodontal pockets  $\geq 4$  mm with bleeding on probing<sup>2</sup>. This is often referred to in the literature as a 'closed pocket'.

If this endpoint has been achieved, the patient should also undergo supportive periodontal care, now referred to as step 4 of care.<sup>2</sup>

If pocket depths of  $\geq 6$  mm are identified, step 3 of therapy should be discussed with the patient and, if indicated, there should be referral to a specialist periodontist<sup>2</sup>.

## Discussion

The aim of periodontal treatment and the ultimate goal of resolution of periodontal disease can be achieved by following the steps outlined in the BSP guidelines. Reduction in gingival inflammation, PPDs and reduction in diseased sites rely on multiple factors, including the operator experience and management, as well as patient factors, that influence the outcomes.

The current guidelines support the use of hand instrumentation, ultrasonic

instrumentation or a combination of the two (blended approach). The delivery can also be over multiple appointments or over a single session as discussed. As always, the effectiveness of treatment is dependent on operator skill and patient factors rather than the delivery modalities of treatment.<sup>3</sup>

The fundamental building blocks of successful periodontal treatment are outlined in step 1 of treatment, and should be re-evaluated and re-visited throughout the patient's periodontal journey.

### Compliance with Ethical Standards

**Conflict of Interest:** The authors declare that they have no conflict of interest.

### References

1. Sanz M, Herrera D, Kebschull M *et al*. EFP workshop participants and methodological consultants. Treatment of stage I–III periodontitis: the EFP S3 level clinical practice guideline. *J Clin Periodontol* 2020; **47 Suppl 22**: 4–60. <https://doi.org/10.1111/jcpe.13290>
2. West N, Chapple I, Claydon N *et al*. British Society of Periodontology and Implant Dentistry Guideline Group Participants. BSP implementation of European S3-level evidence-based treatment guidelines for stage I–III periodontitis in UK clinical practice. *J Dent* 2021; **106**: 103562. <https://doi.org/10.1016/j.jdent.2020.103562>
3. Suvan J, Leira Y, Moreno Sancho FM *et al*. Subgingival instrumentation for treatment of periodontitis. A systematic review. *J Clin Periodontol* 2020; **47 Suppl 22**: 155–175. <https://doi.org/10.1111/jcpe.13245>
4. Breininger DR, O'Leary TJ, Blumenshine RV. Comparative effectiveness of ultrasonic and hand scaling for the removal of subgingival plaque and calculus. *J Periodontol* 1987; **58**: 9–18. <https://doi.org/10.1902/jop.1987.58.1.9>
5. Rateitschak-Plüss EM, Schwarz JP, Guggenheim R *et al*. Non-surgical periodontal treatment: where are the limits? An SEM study. *J Clin Periodontol* 1992; **19**: 240–244. <https://doi.org/10.1111/j.1600-051x.1992.tb00460.x>
6. Liss A, Wennström JL, Welander M *et al*. Patient-reported experiences and outcomes following two different approaches for non-surgical periodontal treatment: a randomized field study. *BMC Oral Health* 2021; **21**: 645. <https://doi.org/10.1186/s12903-021-02001-4>
7. Farman M, Joshi RI. Full-mouth treatment versus quadrant root surface debridement in the treatment of chronic periodontitis: a systematic review. *Br Dent J* 2008; **205**: E18. <https://doi.org/10.1038/sj.bdj.2008.874>
8. Paterson M, Johnston W, Sherriff A, Culshaw S. Periodontal instrumentation technique: an exploratory analysis of clinical outcomes and financial aspects. *Br Dent J* 2023; 1–8. <https://doi.org/10.1038/s41415-022-5405-1>
9. Stein JM, Yekta-Michael SS, Schittenhelm F *et al*. Comparison of three full-mouth concepts for the non-surgical treatment of stage III and IV periodontitis: a randomized controlled trial. *J Clin Periodontol* 2021; **48**: 1516–1527. <https://doi.org/10.1111/jcpe.13548>
10. Eberhard J, Jepsen S, Jervøe-Storm PM *et al*. Full-mouth treatment modalities (within 24 hours) for chronic periodontitis in adults. *Cochrane Database Syst Rev* 2015; **2015**: CD004622. <https://doi.org/10.1002/14651858.CD004622.pub3>
11. Mattila K, Vesanen M, Valtonen V *et al*. Effect of treating periodontitis on C-reactive protein levels: a pilot study. *BMC Infect Dis* 2002; **2**: 30. <https://doi.org/10.1186/1471-2334-2-30>
12. Bansal T, Pandey A, Deepa D, Asthana AK. C-reactive protein (CRP) and its association with periodontal disease: a brief review. *J Clin Diagn Res* 2014; **8**: ZE21–24. <https://doi.org/10.7860/JCDR/2014/8355.4646>
13. Schenkein HA, Loos BG. Inflammatory mechanisms linking periodontal diseases to cardiovascular diseases. *J Periodontol* 2013; **84 (4 Suppl)**: S51–69. <https://doi.org/10.1902/jop.2013.134006>
14. Naruishi K, Nagata T. Biological effects of interleukin-6 on gingival fibroblasts: cytokine regulation in periodontitis. *J Cell Physiol* 2018; **233**: 6393–6400. <https://doi.org/10.1002/jcp.26521>
15. Al-Isa M, Alotibi M, Alhashemi H *et al*. Effect of non-surgical periodontal therapy on the fibrinogen levels in chronic periodontitis patients. *Saudi Dent J* 2019; **31**: 188–193. <https://doi.org/10.1016/j.sdentj.2018.12.001>

**UNIVERSITY OF BIRMINGHAM**

## MSc Restorative Dentistry

Study with the University of Birmingham School of Dentistry, an acknowledged world leader in innovative online dental education.

We develop  
We activate

[birmingham.ac.uk/restorative-dentistry](https://birmingham.ac.uk/restorative-dentistry)

[birmingham.ac.uk](https://birmingham.ac.uk)