

“Scaling: Highly Rated But Surely Underrated”

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Abstract

Periodontitis is chronic immunoinflammatory disorder affecting the supporting structures of the teeth. It has been affecting mankind since a long time with its modality of treatment evolving continuously through the years. Dental plaque is the key etiological factor for initiation and progression of periodontal disease. Nonsurgical periodontal therapy is a regimen that aims at removal of supra and subgingival deposits. This therapy is considered as the gold standard for treating periodontal disease. The purpose of this article is to describe and report a case demonstrating the benefits of nonsurgical periodontal therapy even when used as a stand-alone therapy.

Key Words Scaling, root planing, ultrasonic, calculus, plaque

Introduction

Periodontitis is chronic immunoinflammatory disorder affecting the supporting structures of the teeth⁽¹⁾. It has been affecting mankind since a long time with its modality of treatment evolving continuously through the years. Dental plaque is the key etiological factor for initiation and progression of periodontal disease. Nonsurgical periodontal therapy is a regimen that aims at removal of supra and subgingival deposits. This therapy is considered as the gold standard for treating periodontal disease.

Periodontitis is a disease involving the supporting structures of the tooth⁽¹⁾. It is an immunoinflammatory condition affecting the hard and soft tissues of the oral cavity that anchor the tooth in the alveolar bone. It begins as an inflammatory change in the gingiva which surrounds the necks of the teeth and then progresses apically along the root surface. Gingivitis involves the soft tissue, whereas Periodontitis is an advanced condition which leads to loss of both hard and soft tissues. The tissue damage due to periodontitis is irreversible as opposed to that in gingivitis which is reversible⁽²⁾.

The initiation and progression of periodontitis depends on three factors namely microbial load, host response and the environmental factors. The majority of microbial load present in the oral cavity is in dental plaque. Dental plaque is a biofilm of microorganisms that grows on the hard and soft surfaces within the mouth⁽³⁾. Plaque starts forming within two

hours of brushing and harbours a plethora of pathogenic microorganisms⁽⁴⁾. If it is not removed within 48 hours it gets calcified and which then further irritates the gingiva and causes progression of the disease hence the need for periodontal treatment arises.

Non-surgical periodontal therapy is considered as the gold standard for treatment of periodontal inflammation⁽⁵⁾. It is also called as ‘Initial therapy’ or Cause related therapy’ or ‘Phase I therapy’ and is the first treatment in the chronology of treating periodontal disease⁽⁶⁾.

Discussion

What is non-surgical periodontal therapy??

Non-surgical periodontal therapy involves scaling and root planing performed by the dentist followed by daily oral hygiene maintenance practices performed by the patient.

Scaling is a procedure which refers to the removal of supragingival and subgingival deposits from the tooth and root surface. Whereas root planing is the removal of residual embedded calculus and portions of cementum from the tooth roots with the aim of producing a smooth hard and clean surface.⁽⁷⁾

Nonsurgical periodontal therapy also involves elimination of plaque retentive areas in oral cavity and the use of various chemotherapeutic methods as an adjunct to plaque control.

Phase I therapy in many cases resolves the inflammation completely and is the only treatment required whereas in some cases it acts as a preparatory phase for a more definitive

surgical therapy. It is based on the principle which says that the removal of local etiological factors will halt the disease process and restore the tissues back to health⁽⁸⁾.

Periodontal treatment aims to create favorable surroundings for the tissue healing⁽⁹⁾.

Periodontal debridement objectives include⁽¹⁰⁾:

1. Disruption and removal of the supra and subgingival biofilm.
2. Removal of plaque retentive factors such as calculus.
3. Conservation of tooth structure.
4. Creation of a biologically acceptable root surface.
5. Resolution of inflammation.

History and evolution over the years

Periodontal disease has been affecting mankind since a long time, the treatment for which initially was extraction of the involved tooth. Hippocrates of Kos Greece, the father of modern medicine was the first to associate gum disease to the presence of calcified deposits which he called ‘pituita’. Understanding the etiology of the disease facilitated in development of instruments used to remove the etiological factors. Scaling and root planing instruments evolved from being crude, huge and heavy in the olden days to being sharp, minute and precise today.

A wide range of supra and subgingival scalers and curettes are available today which can be used manually as well as are power driven.

Importance of elimination of calculus

Calculus is a contributory, rather than a causatory factor of periodontitis⁽¹¹⁾ because,

1. All forms of calculus deposits are coated by a layer of dental plaque.
2. Supragingival calculus acts as a hindrance for toothbrushing and interdental cleaning.
3. Subgingival calculus is an obstruction while subgingival cleaning and acts as a nucleus for bacterial colonization.

4. Subgingival calculus is a radix of bacterial endotoxins. Therefore, it is necessary to completely remove the calculus deposits present both supra and sub gingivally.

Instruments used for non-surgical periodontal therapy

They can be classified as hand instruments and power-driven instruments. Hand instruments can further be classified into supra or subgingival instruments; and universal or area specific instruments⁽¹²⁾. Each instrument has

1. Handle: used by the operator to hold the instrument.
 2. Working end: it can be cutting or non-cutting and is used for scaling, root planing or curettage.
 3. Shank: part which connects the handle to the working end
- The various commonly used instruments include:

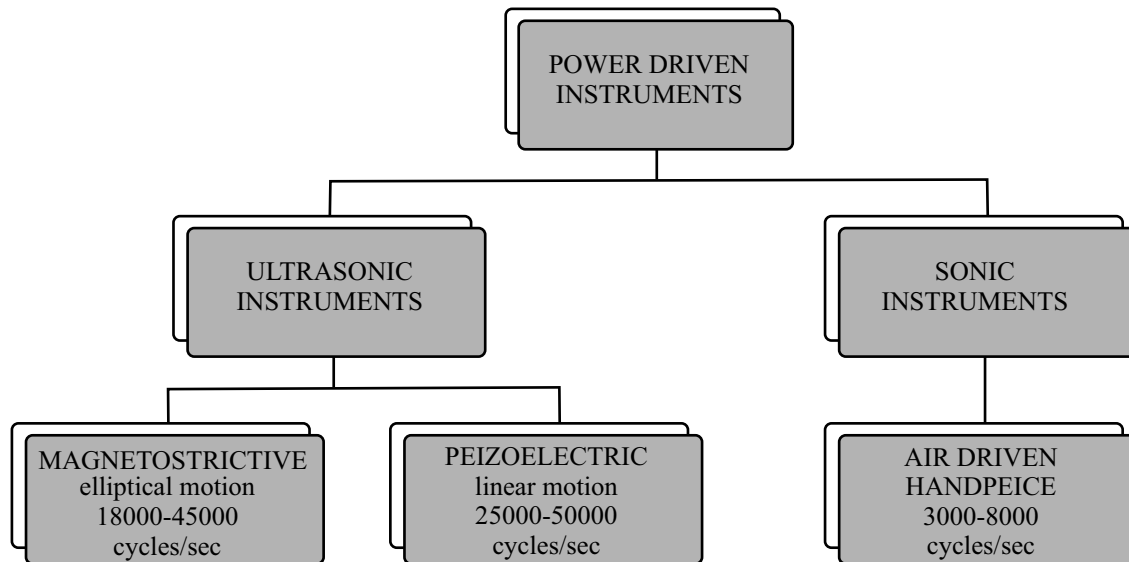
- Chisel/push scaler
Instrument with a straight shank and blade beveled at 45° and is used with a push stroke.
- Trihedral scalers
Working end is triangular in cross section and it has two cutting surfaces which meet at the working end. It includes sickle scalers and jaquette scalers mainly used for removing supragingival calculus.
- Periodontal hoe
It has a blade angle of 99° with a cutting edge angle beveled at 45°. It is used in pull stroke usually to remove subgingival calculus deposits. Two point contact is essential for optimal usage of the instrument.
- Periodontal file
The working end is designed with multiple, straight cutting edges which help in removal of burnished calculus deposits. It is useful in filing areas that have previously been “over instrumented”. It is used to crush and create a rough surface on burnished calculus deposits to facilitate its removal by another instrument.
- Curettes

Table 1: Universal V/s Gracey Curette

FEATURE	UNIVERSAL CURETTE	GRACEY CURETTE
Cutting edges	Has two cutting edges: one on each side of the facial surface	Has only one cutting edge: Lower edge of the facial surface
Usage	Designed so that one instrument can be used universally on all tooth surfaces and areas.	Available in sets of instruments each designed for a particular area or tooth surface.
Cutting angle	Non offset cutting edge. Facial surface is beveled at 90° to the shank	Offset cutting edge. Facial surface is beveled at 60°-70° to shank
Facial curvature	The facial surface is curved in one plane, up only	The facial surface is curved in two planes, up and to the side.

Recommended protocol for root surface instrumentation (RSI)⁽¹³⁾

- Re-check probing depths/bleeding/deposits.
- Pre procedural Chlorhexidine rinse (0.2%) will reduce microbial contamination in aerosol by 96%.
- Explore root surface thoroughly with World Health Organization (WHO) probe.
- Remove the supra and subgingival deposits with the scaler and curettes.
- Re-explore with WHO probe or explorer to check presence of deposits by tactile sense.
- Subgingival irrigation to be done wherever needed.

**Table 2: Hand V/s Ultrasonic Instruments**

HAND SCALING INSTRUMENTS	ULTRASONIC INSTRUMENTS
Mechanism of action is mechanical action	Mechanism of action involves : mechanical action, cavitation, acoustic turbulence, fluid lavage
Removes only those deposits which it contacts	Destroys and eliminates bacterial deposits from a distance.
Larger tip size (0.76-1mm)	Smaller tip(0.3-0.6 mm)
Subgingival irrigation is required as an adjunct	Flushing action of the scaler removes debris and bacteria from the pocket
Moderate to heavy forces are required for calculus removal	Light lateral pressure is required for calculus removal
Frequent sharpening needed	No sharpening needed
Must be positioned apical to the deposit hence leads to considerable tissue distension, more tissue trauma and slower healing	Easily inserted into the pocket causing less tissue trauma and faster healing

Ultrasonic V/s Manual Instrumentation in meeting the objectives of periodontal debridement**1. Disruption and removal of subgingival biofilm:**

Ultrasonic instrumentation for root surface debridement is advantageous in furcation areas⁽¹⁴⁾. It mechanically disrupts the biofilm due to improved conformity of its design combined with its vibratory and biophysical mechanism.

2. Calculus removal:

Hand as well as ultrasonic instruments have the same efficiency of calculus removal but ultrasonic is preferred as it reduces the undue pressure and unwanted removal of cementum during its usage.

3. Conservation of tooth structure:

The mean loss of cementum by use of hand instrumentation is 9.1 µm/working stroke. This is almost

9 times as compared to ultrasonic instrumentation which is 1µm/working stroke.⁽¹⁵⁾

Manual instrumentation may lead to removal of more than the maximum of 50 µm of cementum per year.⁽¹⁶⁾⁽¹⁷⁾

4. Resolution of disease:

Resolution of inflammation is seen by both hand and ultrasonic instrumentation. Reduction in pocket probing depth and gain in Clinical attachment level were almost identical.⁽¹⁸⁾⁽¹⁹⁾⁽²⁰⁾⁽²¹⁾⁽²²⁾

5. Efficiency:

There is considerable difference in the time taken in accomplishing the clinical goal of calculus removal. Time taken to debride one quadrant by ultrasonic instruments is 68 mins as compared to hand instruments which took 105 mins in patients with moderately deep pockets.⁽²¹⁾⁽²³⁾⁽²⁴⁾

Single V/s Multiple Instrumentation

Contrasting opinions are seen. One study concluded that there is reduction in mean probing depth by of 2 mm after single instrumentation which led to no additional improvement even after subsequent instrumentation.⁽¹⁸⁾⁽¹⁹⁾

On the other hand another study claimed reduction in mean probing depths from 7.2mm to 6mm after initial scaling episode within 16 weeks followed by further reduction in pocket depths to 4.9 mm after a second episode of instrumentation.⁽²⁵⁾

Full mouth disinfection protocol

This was first introduced by Quirynen and coworkers and is also known as one stage or single stage disinfection. The aim of this procedure is to reduce the microbial load in the pockets and intraoral niches in a single sitting to minimize the risk of reinfection by pathogenic bacteria. This also allows to properly reevaluate the oral hygiene practices followed by the patient on the day of recall. This involves:

1. Scaling and root planing to be completed within a period of 24 hours to minimize the number of subgingival pathogenic organisms.⁽²⁸⁾⁽²⁹⁾⁽³⁰⁾
2. Brushing the dorsum of the tongue with a 1% chlorhexidine gel for 1 minute;
3. Rinsing the mouth twice for one min and gargling for 10 secs with A 0.2% chlorhexidine solution.⁽³¹⁾
4. Irrigation of periodontal pockets with a 1% chlorhexidine to reduce the bacterial load.⁽³²⁾
5. Rinsing with 10 ml of 0.2 % chlorhexidine twice a day for a period of two weeks and use mechanical plaque control aids to retard the re-establishment of pathogenic species subgingivally.⁽³³⁾

The focus of this treatment is the elimination of potent periodontal pathogens from non-periodontal sites as well . These areas include the dorsum of the tongue, oral mucosa, saliva and mucosal surface of the tonsils. An attempt at elimination of these microorganisms from all niches is made to prevent possible reinfection.

Healing after non surgical periodontal therapy

Various clinical and histologically changes are observed after scaling and root planing. The most obvious clinical sign is the reduction in the critical pocket probing depth which occurs mainly due to resolution of the gingival inflammation and shrinkage of the marginal gingiva.

Repair takes place by the formation of long junctional epithelium. Clinical changes after SRP are due to removal of the etiological factors and improved oral hygiene maintenance and plaque removal by the patient. They can be appreciated completely 1-2 weeks after SRP and include drastic reduction in gingival swelling and bleeding.

Efficient root surface instrumentation and disruption of the subgingival biofilm will create a root surface that is biologically compatible with the formation of the long junctional epithelium with a hemidesmosomal attachment to the root surface.

Formation of new collagen fibers start by 3 weeks after SRP and mature gradually from 4th to 7th week after non-surgical treatment.

An evidence base for non-surgical treatment

A couple of studies assessing effect of root surface debridement on pocket probing depth and clinical attachment level stated that⁽²⁶⁾⁽²⁷⁾

1. There is little significant improvement following root surface instrumentation of shallow pockets
2. Shallow pockets lose some clinical attachment after instrumentation.
3. Pockets of 4–6mm show average probing depth reductions of about 1mm and 0.5mm gain of attachment after treatment.
4. Deep pockets show average probing depth reductions of about 2mm and 1mm gain of attachment after treatment.

It is important to note that there are various other confounding factors that affect the treatment outcome which include patient motivation and compliance, presence of systemic and local risk factors, genetic predisposition to periodontal disease and nature of the oral microbiota.

Methods

Case Report:

A 56 year old male patient reported to the Department of Periodontics with the chief complaint of deposits on teeth and

halitosis. Bleeding was noted while brushing since one month, hence the patient stopped brushing his teeth. The patient has no contributing medical history.

Intraoral examination revealed extensive calculus deposits covering the cervical third of crown and root surfaces of all the teeth. Bleeding on probing was positive. Gingiva demonstrated erythema with loss of stippling. Pathological mobility (Miller's grade I) was noted with 43. Generalized gingival recession seen with an average clinical attachment loss of 4mm. A strong offensive odour was noted suggestive of organoleptic score of Grade 5.

Treatment: Patient was educated regarding his oral condition and after consenting for treatment, a thorough supra and subgingival scaling was performed using piezoelectric ultrasonic scaler. Oral hygiene instructions were reinforced. 0.2 % Chlorhexidine mouthwash was prescribed twice a day for 2 weeks and a suitable brushing technique was demonstrated.

Follow-up: At the end of one month significant improvement was noted. Halitosis was reduced to Grade I. Patient was motivated with the results and is currently under maintenance therapy.



Figure 1 : Preoperative frontal view of the dentition shows presence of heavy deposits of supra and subgingival calculus



Figure 2 : 1 month Postoperative frontal view of dentition shows complete absence of calculus and a healthy gingiva



Figure 3 : Preoperative mandibular occlusal view shows calculus deposits on the lingual aspect of the mandibular teeth.



Figure 4 1 month Postoperative mandibular occlusal view shows complete absence of deposits indicating a good patient compliance after nonsurgical therapy.

Conclusion

Dental plaque is inevitable with mechanical plaque control being the mainstay to maintain oral hygiene. Scaling and oral hygiene reinforcement by the clinician therefore remains to be the gold standard of treatment for periodontal disease.

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Conflict of interest : Nil

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