

The essential phase after Non- Surgical and Surgical Periodontal therapy- “Supportive Periodontal Therapy”: A Review

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Abstract

For the success of the non surgical and surgical periodontal therapy, the most important therapy is the supportive periodontal therapy. The main aim of the supportive periodontal therapy is to prevent the relapse or recurrence of non surgical or surgical periodontal therapy. Supportive periodontal therapy also known as maintenance therapy includes rechecking for plaque, calculus, bleeding on probing, pockets, bone loss, thorough reevaluation of medical history such as checking for diabetic levels, blood pressure. Supportive Periodontal S also provides a view regarding relative risk assessment for bleeding on probing, tooth risk assessment, site risk assessment. Supportive Periodontal therapy is an essential therapy to support the patient standard level of care. Hence this therapy is a need of an hour for both the Periodontist and Patient.

Keywords: Risk assessment, Reevaluation, Maintenance, Merin, Complication.

Introduction

In Periodontology, two types of disease are more common; gingivitis, and Periodontitis. The main difference between gingivitis and Periodontitis is in the fact, that in gingivitis there is an inflammation of gingiva, without the loss of clinical attachment. Whereas in the periodontitis there is an extension of inflammation from gingiva into the supporting structures of teeth leading to clinical attachment loss.^[1] The one of the earliest predictor of gingivitis and Periodontitis is then bleeding on probing which is mainly because of the red complex of microorganisms that are present in biofilm. This bleeding on probing is an objective sign rather than the subjective sign. Also the main cause of gingivitis and periodontitis is the presence of plaque and calculus as well certain systemic diseases that can aggravate the response of an individual to gingivitis and periodontitis. Therefore the treatment is itself in the fact to remove these etiological factors initially, followed by its management either surgically or non-surgically. Hence followed by the treatment, its necessary to maintain the treated condition very well and for that proper maintenance of treated condition, the Supportive Periodontal therapy or the maintenance phase plays the most crucial role.^[2] In supportive periodontal therapy, the main aim is to reevaluate thoroughly the structures of the oral cavity, that have undergone treatment. This therapy involves rechecking for plaque and calculus, followed by scaling once again if they are present, rechecking for bleeding on probing, pockets, bone loss, intactness of the restoration, thorough reevaluation of medical conditions. By this therapy the clinician come to know that how well the patient is maintaining the treated condition, and this therapy add as an

adjunct, to help the patient to maintain his or her oral and systemic condition.^[3]

Definitions

Periodontal treatment is divided into four phases:^[4]

1. Evaluation and management of systemic phase (in consultation with the patient physician)
2. Evaluation and management of the cause related phase (plaque, calculus, faulty restorations, caries)
3. Corrective phase after the cause related phase which involves minor and major surgery.
4. Maintenance phase

In The World Workshop of Periodontology 1989, this maintenance phase was renamed as Supportive Periodontal Therapy (SPT). This therapy involves taking into considerations of all those factors, which prevents the chances of reinfection, and which helps the patient to maintain his or her own measures of oral health in a good state. This therapy helps the patient to maintain there dentition, in a good health for the longest period of time and to evaluate the patient oral hygiene measures whether they are correctly practicing these oral hygiene measures or not.

Basic paradigm for the prevention of periodontal disease

Supportive periodontal therapy is based upon the reevaluation and retreatment of etiopathogenesis of periodontitis i.e. microbial factors and its modification by host response. Over the past years, a direct causal relationship between microbes and its direct effect on gingival and periodontal health is proved and the restoration of normal gingival and periodontal

health, which was because of the removal of these etiological factors.^[5] Later on it was further seen that some individuals having greater amount of etiological factors and poor oral hygiene yet not developed gingivitis or periodontitis through which the concept of host response came into existence which may vary from person to person.^[6] However in the experiment conducted by Loe and Silness, the plaque accumulation was followed by the development of gingivitis which on the resuming of oral hygiene measures leads to the reversal of gingivitis.^[7] In 1746, Fauchard stated that no caring to clean the teeth forms the basis for all those diseases of teeth that destroy them. However, following treatment, its not possible for each and every individual to maintain their proper oral hygiene ,hence here the professional supportive periodontal therapy plays an important role in maintaining the oral hygiene standard of the patient and to prevent the recurrence of the disease.^[8] In a number of clinical studies by Ramjford (1968), Rosling (1976),it was found that irrespective of the treatment provided, well substituted supportive periodontal therapy, resulted in maintainance of probing depths, and clinical attachment level.^[9]

Supportive periodontal therapy for gingivitis

Gingivitis is the first and foremost common disease affecting gingiva. The main etiological factor for gingivitis the presence of plaque, followed by calculus. But gingivitis if treated on time by the personal oral hygiene measures followed by the professional measures that is the supportive periodontal therapy can became reversible.^[2] Various studies supports this view. Studies carried by Poulsen et al (1976),Bellini et al (1981), in children have justified that personal oral hygiene measures, followed by professional recall visits, resulted in decreasing the severity of gingivitis.^[10] The most remarkable study, carried in adults by Lovdal et al (1961), in which the patients were on supportive periodontal therapy and in which they recalled patients four times during each year for professional supragingival and subgingival scaling, followed by reinforcement of oral hygiene measures. The result of this study showed that, there was an improvement in gingival conditions, and reduction in tooth loss than that before this supportive periodontal therapy.^[11]

Supportive periodontal therapy for periodontitis

Various studies have been carried out, regarding the success of Periodontal treatment following the well enforced supportive periodontal therapy. Studies carried out by Universty of Michigan, Lomalinda in which following the periodontal treatment modality, the patients were put on supportive periodontal therapy in which they were recalled three to four months per year ,and it was noted that well performed oral hygiene measures by the patient and professional recall visits resulted in significant level of clinical attachment level gain.^[12] In another study by Lindhe and Nyman (1984), 74 patients with advanced periodontitis, were treated by initially removal of etiotrophic factors, followed by modified widman flap surgery ,and later on was

put on a supportive periodontal therapy for 14vyears. The result of this study showed that there was a significant improvement in the probing pocket depth, and clinical attachment level gain along with recurrence to very few number sites. Hence from this study, it was concluded that advanced periodontitis cases can be maintained well following supportive periodontal therapy, and that recurrence over few sites require supportive periodontal therapy on more long term basis.^[13]

Continuous multilevel risk assessment

It is cleared from the mentioned studies that most of the individuals carry certain level of risk for the recurrence of the disease despite the effective oral hygiene measures, practiced by the individual and the enforcement of supportive periodontal therapy. This shows that it became necessary to evaluate the risk at a multilevel in order to determine the more precise duration and frequency of supportive periodontal therapy. It includes the risk assessment at following levels:^[14]

1. Subject level risk assessment: it includes six points
 - a. Percentage of bleeding on probing
 - b. Prevalence of residual pockets greater than 4 mm.
 - c. Loss of teeth from a total of 28 teeth.
 - d. Loss of periodontal support in relation to patient age.
 - e. Systemic and genetic conditions.
 - f. Environmental factors like smoking.
- A. Percentage of bleeding on probing: Comprises the first factor in subject level risk assessment. Indicates the patient mentality of maintaining the oral hygiene with proper oral hygiene measures after periodontal treatment. Value ranges between 10% to 25%. An individual is set to be at a risk for recurrence of periodontal disease, if its percentage of bleeding on probing is more than 25%.
- B. Prevalence of residual pockets greater than 4 mm: The success of Periodontal treatment lies in the concept of Pocket elimination. Periodontal pocket of increasing depth at the time of supportive periodontal therapy carries a chance of recurrence of disease. But the concept lies in the fact that despite of deep pockets present, there should not be any further progression of disease and that deep pockets present should be stable at the time of supportive periodontal therapy. Hence a pocket depth greater than 4 mm, carries the highest risk of recurrence of disease.
- C. Loss of teeth from a total of 28 teeth: There are many reasons for tooth loss such as periodontitis, caries, abscess, trauma. If there are eight or more than eight teeth lost, from a total of 28 teeth(excluding third molars), the individual is said to be at a higher risk for recurrence of disease.
- D. Loss of periodontal support in relation to patient age: Tooth are held in their position by a firm periodontal support. Loss of periodontal support is characterized radiographically as bone loss. The

bone loss that is decrease in height of alveolar bone, is one of the characteristic feature of periodontal disease. During the supportive periodontal therapy, the periodontal support is calculated by the total amount of bone loss divided by patient age. If this periodontal support is 0.5 or less than 0.5, then it is said that a patient is having sufficient amount of periodontal support. But if this periodontal support is upto 1 or greater than 1, it is said that a patient is having poor periodontal support, and these patients carries highest risk of the recurrence of the disease.

- E. Systemic and genetic conditions: According to the American Academy of Periodontology (1999) and 2017 World Workshop in Periodontology, it is clearly mentioned that many systemic diseases can lead to periodontitis. Among this systemic diseases, Diabetes is the major disease affecting the population worldwide and periodontitis is regarded as sixth complication of diabetes, due to the fact that elevation of blood glucose levels in diabetes, leads to the alteration in microbial flora of the oral cavity of the host, leading to periodontitis. Hence it is clear from the fact that systemic conditions do lead to the development of periodontitis. Apart from microbial flora leading to periodontitis, a new concept of host response shows that host response can modify the progression of periodontal disease which is proven from a study that in patients who don't maintain their proper oral hygiene, still does not develop gingivitis or periodontitis and some patients who maintain their proper oral hygiene still develops gingivitis or periodontitis. This is because of the host response, which further modify the progression of the disease. In a study it is found that IL-1 genotype present in some individuals are at a higher risk of disease progression, as compared to those, who do not possess, this genotype.
- F. Environmental factors (smoking): Smoking has an additive effect on the progression of periodontal disease, on treatment, and on the prognosis of the treatment. Preber & Bergstrom (1985,1990), showed that smoking will affect treatment outcome after scaling and root planning, modified widman flap surgery, and regenerative periodontal surgery.^[15] Bauhmert (1994), showed that smoking had less favorable healing response during both at reevaluation and following supportive periodontal therapy of six years. Smoking is a sixth risk factor for periodontal disease recurrence.^[16] Non smokers and former smokers have a lower risk for disease recurrence as compared to heavy smokers, which possess a greater risk for recurrence of the disease.

Calculating the patient individual risk assessment

Based upon the individual patient risk, a diagram is consulted, in which these six vectors are made and the calculation is done by:

1. A low periodontal risk patient has all the parameters within the low risk category, or at least one parameter in the moderate risk category.
2. A moderate periodontal risk patient has two parameters within moderate risk category, or atleast one parameter in the high risk category.
3. A high periodontal risk patient has two parameters in the high risk category.
2. Tooth risk assessment: It includes the following factors:
 - a. Tooth position within the dental arch
 - b. Furcation
 - c. Mobility
 - d. Residual Periodontal support.
 - e. Iatrogenic factors.
- A. Tooth position within the dental arch: According to the clinical studies by Ditto and Hall (1954), malocclusion results in severity of periodontitis.^[17] However studies carried out by James and Geiger (1962), suggested that there is no relationship between malocclusion, plaque accumulation, and severity of periodontal disease.^[18] Though it is clearly mentioned from the literature, that crowding, may lead to the development of gingivitis, but it is still yet to be cleared, that crowding or any kind of malocclusion leads to the attachment loss too.
- B. Furcation: In a studies by Hirschfield and Wasserman (1978) Mcfall (1982), confirmed that, Multirrooted teeth with furcation involvement, have a greater risk for tooth loss during supportive periodontal therapy.^[19] Study done on flat molar sites, and furcation involved molar sites by Nordland (1987), in terms of bleeding on probing, probing pocket depth, clinical attachment level, showed that treatment outcomes were poor in case of furcation involved molars.^[20] However, it has to be realized that not all furcation involved teeth, undergoes extraction at the time of supportive periodontal therapy as a properly carried out supportive periodontal therapy is much more important to aid in maintaining furcation treated area over longer period of time.
- C. Mobility: In a study by Pearson et al (1981), It was concluded that tooth mobility varies during non surgical, and surgical phase of therapy. As during the non surgical phase of periodontal therapy, tooth mobility is decreased. Then following the surgical periodontal therapy healing phase, there is a increase in tooth mobility due to increase in the bone resorption, followed by decrease in mobility due to increase in the bone formation.^[21] Hence during supportive periodontal therapy, the time period for the evaluation of tooth mobility is important as the mobility response is different during each phase of periodontal therapy.

- D. Residual periodontal support: Formerly it was believed that the teeth with the reduced periodontal support, should be extracted or splinted. But according to the study by Nyman and Lindhe (1979), Bragger (1990), teeth with a reduced but a healthy periodontal support, can function on long term basis, provided that reduced periodontal support is not affected by the traumatic forces.^[22]
 - E. Iatrogenic factors: Many other procedures apart from periodontal disease, have an influence on the periodontium, and can lead to gingivitis and periodontitis. These procedures include overhanging restorations, ill fitting dentures. Supragingival, equigingival, and subgingival margins are present over which the restoration or a denture is prepared. Placement of denture or marginal restorations at the supragingival and equigingival levels are acceptable, but placement of denture or marginal restorations, at the subgingival level is injurious to periodontium, as this placement can lead to the accumulation of plaque and alteration of microbial flora which in turn can lead to gingivitis or periodontitis. Hence during supportive periodontal therapy, it is a necessity to reevaluate these factors too for the long term survival of the dentition.
3. Site risk assessment: It includes the following points:
- a. Bleeding on Probing
 - b. Probing depth and loss of attachment.
 - c. Suppuration.
- A. Bleeding on probing: First and the foremost indicator of the initiation of gingivitis or the active condition of progression of periodontitis. More of an objective sign rather than a subjective sign. Bleeding on probing is detected by a probe. But this probe force is a matter of concern. A probing force greater than 25gm indicates that bleeding on probing is mainly due to tissue trauma, rather than tissue inflammation. This clinical parameter, is the most reliable indicator, for the evaluation of the periodontium stability. Its absence indicate that the periodontium is in a healthy condition. However its presence indicates that there is progression of the disease particularly, if the same site shows bleeding on probing, following repetitive evaluation.
- B. Probing depth and loss of attachment: Measuring the probing depth is the most diagnostic indicator for the evaluation of periodontal disease. However this probing depth can vary in relation to the probing force, probing angulation, difficulty in obtaining a reference point. Probing depth should be measured thrice that is at baseline (following non surgical therapy), post healing phase, and at supportive periodontal therapy phase. Following the standard reevaluation during maintainance phase or the supportive periodontal therapy phase, if there is a

recurrence of pocket depth, then it indicates the progression of the disease.

- C. Suppuration: One of the feature of the periodontitis is the suppuration. It is detected clinically during probing or by means of ball burnisher. Presence of suppuration during the supportive periodontal therapy, indicates that the disease is in its active state and needs further measures to control the progression and recurrence of the disease.

Clinical implementation of risk assessment level

The clinical significance of this level of risk assessment is based upon the fact, that certain clinical parameters have to be reevaluated before doing treatment during supportive periodontal therapy. The information obtained during clinical reevaluation indicates, that either the disease are further progressing or recurring, or the further progression of the disease is controlled. Assessment at patient, tooth, and site level indicate the frequency of recall maintainance, and if disease is found to be further progressing, then measures to be taken to control the progression of the disease. Hence all these are the clinical significance for a risk assessment level.^[15]

Protocol of supportive periodontal therapy.

It consist of four phases, which include the following:

1. Examination, revaluation, and diagnosis.
2. Motivation, reinstruction, and instrumentation.
3. Treatment of the reinfected sites.
4. Polishing of the entire dentition, application of fluoride, determination of future Supportive periodontal therapy.
 - a. Examination, revaluation, and diagnosis: Forms the first and the utmost important part of the supportive periodontal therapy. It includes the examination of extraoral structures (temporomandibular joint, facial symmetry, lymph nodes) and intraoral structures which include (plaque, calculus, restorations, bleeding on probing, probing pocket depth), thorough revaluation of medical history, bitwing, and periapical radiographs.
 - B. Motivation, Reinstruction, and instrumentation: Following examination, revaluation, and diagnosis, patient should be informed about their present situation, and should be motivated in a positive manner how to maintain the condition in a good state. By examination of the patient, the clinician came to know, that is the patient following all the instructions well, and by the clinical judgement, the patient is reinstructed to follow all the essential instructions, necessary to maintain the oral health and general health in a good state. In a study by Lindhe et al(1982,)only those sites, that upon examination have persistent bleding on probing, inflammation, pocket depth, should be reinstrumented, while those sites that are in a healthy condition should not be reinstrumented,

otherwise because of mechanical trauma to the tissues, there will be the loss of attachment.²³

- C. Treatment of the reinfected sites: The most common cause for the reinfection is the inadequate treatment, improper oral hygiene care by the patient. The reinfection develops in those sites which are inaccessible for treatment such as furcations. During, supportive periodontal therapy, treatment of the reinfected site, requires the thorough instrumentation under Local anaesthesia, surgical therapy so as to gain access to the underlying inaccessible areas for thorough debridement.
- D. Polishing of the entire dentition, application of fluoride, determination of future supportive periodontal therapy: The supportive periodontal therapy is concluded, by polishing the entire dentition so as to achieve a plaque free smooth surfaces. Application of fluoride or chlorhexidine varnish to treat hypersensitivity for recession.

Merin classification for recall intervals for various classes of recall patients^[16]

| Merin classification | Characteristics | Recall interval |
|----------------------|--|----------------------------------|
| First year | Routine therapy & uneventful healing. Or First year patient-difficult case with complicated prosthesis, furcation involvement, poor crown to root ratio, or questionable patient cooperation | 3 months Or 1 to 2 months. |
| Class a | Excellent results well maintained for 1 year or more. Patient displays good oral hygiene, minimal calculus, no occlusal problems, no complicated prosthesis, no remaining pockets, and no teeth with less than 50 percent of alveolar bone remaining | 6 months to 1 year. |
| Class b | Generally good results maintained reasonably for one year or more, but patient displays some of the following factors like inconsistent or poor oral hygiene Heavy calculus formation, systemic diseases leading to periodontal breakdown, some remaining pockets, ongoing orthodontic therapy, positive genetic test. | 3 to 4 months |
| Class c | Generally poor results following periodontal therapy and/or several negative factors such as heavy calculus, poor oral hygiene, remaining pockets, occlusal problems, periodontal surgery indicated, but not performed for medical, psychologic, or financial reasons. | 1 to 3 months |

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|--|---|--|
| | teeth with less than 50 percent of alveolar bone remaining. | |
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Supportive periodontal therapy complications

1. Caries: Patients during periodontal therapy have most of the altered cementum removed during scaling & root planning and further there is a reduction in dentin thickness during supportive periodontal therapy. Since both cementum and dentin are responsible for the prevention of dental caries, the removal of cementum and dentin during periodontal therapy and further during supportive periodontal therapy, results in the causation of caries. Hence it is advisable that patients who are on supportive periodontal therapy, should be also instructed regarding the use of fluoride mouthrinses, in order to prevent the occurrence of caries.
2. Periodontal abscess: Patients who received non surgical periodontal therapy, during the initial cause related phase of therapy, are at the greater risk for the recurrence of periodontal abscess.
3. Root sensitivity: During Periodontal, and supportive periodontal therapy, and particularly during healing phase, there is a reduction in dentin thickness, and, recession due to soft tissue shrinkage. These two things results in sensitivity.

Conclusion

It is a well known fact that irrespective of any treatment modality performed, until and unless if the supportive periodontal therapy is not enforced, the treatment can be a failure both for the clinician as well as for the patient. Supportive periodontal therapy deals with all those measures to be taken, which will result in the healthy periodontium, prevents the recurrence of the disease, and hence the healthy functioning of the entire dentition. Supportive periodontal therapy involves, reevaluation, diagnosis, retreatment, patient reinforcement, so as to prevent the recurrence of the disease. Through supportive periodontal therapy, the clinician gets aware of the patients behavior, regarding the management of his or her oral hygiene. Hence supportive periodontal therapy forms an essential part of periodontal therapy, as it helps in recognizing individual patients need in maintaining his or her proper oral health.

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Conflict of Interest

None.

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