

Subgingival instrumentation for the treatment of periodontitis

Treatment using subgingival instrumentation can reduce probing pocket depths, gingival inflammation and the number of diseased sites.

Background

Periodontal disease is the most common chronic inflammatory non-communicable disease in the human population. It is estimated that severe periodontitis affects 11% of the world's population, with prevalence increasing with age.¹ The diagnosis of periodontal disease includes history, examination and screening initially. Subsequently, a full periodontal assessment should be carried out where indicated (e.g., BPE Code 3, Code 4 and/or Code*). Radiographic assessment (periapicals or OPG/DPT) should be carried out where clinically justified. The diagnosis of periodontal disease is outside of the scope of this article; however, the author would recommend the use of the 2017 'Classification of Periodontal Diseases to Reach a Diagnosis in Clinical Practice' from the British Society of Periodontology (BSP)² to aid the diagnostic process.

What is subgingival instrumentation?

Subgingival instrumentation refers to all non-surgical procedures, either performed by hand (i.e., curettes) or with power-driven instruments (i.e., sonic/ultrasonic devices).

When is subgingival instrumentation indicated?

- To treat periodontitis in order to reduce probing pocket depths, gingival inflammation and the number of diseased sites; and,
- to remove subgingival biofilm and calculus – "cause-related therapy".³

What do I use for subgingival instrumentation?

It is recommended that subgingival periodontal instrumentation is performed with hand or powered (sonic/ultrasonic) instruments, either alone or in combination.³

Ultrasonic scalars

- **Magnetostrictive scaler (e.g., Cavitron select):** energy is converted to vibrations from the elliptical stroke patterns of the unit's metal rod or stack of metal sheets. All surfaces of the tip are active in the removal of debris (Figure 1).

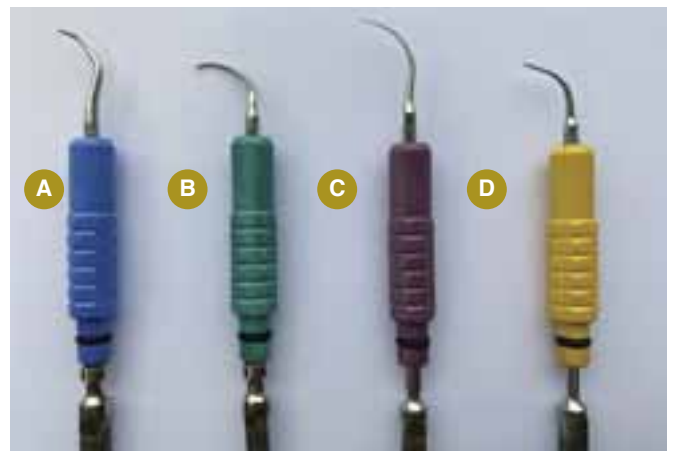


FIGURE 1: Cavitron Select ultrasonic tips: A: 'Powerline' ultrasonic insert – thicker insert with larger tip for efficient removal of heavier deposits; B: 'Slimline' ultrasonic insert – light to moderate calculus removal; C: 'Thinert' ultrasonic insert – extra thin tip for access to difficult-to-reach areas, e.g., imbrications, interproximal surfaces and areas of tight tissues; and D: 'Softip' insert – removes plaque and calculus around titanium implants and abutments.

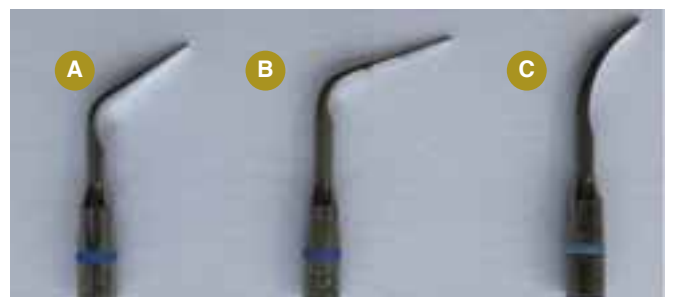


FIGURE 2: Satelec scaler tips: A: tip no. 10X for supragingival scaling; B: tip no. 10Z for subgingival scaling – recommended for scaling pockets <4mm; and, C: tip no. 1 universal scaling tip recommended for simple cases and gross supragingival scaling.

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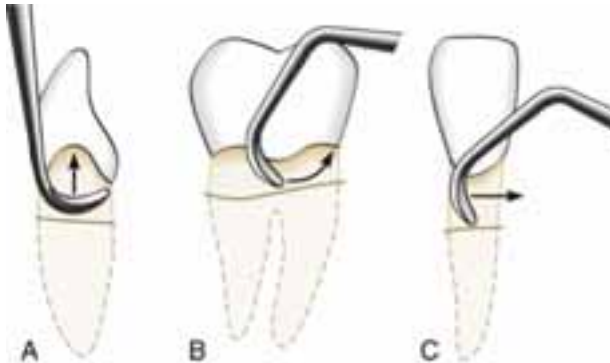


FIGURE 3: Illustration of subgingival scaling strokes: A: vertical; B: oblique; and, C: horizontal.

- **Piezoelectric scaler (e.g., Satelec):** strokes occur in a linear pattern via crystals activated by the ceramic handpiece. Only the lateral sides are effective in the removal of debris (Figure 2).

Protocol for use of an ultrasonic scaler:

- use a chlorhexidine rinse (0.2%) pre-operatively to reduce the number of viable bacteria sprayed onto the operator during scaling;
- use at half power with adequate water coolant;
- use light but firm pressure;
- hold tip parallel to long axis of the tooth;
- keep tip moving at all times to avoid damage to the root;
- always use the side of the ultrasonic insert, never the tip (the tip can be used for supra-gingival stubborn calculus deposits only);
- use short strokes, alternating between horizontal, vertical and oblique/crosshatch strokes (Figure 3), completely covering the root surface; and,
- ensure that the tip of the ultrasonic insert being used is not worn – the last 4mm of the insert is referred to as the tip's 'active' area.

Gracey curettes

How to use Gracey curettes:

- select the correct Gracey curette according to the colour coding in Table 1;
- insert working end passively and parallel to long axis of the root (review radiographs to assist with root morphology navigation);
- ensure secure finger rest;
- turn the 'toe' of the working end to engage the root surface; and,
- vertical, circumferential/horizontal and oblique/crosshatch strokes should be used (Figure 3).

Clinical tip

A disclosing agent (solution, gel or tablet) can be used pre-operatively before scaling, both as a patient motivator and also to help visualise and identify plaque biofilm on tooth surfaces supragingivally and subgingivally.

Guided biofilm therapy

Guided biofilm therapy (GBT) is a new regimen where there is a sequential removal of plaque and calculus by initially detecting it with a disclosing agent, followed by the use of air abrasive powder (typically glycine-based powder or erythritol powder) for the removal of plaque and stains. Finally, the subgingival

Table 1: Gracey curette colour coding and recommended area of use.

Code	Colour	Area of use
1/2	Pink	All surfaces of anterior teeth
7/8	Green	Buccal and lingual surfaces of posterior teeth
11/12	Orange	Mesial surfaces of posterior teeth
13/14	Light blue	Distal surfaces of posterior teeth
15/16	Brown	Mesial surfaces of difficult posterior teeth
17/18	Purple	Distal surfaces of difficult posterior teeth
ODU	Lilac	Detection of subgingival calculus (sharp tip)

plaque and calculus are removed with a specialised nozzle (Figure 4) and (if required) eventually scaled with a specialised tip. GBT involves removal of biofilm from surfaces above and below the gumline prior to the removal of calcified deposits.

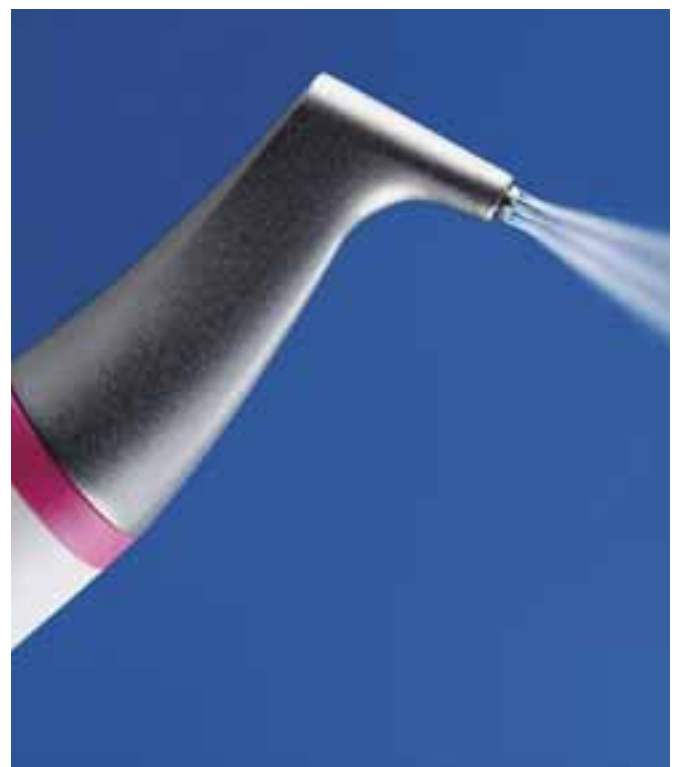


FIGURE 4: GBT Airflow Max Handpiece (EMS Dental).

Why use GBT?

Once the plaque biofilm (which is 'slimy' in nature) is removed from tooth surfaces (both supra and sub-gingivally), it is easier to tactically and/or visually identify remaining calcified deposits. Patients report that GBT is more comfortable than conventional scaling and root planing, and takes less time. It is an effective way of removing subgingival biofilm and can be used in conjunction with traditional ultrasonic and hand instruments when it comes to tenacious subgingival calculus deposits or heavy staining.

What instruments are used?

There are two types of nozzles used for air polishing, namely the supragingival and subgingival nozzle. The supragingival nozzle, otherwise known as the standard nozzle, is used to remove supragingival plaque and stains. On the other hand, subgingival nozzles can be used for the removal of subgingival biofilm and calcified deposits, as well as in the treatment of peri-implantitis. The subgingival nozzle typically features a clip-on, calibrated, sterile, single-use tip for precision subgingival application, and is approved for subgingival use in periodontal pockets up to 5mm (US Food and Drug Administration).

How do I use the subgingival nozzle?

- Insert nozzle tip to the bottom of the pocket and pull the nozzle back 1mm and later activate the spray; and,
- move nozzle continuously in a vertical-incisal motion to cover the entire length until removed from the pocket for about five seconds.

When do I review my patient following subgingival instrumentation?

Patients should be reviewed three months after undergoing subgingival instrumentation (with or without the use of systemic antimicrobials as determined by the treating practitioner). The maintenance protocol for a patient with a stable periodontium (i.e., bleeding on probing (BoP) <10%, pocket probing depths (PPD) $\leq$ 4mm and no BoP at 4mm sites)² should be:

- supportive periodontal care;
- reinforce oral hygiene, risk factor control, and behaviour change;
- regular targeted professional mechanical plaque removal (PMPR) as required to limit tooth loss; and,
- consider evidence-based adjunctive efficacious toothpaste and/or mouthwash to control gingival inflammation.

References

1. Billings M, Holtfreter B, Papapanou PN, Mitnik GL, Kocher T, Dye BA. Age dependent distribution of periodontitis in two countries: findings from NHANES 2009 to 2014 and SHIP-TREND 2008 to 2012. *J Clin Periodontol*. 2018;45(Suppl. 20):S130-S148.
2. British Society of Periodontology. Implementing the 2017 Classification of Periodontal Diseases to Reach a Diagnosis in Clinical Practice. Available from: https://www.bsperio.org.uk/assets/downloads/111_153050_bsp-flowchart-implementing-the-2017-classification.pdf.
3. Sanz M, Herrera D, Kebschull M, Chapple I, Jepsen S, Beglundh T *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.

Quiz answers

Questions on page 90.

1. Supra-crestal attachment.
2. 2mm. However, as this is hard to measure clinically, when preparing crown margins, a figure of 3mm is used taking into account possible measurement errors.
3. The radiograph shows that the carious lesion margin is less than 1mm from the crestal bone. Placing a restoration there would impinge on the supracrestal attachment and a constant

inflammation would be created as a result. This would be made worse by the patient's inability to clean this area, with a risk of alveolar bone resorption. The body will attempt to recreate room between the alveolar bone and the margin to allow space for tissue reattachment.

4. Crown lengthening.



FIGURE 1: X-ray of lower right molar.