

An Insight into Supportive Periodontal Therapy and Maintenance Care

Abstract:

Periodontitis is a painless destructive disease of the tooth supporting structures that progresses silently, hence it's a big challenge for clinicians to motivate the patients for therapy. Several factors influence the treatment outcome such as genetic variations, smoking, systemic complications, stress, trauma from occlusion, iatrogenic dentistry, etc. There is ever-growing evidence that recall visits are prerequisites for the success of therapy. At the personal level, maintenance is difficult for an average patient as this demands frequent elimination of soft and hard deposits from all the possible surfaces, hence highlighting the significance of repeated professional care at regular intervals. An effective outcome of the therapy can be achieved by a fruitful combination of both active and supportive periodontal therapy, hence reducing the possibility of re-infection and arresting the disease progression.

Key-words: Supportive Periodontal therapy; an extended trimeric model; compliance; risk assessment.

Introduction:

Periodontitis is a poly-microbial and multi factorial disease that affects the supporting structures of the tooth.[1] As per the records of **Global burden of Disease Study**, severe periodontal diseases is the 11th most prevent condition in the world.[2] Bacterial plaque deposit is the main etiology that initiates an inflammatory response within the periodontium.[3] Several attempts have been made to remove and inhibit this plaque and restore the periodontium that has been injured by the disease activity.[4] Both surgical and non-surgical therapeutic approaches have been adopted by clinicians to cure the disease depending on the patient's periodontal and systemic status.[5] After the accomplishment of the treatment, patients must be evaluated for maintenance care and subsequent recall visits should be followed. This would help in to assess the success of the therapy, achieve long term therapeutic targets, eliminate residual infection, prevent the recurrence of disease and reinforce oral hygiene.[6] The results of several clinical trials have suggested that patients who do not comply with the maintenance programme displayed obvious signs of relapse. As per a study by Cortellini

et al., patients who are not maintained on supervised recall visits after periodontal surgery tend to suffer from relapse by 50-fold increase.⁷ According to the **American Academy of Periodontology (AAP)**, treatment with a long-term maintenance program following active periodontal treatment is termed as "Supportive Periodontal therapy" (SPT). Professional maintenance care is an important factor in the

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Received : 28 May, 2024, **Published :** 31 July, 2024

Access this article online	
Website: www.ujds.in	Quick Response Code 
DOI: https://doi.org/10.21276/ujds.2024.10.2.18	

How to cite this article: Ojha, M. O., Vartika Verma, Kapilesh Singh, & Darshana Sarkar. (2024). An Insight into Supportive Periodontal Therapy and Maintenance Care. UNIVERSITY JOURNAL OF DENTAL SCIENCES, 10(2).

success of periodontal or implant therapy.[8] It includes a complete assessment of medical and dental history, extra and intra-oral examinations, evaluation of the hard and soft tissue conditions, radiographic considerations and periodontal charting. This is followed by the removal of soft debris and plaque, adherent calculus by scaling and root planing, polishing of tooth surfaces, reinforcement of oral hygiene and behavior modification.[9,10] This review is an attempt to highlight the significance of supportive periodontal therapy and routine visits for the success of periodontal treatment.

Goals of SPT:

1. To inhibit or curtail the recurrence of gingivitis, periodontitis or peri-implantitis.
2. To reduce the incidence of teeth loss or implant loss affected by the disease.

Objectives of SPT:

1. The key objective of supportive periodontal therapy is to secure optimal supra and subgingival plaque control by enlightening the patients about the importance of maintaining oral hygiene and regular professional visits.
2. Preservation of alveolar bone support (as assessed with the help of radiographs) and maintaining stable clinical attachment level.
3. Reinforcement of proper intra-oral hygiene.

Sequence of periodontal therapy and maintenance care:

According to the Periodontal treatment Planning model by Carranza there are four phases that need to be addressed: (Phase 0: Emergency phase, Phase I- Non-Surgical phase, Phase II- Surgical phase and Phase III- Restorative phase).[11] **(Table: 1)**

The current periodontal sequence therapy adopts the trimeric model representing the petals of a trimeric flower (example: Mariposa Lily). According to this model, each phase (Phase I- Disease Control phase, Phase II- Surgical phase and Phase III- Restorative phase) is concluded with centered towards Phase IV/ Re-evaluation phase. **(Table: 2)** This is a necessary step for the dentist to check for the response of periodontium to the therapy and to revise the overall treatment plan accordingly. The recent classification introduces an extended trimeric model rendering to which the preparation of periodontium for restorative dentistry and adjunctive orthodontic therapy are added[11,12]. **(TABLE: 3)**

(Table: 1)

Preliminary Phase/ Phase 0	(a) Treatment of emergencies: Dental or periapical Periodontal Other (b) Extraction of hopeless teeth and provisional replacement if needed (may be postponed to a more convenient time)
Nonsurgical Phase (Phase I Therapy)	Plaque control and patient education: Diet control (in patients with rampant caries) Removal of calculus and root planing Correction of restorative and prosthetic irritation factors Excavation of caries and restoration (temporary or final, depending on whether a definitive prognosis for the tooth has been determined and the location of caries) Antimicrobial therapy (local or systemic) Occlusal therapy Minor orthodontic movement Provisional splinting and prosthesis
Surgical Phase (Phase II Therapy)	(a) Periodontal therapy, including placement of implants (b) Endodontic therapy
Restorative Phase (Phase III Therapy)	(a) Final restorations (b) Fixed and removable prosthodontic appliances (c) Evaluation of response to restorative procedures
Maintenance Phase (Phase IV therapy)	Periodic rechecking

(Table: 2)

PHASE I (INITIAL THERAPY – DISEASE CONTROL PHASE)	1. Treatment of Emergencies 2. Antimicrobial therapy 3. Diet Control 4. Patient Education and motivation 5. Correction of Iatrogenic Factors 6. Deep Caries 7. Hopeless Teeth 8. Preliminary Scaling 9. Temporary Splinting, occlusal adjustment, and minor orthodontic tooth movement 10. Scaling and Root Planing
PHASE II (SURGICAL THERAPY)	1. Pocket management in specific situations. The most popular traditional indication is the presence of pockets of 5mm. 2. Irregular bony contours or deep craters. 3. Areas of suspected incomplete removal of local deposits. 4. Degree II and III furcation involvements. 5. Distal areas of last molars with expected mucogingival problems. 6. Persistent inflammation. 7. Root coverage. 8. Removal of gingival enlargements.
PHASE III (RE-STORATIVE THERAPY)	Fixed or removable prosthodontics, Periodontal Prosthesis, or other kinds of restorations are done.
PHASE IV (MAIN TENANCE PHASE - SUPPORTIVE PERIODONTAL THERAPY):	In the trimeric model, re-evaluation is a transitional step that needs to be done between every phase of the Treatment plan and the other. It is usually done after 3-6 weeks from initial therapy. It includes

(Table: 3)

THE EXPANSION OF THE SURGICAL PHASE	<p>Surgical Procedures could be divided into two major types:</p> <ul style="list-style-type: none"> •Periodontal Surgery: Surgeries to control active periodontal disease. E.g. pocket reduction surgeries. •Preprosthetic Surgery: Surgeries to prepare for the Restorative Phase. E.g. crown lengthening surgery, root coverage surgery
ADJUNCTIVE ORTHODONTIC THERAPY	<p>Adjunctive orthodontic therapy is placed separately and in close association with the surgical therapy Phase (Phase II) where some surgical procedures may precede it while other surgical procedures should be done after its completion</p>

The durability of periodontal treatment revolves around the up keeping of the out comes accomplished in the other stages of periodontal therapeutic plan. This dictates a lifelong relation between the patient and the treating dentist or periodontist.

Types of SPT:

As reported by **Schallhorn and Snider (1981)**, there are four forms of SPT, namely, Preventive maintenance therapy, Trial maintenance therapy, Compromised maintenance therapy and Post-maintenance therapy. Preventive maintenance therapy is done in individuals free of periodontal pathos is in order to prevent the onset of disease.[13]

Trial maintenance therapy is followed for patients with borderline periodontal conditions(borderline pockets and furcations, inadequate attached gingiva) and to evaluate the necessity for corrective therapy.[13]

There are patients with systemic complications, inadequate oral hygiene, economic crisis or other conditions where periodontal therapy is suggested but cannot be carried out. For such patients compromised maintenance therapy is advised which is intended to slow down the disease process.[13]

Post-maintenance therapy is considered for patients who have undergone surgical or non-surgical therapy. The objective is to prevent the relapse of disease process.[13]

Compliance:

SPT stresses on patient's compliance and their cooperation. Compliance is the extent to which a patient's behavior coincides with the medical and dental advice.[14] **Dr. Wilson** in the year **1984** proposed that only 16% of patients comply with SPT intervals.[15] A report by **Schwartz et al.** in his study demonstrated that if a patient withdraw from recommended oral hygiene schedules, they do so within 3 months.[16] “Why patients fail to comply” is a paramount question that needs to be addressed. The most typical reason in this regard is the “white apron fear” that involves anxiety and pain associated with dental treatments.[17] In a developing country like India, low socioeconomic status is yet another issue. Monetary problem related to dental therapy is a matter of concern. Also, due to lack of dental education and proper motivation, patients tend to deny the regular treatment regimens portraying a self-destructive conduct. Possible methods for successful compliance are proper tutoring patients the significance of good oral hygiene, maintaining a good rapport and communication with them, obtaining written consent from the patient concerning the procedure, simplification of procedure, maintenance of patient's information records and recall visits and positive reinforcements.[18,19]

Patients confronted by a clinician can be categorized into-compliant, non-compliant and erratic. Compliant patients are the ones that adhere with the protocols advised by the medical/dental practitioner whereas non-compliantpatientsrefrain from follow ups. Erratic patients comply occasionally, hence need to be tutored accordingly.[20,21]

Oral health education interventions:

A health education programme is claimed to be beneficial to patients if it is guided by the concept of health behavior modification.[22] Detailed information through pamphlets and audio visual aids about the signs and symptoms of the disease, their relation to the presence of bacterial biofilm, periodontal status and possibilities of systemic involvement via vascular and lymphatic routes should be communicated to the patients and to the public at various forums like hospitals, educational institutions and public health centers.[23] Awareness about personal oral care and the use of disclosing agents to appreciate the presence of bacterial plaque should be encouraged.[24] A study was conducted by **Krishna Subedi et al.** in 240 school students between 12-15 years of age where the participants were randomized into two groups-experimental (received oral hygiene education) and control (did not received oral hygiene education). The results

displayed that there was an overall improvement in the oral hygiene status of the experimental group by 54.8%. [25] A similar randomized clinical trial was conducted by **Pattarin et al.** in 435 school children to assess the efficacy of oral hygiene education. The authors concluded that students who received proper knowledge oral health could maintain proper oral hygiene. [26]

Another element that can be integrated into SPT is Motivational interview (MI). It is a client/patient-centered therapeutic method for behavioral modification and reinforcing his/her commitment to change. [27,28] **Miller and Rollnick's** emphasized on three essential components: the willingness, ability and readiness to change. Praises can be used for good performance whereas reprimands/refusals can be used as adjunctive in the learning process. In the course, patient's views need to be evaluated and focused on. The dentist should give him recognition and his autonomy should be respected. [29]

Periodontal risk assessment:

Numerous models have been proposed to evaluate risk factors that might aid in developing periodontitis. These include periodontal risk calculator (PRC), Health information suite (OHIS), Hexagonal risk diagram for periodontal risk assessment (PRA), Chandra's model and simplified method-University of Ferrara (Unife). [30,31]

PRC (**Page et al**) is a web-based tool that uses information like patient age, smoking history, diabetes, history of periodontal surgery, pocket depth, furcation involvement, subgingival calculus or restorations, radiographic bone height and vertical bone lesions. The system relies on mathematically derived algorithms for quantitative risk assessment. OHIS (**Page et al**) is yet another model that aggregates and analyses data like oral health status, interventions and therapies required and also behavioral decisions. It assists in consistent and precise decision making, lessens the economic burden on patients and permits and improvement in oral health. [32]

The concept of PRA was introduced by **Lang and Tonetti** which considers the following parameters as risk factors- Percentage of bleeding on probing, the prevalence of residual pockets greater than 4mm, loss of teeth from a total of 28 teeth, loss of periodontal support in relation to patient's age, systemic and genetic conditions and environmental factors like smoking. The model is valuable in modifying the frequency and contents of maintenance recall. **Chandra (2007)** took a step ahead by underlining diabetes as a crucial

risk factor in influencing periodontitis. **Trombelli et al. (2009)** proposed Unifemodel to evaluate periodontal risk assessment where five parameters were drawn- Smoking status, Diabetes, Number of sites with probing pocket depth \geq 5mm, bleeding on probing and bone loss. [33]

Role of Dental Professional in SPT:

Several parameters are appraised during recall visits like the gingival architecture and condition, the periodontal status and results obtained from radiographic examination. The gingival conditions include the color, contour, consistency, position of gingival margins, bleeding on probing, presence or absence of stippling, and presence or absence of exudate or abscess. Periodontal parameters like probing pocket depth, clinical attachment level, furcation involvement, mobility, pathological migration and muco-gingival conditions should be judiciously scrutinized. Radiographic evaluation can be done via Intraoral periapical radiographs (IOPAR), Orthopantomogram (OPG) and Cone-beam computed tomography (CBCT). The recent techniques in diagnosis encompasses the use of automated, the rmalandthree-dimensional probes, spectro-optical technology, digital radiography, computer-assisted densitometric image analysis system (CADIA), Nuclear medicine bone scan, ultrasound imaging, Optical coherence tomography (OCT), Magnetic resonance imaging (MRI), etc. [34]

After the detail investigation, SPT should be carried out that obeys the same dogmas followed for the treatment of active disease phase. For gingivitis patients, supra and subgingival scaling is performed followed by surface polishing. For periodontitis patients, it is important to appreciate the stability of the disease process. Approaches adopted for patients with halted periodontitis are scaling and root planing, proper oral hygiene regimens, correction of occlusal disharmony and splinting. Non-surgical therapies like subgingival irrigation, local drug delivery, or antibiotic prophylaxis can be recommended as well. Surgical procedures involving curettage, pocket therapy and mucogingival surgeries can be carried out if oral hygiene is found to be satisfactory. [35,36]

Patients with periodontitis which is progressing even after the completion of therapy should be often monitored. Microbial analysis and culture sensitivity tests should be executed. Several chair side diagnostic kits are available to assess the levels of inflammatory enzymes and biomarkers like Periocheck (for collagenase), Periogard and Pocketwatch (to detect AST in GCF) and Prognostik (for serine protease activity).

Mombelli and Lang (1990) proposed the CIST protocol for implant patients. As per this, patients are grouped based on the probing pocket depth (PPD): ≤ 3 mm, 4-5mm and ≥ 5 mm. Patients with PPD less than 3mm are further subcategorized into two groups depending on the plaque index. A plaque index less than 1 and absence of bleeding on probing indicates the requirement of mechanical debridement, scaling and polishing (A). The same is advised for patients with plaque index greater than 1 or bleeding on probing. If PPD ranges between 4-5 mm, mechanical debridement is suggested with antiseptic cleaning (B). Patients with PPD greater than 5 mm are subdivided into three categories depending on the radiographic findings. No notable cratering implies the need of treatment plan (A+B). If cratering is observed and is less than 2 mm, then treatment plan (A + B) is followed along with systemic or local antibiotic therapy (C). If the detected cratering is more than 2 mm, treatment plan (A+B+C) is implemented along with regenerative or resective periodontal surgeries (D).[37]

Merin's classification is the standard most protocol followed for recall visits. For first year patients with proper hygiene and satisfactory healing, the maintenance regimens are scheduled at 3 months interval. Patients with complicated findings and treatment planning's are followed-up every 1-2 month. After the completion of first year, patients can be categorized into Class A, Class B and Class C. Class A patients exhibit excellent or good oral hygiene with no occlusal problems or complicated prosthesis and no teeth with less than 50% of bone support. For such patients, recall intervals can vary anytime between 6 months to one year. Class B patients may display inconsistent oral hygiene, heavy calculus, systemic complications, smokers, occlusal disharmony, few remaining pockets, complicated prosthesis, recurrent dental caries, patients undergoing orthodontic therapy and few teeth with less than 50% of bone support. Such patients are recalled after every 3-4 months. Class C patients portray inconsistent oral hygiene with heavy calculus, positive family history, systemic complications, smokers, occlusal disharmony, several pockets, complicated prosthesis, recurrent dental caries, patients with ongoing orthodontic therapy and many teeth with less than 50% of bone support. Such patients are followed for every 1-3 months.[38,39]

Restorative dentistry and SPT:

Periodontium of the restored tooth reveals the extent of compatibility of contours and margins of the restoration with the tissues. Tooth mobility, fremitus, PDL widening and bone loss are some findings associated with faulty restoration.

Overhangs or plunger cusp can provoke food impaction. For the success of restoration, marginal fit and biological width are vital considerations that cannot be overlooked. Also, a well-polished surface attracts minimal plaque. Full crown restoration could elicit recurrent caries. For multiple caries, proper maintenance interval is required for re-evaluation and adjustment. Re-cementation is done wherever possible and also periodic occlusal adjustments should be followed.[40]

Orthodontics and SPT:

Patients selected for undergoing orthodontic therapy require oral screening and regular oral prophylaxis as the appliances used during the treatment tends to facilitate plaque deposit and calculus formation. Inflammatory periodontal diseases can be treated by scaling and root planing. Also, flap surgeries can be performed depending on the inflammatory status and bone loss. Trauma from occlusion needs to be relieved prior to therapy and occlusal adjustments must be performed. Mucogingival problems like high frenal attachment and recession should be amended after the accomplishment of orthodontic therapy.[41]

Radiation therapy and SPT:

Prior to the therapy, a complete periodontal evaluation of the remaining dentition should be done. A periodontist has to opine about the teeth that need to be retained. Extraction during radiation therapy can prove to be harmful. During the therapy, patients may suffer from mucositis, xerostomia, altered taste sensation, root caries or osteoradionecrosis. Such patients should be kept under palliative care. During this phase, adequate oral hygiene should be maintained by the patients along with topical application of fluorides. Root planing should be accompanied by antiseptics and antibiotics. Invasive surgeries should be avoided that involves excess bleeding or prolonged healing time.[42]

Role of patients in SPT:

SPT demands a collaboration of the clinician and the patient where he is kept under lifelong maintenance regimen for repeated disruption of plaque biofilms. Patients should follow appropriate oral hygiene instructions as given by their dentist. This involves brushing techniques (Bass, Modified Bass, Charter's, Stillman and Fones) depending on their oral status. Also, they can be prescribed manual or powered toothbrushes along with interdental cleaning aids that can range from interdental/proximal brushes, dental floss, toothpicks, etc. Personally applied oral irrigation devices, chemical plaque control agents and fluoride gels can also be suggested. Every possible care should be undertaken to prevent the relapse of periodontal disease.[43]

Time allocated for SPT:

1. The first part of SPT includes clinical and radiographic evaluation. The time allotted for this part should be 10-15 minutes.
2. The second part of SPT includes therapy, reinforcement of instructions and motivations. The timing for this part should range between 30-45 minutes.
3. The final part includes rescheduling of the patients which should be done in 1-5 minutes.

Complications associated with SPT

1. **Root caries:** Literature review suggests that there is an increase in the incidence of root caries as regular SPT might involve removal of some portion of cementum, thereby exposing the roots of the teeth to oral fluids and bacteria.
2. **Periodontal abscess:** This is due to migration of subgingival calculus remnant or foreign materials deep into the non-inflamed tissue paving way for further inflammation and abscess.
3. **Root sensitivity:** Root sensitivity is yet another common problem associated with regular SPT. This can lead to temporary discomfort or can give rise to chronic pain.

Conclusion:

Concept of periodontal health and disease is multifaceted and it is obvious that patient's perception of their oral health and how oral diseases may affect their general life pattern and mental well-being is of importance when considering prevention and treatment of periodontal diseases. A patient should be provided with a comprehensive treatment therapy involving routine checkup, removal of deposits, fluoridation and training of personal oral home care technique by the dental team.

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