Non-Surgical Periodontal Therapy II: Scaling and Root Planning

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Reference

- CARRANZA’s Clinical Periodontology 12th Edition
- Part 2, Section IV Chapter (44)
outline

- Principles of Scaling and Root Planing (*e-only*)
- Classification of Periodontal Instruments
- General Principles of Instrumentation (*e-only*)
- Instrument Sharpening (*e-only*)
PRINCIPLES OF
SCALING AND
ROOT PLANING
Definitions and Rationale

**SCALING:** The process by which biofilm and *calculus* are removed from both supragingival and subgingival tooth surfaces.
ROOT PLANING: the process by which residual embedded calculus and portions of diseased cementum are removed from the roots to produce a smooth, hard, clean surface.
Rationale

- The primary objectives of scaling and root planning is to
  - Restore gingival health
  - Arrest the progression of periodontal disease.
This is achieved by completely removing elements that provoke gingival inflammation (i.e., biofilm, calculus, and endotoxin) from the tooth surface.
Scaling alone is sufficient for the enamel, but not dentin or cementum
Why scaling is sufficient in supragingival deposits (enamel)?

- When biofilm and calculus form on enamel, the deposits are usually superficially attached to the surface and are not locked into irregularities.

- Scaling alone is sufficient to remove biofilm and calculus completely from enamel.
Why scaling is insufficient in removing deposits in root surface?

- Deposits of calculus on root surfaces are frequently embedded in cemental irregularities.

- Subgingival calculus is porous and harbors bacteria and endotoxin and therefore should be removed completely.
Why scaling is insufficient in removing deposits in root surface?

- When dentin is exposed, biofilm bacteria may invade dentinal tubules.

- Therefore **scaling alone is insufficient to remove them, and a portion of the root surface must be removed to eliminate these deposits.**
Evidence based studies in periodontal instrumentation

- Instrumentation has been shown to
  - Reduce the numbers of subgingival microorganisms
  - Produce a shift in the composition of subgingival biofilm (from gram-negative anaerobes to gram-positive facultative bacteria compatible with health).
The critical probing depth for

- Scaling and root planning is $2.9 \text{ mm } \pm 0.4$
- Periodontal surgery is $4.2 \text{ mm } \pm 0.2$.

(Lindhe et al. 1982)
Scaling and root planning did not result in total removal of subgingival calculus particularly in deep pockets (>5mm).

(Rabbani et al. 1981)
Instruments for Scaling and Root Planning
Periodontal instruments

Periodontal Instruments classification

- Periodontal probes
- Explorers
- Scaling, root-planing, & curettage instruments
- Periodontal endoscope
- Cleansing and polishing instruments

- Sickle scalers
- Curettes
- Hoe, chisel, and file scalers
- Ultrasonic and sonic instruments
Scaling and Root Planning

Instruments

- Sickle scalers
- Curettes
- Hoe, chisel and file scalers
- Ultrasonic and sonic scalers
Hand Instruments
**Figure 45-1** Parts of a typical periodontal instrument.
Adaptation technique

- The cutting edge has 3 sections:
  - Leading third – (toe) (used more often during instrumentation)
  - Middle third
  - Heel third
Figure 45-11 Both ends of a U15/30 scaler.
Figure 45-8 Basic characteristics of a sickle scaler: triangular shape, double-cutting edge, and pointed tip.
Sickle Scalers (Supragingival Scalers)

- 2 cutting edges
- Straight flat surface
- Sharply pointed tip
- Blades may damage the tissue subgingivally

Used: To remove supra-gingival calculus
Curettes

Figure 45-18 Reduced set of Gracey curettes. Left to right, #5-6, #7-8, #11-12, and #13-14.
Figure 45-14 Basic characteristics of a curette: spoon-shaped blade and rounded tip.
Curettes

- Semicircular cross section with a convex base
- Rounded tip
Curettes

- Used to remove subgingival calculus, root planning altered cementum, and removing soft tissue lining pockets.
curved blade and rounded toe of the curette allow the blade to adapt better to the root surface, unlike the straight design and pointed end of a sickle scaler, which can cause tissue laceration and trauma
Instruments for Scaling and Root Planning

- **Universal Curettes**
- **Area specific (Gracey Curettes)**
**Figure 45-21** A, Universal curette as seen from the blade. Note that the blade is straight. B, Gracey curette as seen from the blade. The blade is curved; only the convex cutting edge is used.
Universal Curettes

- The working ends of the universal curette are designed in pairs so that all surfaces of the teeth can be treated with one double-ended instrument or a matched pair of single-ended instruments.
Universal Curettes

- The face of the blade is at a 90-degree angle to the lower shank (perpendicular)
- The blade is curved in one direction from the head to the toe
- Used in most areas by altering finger rest, fulcrum, and operators hand position
Universal Curettes

- The primary advantage of these curettes is that they are designed to be used universally on all tooth surfaces, in all regions of the mouth.

**LIMITATIONS:**

- limited adaptability for the treatment of deep pockets in which apical migration of the attachment has exposed furcations, root convexities, and developmental depressions.

- For this reason, many clinicians prefer the Gracey curettes and new modifications of Gracey curettes.
Area Specific (Gracey) Curettes

- The blade is 60 to 70 degrees to the lower shank (offset blade)

- Curved from the head to the toe and also along the side of the cutting edge
Offset blade
Area Specific (Gracey) Curettes

- Designed to adapt specific anatomic areas of the dentition
- Gracey #1-2: Anterior teeth
- Gracey #3-4: Anterior teeth
- Gracey #5-6: Anterior teeth and premolars
- Gracey #7-8 and Posterior teeth facial and lingual
- Gracey 9-10: Posterior teeth facial and lingual
- Gracey #11-12: Posterior teeth :mesial
- Gracey #13-14: Posterior teeth :distal
- Gracey #15-16: Posterior teeth :mesial
- Gracey #17-18: Posterior teeth :distal
Double-ended Gracey curettes are paired in the following manner:

- **Anterior teeth**
- **Anterior & PM teeth**
- **Posterio teeth (Mesial)**
- **Posterio teeth (Distal)**

![Image of Gracey Curettes](image-url)
Gracey Curettes

- **Push designed strokes** → old original design + not recommended → if used with **pull strokes** instead, they are likely to burnish calculus rather than completely remove it.

- **Pull designed strokes** → new current modified design → used with **pull strokes** → for calculus removal.
Summary
Comparison between Scalers and Curettes

Cutting Edges
Cross section
Uses
tip
# Universal Curettes vs Gracey Curettes

<table>
<thead>
<tr>
<th></th>
<th>Universal</th>
<th>Gracey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area of use</strong></td>
<td>All</td>
<td>Specific</td>
</tr>
<tr>
<td><strong>No. of cutting edges</strong></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Curvature</strong></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Blade angle</strong></td>
<td>90</td>
<td>60-70</td>
</tr>
</tbody>
</table>
Using Gracy Instruments
8 PRINCIPLES APPLY ONLY TO GRACEY CURETTES:

1. **Determine the correct cutting edge**
   - visually inspecting the blade & confirmed by lightly adapting the chosen cutting edge to the tooth with the lower shank parallel to the surface of the tooth.
PRINCIPLES APPLY ONLY TO GRACEY CURETTES:

2. Make sure the lower shank is parallel to the surface to be instrumented.

(The lower shank of a Gracey curette is that portion of the shank between the blade and the first bend in the shank).

WHY?

Because the Parallelism of the handle or upper shank is not an acceptable guide with Gracey curettes because the angulations of the shanks vary.
On anterior teeth the lower shank of the **Gracey #1-2, 3-4, or 5-6** should be parallel to mesial, distal, facial, or lingual surfaces of the teeth.

On posterior teeth the lower shank of the **#7-8 or 9-10** should be parallel to the facial or lingual surfaces of the teeth.
The lower shank of the #13-14 should be parallel to the distal surfaces of the teeth.

The lower shank of the #11-12 should be parallel to the mesial surfaces of the teeth.
PRINCIPLES APPLY ONLY TO GRACEY CURETTES:

3. When using intraoral finger rests, keep the fourth and middle fingers together in a built-up fulcrum for maximum control and wrist-arm action.

4. Use extraoral fulcrums or mandibular finger rests for optimal angulation.
PRINCIPLES APPLY ONLY TO GRACEY CURETTES:

5. Concentrate on using the lower third of the cutting edge for calculus removal.

6. Allow the wrist and forearm to carry the burden of the stroke, rather than flexing the fingers.
PRINCIPLES APPLY ONLY TO GRACEY CURETTES:

7. Roll the handle slightly between the thumb and fingers to keep the blade adapted.

8. Modulate lateral pressure from firm to moderate to light depending on the nature of the calculus, and reduce pressure as the transition is made from scaling to root-planing strokes.
Instrument Sharpening

Prior to any instrumentation, all instruments should be inspected to make sure that they are clean, sterile & in good condition.
Instrument Sharpening

- The working end of pointed or bladed instruments must be sharp to be effective.
Evaluation of Sharpness

Sharpness can be evaluated through:

1. **Light reflection:** cutting edge of a dull instrument appears bright unlike the sharp one

2. **Tactile evaluation:** Drawing the instrument across an acrylic rod (test stick), dull instrument will slide smoothly unlike a sharp one
Glare from reflected light

Dull cutting edges

Cross section

Sharp cutting edge (no glare)

Sharp cutting edges

Cross section
Objective of Sharpening

- To **restore** the fine, thin, linear cutting edge of the instrument
- without distorting the original angles of the instrument → ineffective
Advantages of Sharpness

- Easier calculus removal
- Improved stroke control
- Reduced number of strokes
- Increased patient comfort
- Reduced clinician fatigue
Sharpening Stones

- A flat India stone
- A flat Arkansas stone
- A cone-shaped Arkansas stone
- A ceramic stone
Principles of Sharpening

- Select a suitable stone (shape and abrasiveness)

- Use sterile stone

- Establish the proper instrument-stone angle

- Maintain a firm grasp and avoid excessive pressure
Principles of Sharpening

- Lubricate the stone during sharpening
- Sharpen instruments at the first sign of dullness
Sharpening Individual Instruments

I- Universal curettes

- The angle between the face of the blade and the surface of the stone will be 100 to 110 degrees

- One plane only
Sharpening Individual Instruments

II-Area-Specific (Gracey) Curettes

- Hold the curette with the face of the blade parallel to the floor
- Identify the edge to be sharpened
- Hold the stone with an angle of 100-110° between the face of the blade and the stone
- Preserve the curve by turning the stone while sharpening from shank to toe
Two planes
How to detect calculus?
Scaling & root planning
Calculus Detection Skills

1- visual examination

2- Tactile exploration fine.
pointed explorer or probe +
Light exploratory strokes
GENERAL PRINCIPLES OF INSTRUMENTATION:
Instrument Activation

1. ADAPTATION

2. ANGULATION

3. LATERAL PRESSURE

4. STROKES
ADAPTATION

- **Def.:** The manner in which the working end of a periodontal instrument is placed against the surface of a tooth.

- **Objective:** is to make the working end of instrument conform to the contour of the tooth surface.
Adaptation technique

- Precise adaptation must be maintained with all instruments:

  → To ensure maximum effectiveness of instrumentation.

  → To avoid trauma to the soft tissues & root surfaces

*Bladed instruments (such as curette) & sharp pointed instruments (explorers) are more difficult to adapt.*
INSTRUMENT ANGULATION

It refers to the angle between the face of a bladed instrument & the tooth surface.
Fig. 36.5: Blade angulations
Root planning angulation
Soft tissue curettage
**LATERAL PRESSURE**

It means the pressure of the instrument against the tooth surface during activation.

It is described as:

1. Light
2. Moderate
3. Heavy pressure
LATERAL PRESSURE

- Repeated application of excessively heavy strokes will nick/gouge the root surface.

- Careful application of varied & controlled amounts of lateral pressure during instrumentation is recommended.
Strokes

- **There are 4 types of strokes:**

1. **Placement stroke.**

2. **Exploratory stroke / assessment stroke.**

3. **Scaling stroke.**

4. **Root planning stroke.**

Any of these basic strokes may be activated by a pull or a push motion in a vertical, oblique, or horizontal direction.

*Vertical and oblique strokes are used most frequently.*
The placement stroke is used to position the working end of an instrument apical to a calculus deposit or at base of sulcus/pocket.
Stroke Directions

Instrument strokes are initiated using a pull stroke in a coronal direction away from the junctional epithelium.

**Pull strokes:**

1. Oblique
2. Vertical
3. Horizontal

Fig. 36.6: Basic stroke directions
## Stroke Directions

<table>
<thead>
<tr>
<th>Stroke Type</th>
<th>Areas of Application</th>
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<tbody>
<tr>
<td>Vertical strokes</td>
<td>Facial, lingual, proximal surfaces of anterior teeth.</td>
</tr>
<tr>
<td></td>
<td>Mesial &amp; distal surfaces of posterior teeth.</td>
</tr>
<tr>
<td>Oblique strokes</td>
<td>Facial &amp; lingual surfaces of anterior teeth.</td>
</tr>
<tr>
<td>Horizontal / circumferential strokes</td>
<td>Line angles of posterior teeth</td>
</tr>
<tr>
<td></td>
<td>Furcation areas</td>
</tr>
</tbody>
</table>

**Fig. 36.6: Basic stroke directions**
Technique for scaling and root planning
Root planning technique
Evaluation of scaling and root planning
Evaluation of scaling & root planning

- Smoothness

- *Tissue response.*
Evaluation of scaling & root planning

- Clinical evaluation of the soft tissue response to scaling and root planning, including probing, should not be conducted earlier than 2 weeks postoperatively.
**Limitation of scaling & root planning**

- Meticulous and requires more experienced operator.
- Time consuming ($\times 2$ the time needed for surgery)
- Less predictable in deep pockets, furcations and interproximal groove.
- Ineffective as mono therapy in the treatment of aggressive periodontitis.
Limitation of scaling & root planning

- Might cause dentine hypersensitivity.

- Increased the risk of disease transmission (aerosol of the powered instruments).

- Powered may interfere with pacemakers.

- Patient discomfort.

- Cost effectiveness.
THANK YOU
ANY QUESTIONS?

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