DOI: https://doi.org/ 10.32828/mdj.v18i2.958

MDJ

Supportive Periodontal Treatment for the natural dentition and dental implants: a review

Ali Taher Ali , B.D.S*

Banaz Jabbar Ali , B.D.S, M.Sc**

*Graduated Dentist, college of dentistry, University of Mustansiriyah. Baghdad-Iraq. E-mail: alitaher112244@gmail.com .

** Lecturer, Department of Periodontics , College of Dentistry, University of Mustansiriyah, Baghdad-Iraq. B.D.S M.Sc. Periodontology, E-mail: banaz.j.ali@uomostansiriyah.edu.iq Baghdad-Iraq. Phone : 009647702570953.(https://orcid.org/0000-0003-0865-6066)

Abstract

Aim: To assess the importance of successful periodontal treatment during long-term supportive periodontal treatment.

The maintenance phase has been named the "cornerstone" of effective periodontal treatment when a patient is transferred from active treatment to a maintenance phase which is considered the final stage in comprehensive patient care, it takes effort and time from the patient, staff, and the dentist.

Surgical and non-surgical techniques are used in periodontal therapy; patients should be put on a schedule of periodic reminder visits for supportive care once periodontal therapy is completed to avoid therecurrence of the disease. PD can recur due to poor mouth oral hygiene, insufficient subgingival removal, the microscopic nature of the dentogingival unit healing after periodontal treatment, and other factors. As a result, effective treatment should be provided to prevent disease recurrence.

Conclusion: The success of periodontal therapy is based on a continuous schedule of periodontal maintenance therapy

keywords: Maintenance Program, Maintenance Phase, periodontal maintenance therapy

Introduction

The symptoms of a microbial infectious illness around the impacted teeth that cause the inflammation of the gingival, formation of the periodontal pocket, and loss of connective tissue attachment and alveolar bone is called periodontal disease (PD).[1]

Periodontal therapy aims to safeguard and preserve the natural dentition of the patient for optimum comfort, function, and aesthetic appearance.[2]

Surgical and non-surgical techniques are used in periodontal therapy; patients should be put on a schedule of periodic reminder visits for supportive care once periodontal therapy is completed to avoid therecurrence of the disease. PD can recur due to poor mouth oral hygiene, insufficient subgingival removal after periodontal treatment, the microscopic nature of the dentogingival unit healing, and other factors. As a result, effective treatment should be provided to prevent disease recurrence.[1]

A positive approach to maintaining and improving treatment results and preventing the development of new diseases is required for successful PD therapy. As a result, a dentist performs supporting periodontal treatment, while a dental hygienist can conduct some components of supportive periodontal treatment (SPT) under the dentist's supervision. [3,4] active periodontal therapy (APT) is the first step in treating periodontitis and is planned to reserve patients' natural dentition and support oral health. [5]to reduce the possibility of reinfection and further development of periodontitis and ensure long-term stability of the periodontium after APT patients are entered into (SPT) programmed the supragingival plaque control considered a vital focus area during SPT as this has proven to maintain the obtained stable periodontal condition. [7,8]

Maintenance Phase

(SPT) ،also known as maintenance therapy or supportive periodontal care) follows the same principles employed in the treatment of active disease. It begins as the patients are considered periodontally stable, which is determined six to eight weeks after completion of active treatment[9]

The importance in assessing periodontal stability and a prognosis for the teeth that are affected are the evaluation of the initial diagnosis and the response to periodontal treatment, and the risk factors (local, systemic and behavioral) for the recurrence of PD [10]

The main objective after periodontal therapy is to preserve the health of the periodontium by stopping recurrence, referred to as the "Maintenance Phase of Periodontal Therapy". "Periodic examination is important for the continuing health of the supporting structures of the teeth once a condition of oral health has been achieved". [11] maintenance visits (generally 1 hour) "The first 10-15 minutes – For clinical evaluation of the periodontal and caries conditions. The second 30-40 minutes – is used to clean and polish all supragingival tooth surfaces, following the instrumentation of the subgingival sites that have been inflamed.

Last 5-15minutes - used to provide adjunctive preventive measures such as topical application of fluoride or chemical plaque control agents. In addition to evaluating the periodontal and caries conditions, the vitality of abutment teeth for fixed bridgework should be checked". [12]

An etiology of the Recurrence of Periodontal Disease

The main etiologic factor of the initiation and progression of periodontitis is Colonization by a pathogenic biofilm [13]. Eventhough the contributing factor that may significantly result in the inflammatory process is host and environmental factors [14,] it has been able to control disease initiation and progression by professional supra-and subgingival biofilm control[15].

Mechanical means, such as hand instruments and/or ultrasonic debridement, are considered the effective control and management of the supra- and subgingival biofilm [16]

Supplementary، the air-polishing devices method with low-abrasive dental hard tissues and various inserts and powders is effective in removing biofilms[17,18] The important part of successful periodontal treatment, especially on deep pockets، is the non-surgical scaling and root planning (SRP)[19]

Frequency and Efficacy

It is difficult to establish general rules for the frequency of maintenance. Still, as we will see when analysing the different risk situations, we will have to assess aspects of the patient, the tooth, and the location. The main aspects being considered are the oral hygiene maintained by the patient, the prevalence of bleeding site on probing, and the levels of clinical insertion and the alveolar bone before performing the treatment. In most longitudinal studies, when patients were regularly maintained at 3-6 months intervals, positive long-term results of periodontal therapy were found when starting with maintenance intervals at the end of the treatment every 3-4 months and adjust them according to the individual risk factor of eachpatient[20,21,22,23]

During the first six months after active therapy, there is a remodelling of the periodontal tissues, which are subject to changes. During this phase of tissue healing, it is recommended that a correct professional cleaning protocol be established24

The frequency should be less than six months for patients with a history of periodontitis, according to multiple clinical research. Intervals of two weeks, 2-3 months, 3-4 months, 3-6months and 4-6 months have been proposed and studied. According to these findings, most individuals with a history of periodontitis should be visited at least four times a year, as this interval reduces the risk of disease progression compared to patients seen less frequently.[25] .

Risk Assessment

The patient's risk of recurrent periodontitis can be assessed based on various clinical variables, with no single criterion playing a more critical role. The full range of risk variables and risk indicators should be assessed simultaneously. A functional diagram has been created for this purpose, which includes the following features (The percentage of bleeding that occurs while probing, there are more than 4 mm residual pockets present (3-5mm), A total of 28 teeth had been lost, The patient's age-related loss of periodontal support, Genetic and systemic diseases, Factors in the environment, such as cigarette smoking.[26,27]

Each character has a scale for minor, moderate, and high-risk profiles. The frequency and complexity of SPT visits will be determined by a full review of the functional diagram, which will offer a customized total risk profile.[26,27] As seen in Fig.1, Each factor represents a single risk factor or indicator, with a low-risk area, a moderate-risk area, and a high-risk area for disease progression. Because all elements must be considered together, the area of comparatively low risk is identified within the polygon's Center circle. On the other hand, the area of high risk is situated

outside the periphery of the second ring in bold. The area of intermediate danger is located between the two bold circles. [26,27]

Classification of post-treatment patients

Patients on a periodontal recall program represent various groups. Patients can improve or relapse to a new categorization with a decrease in or worsening PD. The patient's PD is categorized according to which dental arch is more affected when one is more involved than the other. [28]Maintenance patients are categorized into several classes based on their periodontal recall schedule characteristics based on Merin's classification of classes A, B, and C. **[28,]** as seen in Table 1.

Description of the intervention

According to the American Academy of Periodontology (AAP), "SPT should include: • an update of the medical and dental history; • examination of extraoral and intraoral soft tissues; • dental examination and radiographic review • evaluation of the patient's oral hygiene performance • periodontal evaluation and risk assessment; • supragingival and subgingival removal of bacterial plaque and calculus; • re-treatment of disease when indicated "[29,30]

It is important to determine the sites showing inflammation and differentiate between stable versus progressive periodontitis. Determination of stability is challenging without monitoring progression over time. However, measures of the level of dental plaque and Bleeding on probing are routinely used as proxy determinants of stability[31].,

The absence of bleeding on probing (BOP) indicates site stability, while bleeding sites may not necessarily progress [32]. Generally, the supragingival debridement will undergo to the sites showing stability or signs of inflammation without disease progression. This can be performed with a variety of instruments and approaches. Specific features likely to be retentive for plaque and calculus should be removed or minimize the volume of bacterial depositsin ؛ addition, a wide range of adjunctive measures have been proposed to minimize the degree of plaque accumulation and inflammation, including adjunctive antimicrobials and lasers. The presence of Indicators of active disease, which include signs of inflammation BOP and suppuration) along with an increase in attachment loss, Re-treatment is required[31]

After treatment of such sites, the reevaluation is based on the extent and severity of the relapse or persistent disease and the degree of control over site or patient-specific risk factors. Typically, these sites are treated using subgingival debridement under local anaesthesia to remove microbial deposits effectively[33,34]

There is a wide range of intervals between maintenance visit recommendations، from 2 -3 months up to 18 months [35]. Independent of the -well known importance of supragingival prophylaxis and oral hygiene instructions during SPT [36,37]. The usually delivered interventions also attempt to eliminate subgingival bacterial deposits [15,38,39]

Petersilka *et al*. [40] suggested that repeated instrumentation and mechanical elimination of subgingival plaque is essential, with subgingival debridement of pockets ≥ 4 mm to avoid rebound to pretreatment levels of periodontal pathogens in subgingival plaque.

Gomes *et al*. (2007), Found significant reductions in probing pocket depth (PPD) and BOP and clinical attachment gain even with PPD ≥ 6 mm as a result of supragingival prophylaxis alone، followed by oral hygiene checkups weekly during the whole six months[41]

Other researchers found a similar effect with pockets site ≥ 6 mm for 2 -4 years, showing this result with only supervised self-performed supragingival plaque control [42,43]

Supportive Care of Dental Implants

Because dental implants are put in a microbe-infested oral environment, they risk developing peri-implant disorders.

Patients who have had successful implant therapy should get tailored, systematic, and ongoing peri-implant tissue supportive care. Patients who are at a higher risk for peri-implantitis, such as those who are edentulous partially or have chronic periodontitis, should be diagnosed and regularly followed. [10]

The patient should be re-evaluated regularly during the first year after an implant is restored (every 3 to 4 months). After the first year, the peri-implant tissues' reaction should be evaluated, and the optimum frequency of periodontal care should be chosen.[44]

Helpful to preserve the permanent health of soft and hard peri-implant, exclusive measurements of oral hygiene and treatment of implants are considered [44]

Peri-implantitis has been defined as an inflammatory status by pathological conditions of soft and hard tissue around the implant, producing the bone progressively lost around the implant[45]. In several studies، a significant risk factor for peri-implant diseases is poor plaque control[46,47,48,] while otherstudies do not see this correlation[49]. Particular supportive implant therapy (SIT) programs were needed to attain permanent peri-implant tissue health to monitor and improve plaque control [50]

Every maintenance appointment includes plaque monitoring and documentation, allowing for a long-term review of oral hygiene. Plaque accumulates more readily on rough-surfaced implants than smooth ones, increasing the risk of peri-implantitis. Surface roughness has also been demonstrated to influence bacterial adherence in vitro, with rough surfaces resulting in a more considerable subgingival bacterial burden. [51]

In spite of limited evidence that gingival stability is essential for implant longevity, any apical gingival edge movement should be noted and monitored.[52]

When probing around oral implants, Gerber and colleagues found that 0.15 N of pressure could be the threshold (i.e., minimal pressure) for avoiding false-positive bleeding readings.[53]

Manual or automated methods, such as the Periotest dental measuring device (or the Ostell instrument, should be used to examine mobility**.** [54,55] always the cause of any mobility should be determined, specifically if it is related to the failure of the prosthesis or osseointegration failure. If the implant becomes moveable, it is considered a failure and should be removed.[51,56,57]

If clinical indications point to peri-implantitis, a radiograph of the area should be taken to confirm the diagnosis. To achieve proper radiograph reading, it's crucial to establish baseline bone levels after implant placement and prosthesis insertion (should they be required in the future). [58]

The program should include the following:

Patient studies have established the need for the appropriate treatment method, leading to the "cumulative interceptive supportive therapy (CIST)" concept. Mombelli and Lang[11] proposed a guideline for treating peri-implant disease that affected the implants, which is (CIST)" ((Fig 2)

In (CIST), the treatment is classified A to D according to the degree of progression of peri-implant disease. The classification is based on the depth of peri-implant pockets with or without (BOP) and the extent of bone resorption, and treatment is specified for each class [59]. As seen fig2.

Lang *et al*. improved it in 2004 and named it AKUT-concept[56.] The basis of this perception is a systematic recall of the implanted patient, and recurrent evaluation of plaque, suppuration, bleeding, pockets, and radiographic signs of bone loss is the foundation of this idea.[56], as seen in table 2.

Discussion

The therapeutic goals of periodontal maintenance therapy (PMT) are to reduce the recurrence of PD and the rate of tooth loss (TL) by monitoring the dentition and replacing prosthetics when necessary and to raise the likelihood of detecting and treating other diseases or conditions found in the oral cavity regularly.[29]

Individuals who receive PMT regularly tend to keep their teeth for longer and have better periodontal health than those who do not.[60] According to recent studies, failure to maintain periodontal treatment is connected with higher periodontitis and tooth loss (TL) development rate.[61,62] PMT is essential for adequately managing PD and keeping a functional dentition throughout one's life.[63]

SPT is an important requirement for the success of periodontal therapy, as shown in several fundamental studies and a current systematic review of [64,65] patients were assessed over a period of more than five years who refused maintenance after having been treated for periodontal disease. In these patients، there was an increase in probing depth and also an increase in the ratios of spreading of the pockets in the different categories, a dental loss of 6%and significant bone loss, the tooth that was lost the most in the second maxillary molar and the one with less the mandibular canine. And they observed that affected furcation's teeth get worse more frequently [66]

One of the important articles of Axelsson and Lindhe." They evaluated a group of 72 patients who were treated surgically over a period of 6 years. Two-thirds of the patients strictly complied with periodontal maintenance every two months for the first two years and every three months for the subsequent four years, while the other third was referred to the general dentist. They observed that after the surgical phase, there were no differences between the two groups for any of the clinical variables analyzed. However, at six years of age, the non-maintenance group practically returned to the initial values (before the surgeries), even observing additional insertion losses of 2-5 mm in 55% of the locations. In the strict maintenance group, it was observed that the positive results obtained after the surgeries were maintained over time and even improved as the years passed"[١٩]

The success rate of SPT might be related to the long-term patients' commitment to the SPT. The significant drop-out of commitment patients to SPT generally decreases within the first five years of SPT[67]. Patients who maintain long-term therapy are often more committed and are better aware of remaining healthy[68]. [69,70,67,68,71]this research showed increased recall frequency when there is a more prolonged duration of SPT, and then this depends on the stability of the periodontium and the individual needs the patients who commit to long-term SPT can be preserved a worse periodontal condition related to the patients who dropped out

Conclusion

The success of periodontal therapy is based on a continuous schedule. (PMT) To detect and intercept any new or recurring disease, periodontal parameters must be monitored regularly. All patients undergo a similar but individual treatment according to their periodontal condition and the patient risk factors.

To better understand the social and emotional elements of oral health, it is crucial to study and comprehend the influence of oral health on quality of life. However, it is also critical for these experts to be more attentive and aware of the requirements of the people by individualizing therapy based on equitable principles to improve life quality.

Suggestion

1- We need more comprehensive awareness to educate periodontal patients about the importance of supportive periodontal treatment.

2- Further studies will require more extended observation periods to assess the effect of supportive periodontal treatment in the presence of risk factors.

Acknowledgements

The authors would like to thank Mustansiriyah University (www.uomustansiriyah.edu.iq), Baghdad, Iraq, for its support in the present work**.**

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

1. Newman, Takei, Klokkevold, Carranza. 11 ed.Carranza's Clinical Periodontolog,.2012
2. Niklaus P Lang, And Jan Lindhe.6TH ed. Clinical Periodontology and Implant Dentistry.
3. Wilson TG Supportive periodontal treatment introduction–definition, extent need, therapeutic objectives, frequency and efficacy. Periodontology 2000. 1996 Oct 1, 12(1):11-5.
4. Cohen Re. Research, Science and Therapy Committee, American Academy of Periodontology. Position Paper. Periodontal maintenance. J Periodontol.2003; 74(9):1395-401
5. Chapple ILC, Van der Weijden F, Doerfer C, et al. Primary prevention of periodontitis: managing gingivitis. J Clin Periodontol. 2015;42(S16):S71-S76. https://doi.org/10.1111/jcpe.12366
6. Manresa C, Ec S, Twigg J, Bravo M. Supportive Periodontal Therapy in adults treated for periodontitis (Review). Published online. 2018. https://doi.org/10.1002/14651858
7. Angst PDM, Finger Stadler A, Mendez M, Oppermann RV, van der Velden U, Gomes SC. Supportive periodontal therapy in moderate-to-severe periodontitis patients: a two-year randomized clinical trial. J Clin Periodontol. 2019;46(11):1083-1093. https://doi. org/10.1111/jcpe.13178
8. Lundgren D, Asklöw B, Thorstensson H, Härefeldt AM. Success rates in periodontal treatment as related to the choice of evaluation criteria. J Clin Periodontol. 2008;28(1):23-30. https://doi. org/10.1111/j.1600-051X.2001.280104.x
9. Morrison EC, Ramfjord SP, Hill R. Short-term effects of initial, nonsurgical periodontal treatment (hygienic phase). J Clin Periodontol. 1980;7(3):199–211.
10. Armitage GC, Xenoudi P. Post-treatment supportive care for the natural dentition and dental implants. Periodontology 2000. 2016;71:164–84
11. Shick R. Maintenance phase of periodontal therapy. J Periodontol.1981 52(9):576-83
12. Lang NP, Suvan JE, Tonetti MS. Risk factor assessment tools for the prevention of periodontitis progression. A systematic review. J Clin Periodontol 2015;42.
13. . Teles RP, Haffajee AD, Socransky SS. Microbiological goals of periodontal therapy. Periodontol 2000. 2006; 42:180–218.
14. Page RC, Kornman KS. The pathogenesis of human periodontitis: an introduction. Periodontol 2000. 1997; 14:9–11.
15. Axelsson P, Nystrom B, Lindhe J. The long-term effect of a plaque control program on tooth

mortality, caries and periodontal disease in adults. Results after 30 years of maintenance. J Clin Periodontol. 2004;31:749–57
16. Greenstein G. Nonsurgical periodontal therapy in 2000: a literature review. J Am Dent Assoc. 2000; 131:1580–92.
17. Wennstrom JL, Dahlen G, Ramberg P. Subgingival debridement of periodontal pockets by air polishing compared with ultrasonic instrumentation during maintenance therapy. J Clin Periodontol. 2011; 38:820–7.
18. Hagi TT, Klemensberger S, Bereiter R, Nietzsche S, Cosgarea R, Flury S, et al. A biofilm pocket model to evaluate different Non-surgical periodontal treatment modalities in terms of biofilm removal and reformation, surface alterations and attachment of periodontal ligament fibroblasts. PLoS One. 2015;10: e0131056.
19. Badersten A, Nilveus R, Egelberg J. Effect of nonsurgical periodontal therapy. II. Severely advanced periodontitis. J Clin Periodontol. 1984;11:63–76
20. Axelsson P, Lindhe J. The significance of maintenance care in the treatment of periodontal disease. J Clin Periodontol .1981 Aug; 8 (4): 281-94.
21. Lindhe J, Nyman S. The effect of plaque control and surgical pocket elimination on the establishment and maintenance of periodontal health. A longitudinal study of periodontal therapy in cases of advanced disease. J Clin Periodontol .1975 Apr; 2 (2): 67-79.
22. Rosling B, Nyman S, Lindhe J, Jern B. The healing potential of the periodontal tissues following different techniques of periodontal surgery in plaque-free dentitions. A 2-year clinical study. J Clin Periodontol.1976 Nov; 3 (4): 233-50.
23. Lindhe J, Westfelt E, Nyman S, Socransky SS, Haffajee AD. Long-term effect of surgical / non-surgical treatment of periodontal disease. J Clin Periodontol.1984 Aug; 11 (7): 448-58
24. Wesfelt E, Nyman S, Socransky SS, Lindhe J. Significance of frequency of professional tooth cleaning for healing following periodontal surgery. J Clin Periodontol. 1983; 10: 148-56.
25. Hill RW, Ramfjord SP, Morrison EC et al .Four types of periodontal treatment compared over two years. J Periodontol.1981;52:655–77
26. Lang NP, Tonetti MS .Periodontal risk assessment for patients in supportive periodontal therapy. Oral Health prev Dent.2003;1:7-16
27. Greenstein G. Therapeutic efficacy of cold therapy after intra oral surgical procedures: a literature review. J Periodontol .2007;78:790-800
28. Merin RL. 9TH ed. Supportive periodontal treatment. In: Newman MG, Takei HH, Carranza FA (Eds) Carranza "s Clinical Periodontology, Philadelphia, PA, USA: WB Saunders.2003; 966-77.
29. AAP.American Academy of Periodontology. Parameter on chronic periodontitis with slight to moderate loss of periodontal support. Parameters of care supplement. J Periodontol. 2000.2000;71(Suppl. 5):853–5
30. American Academy of Periodontology. Position Paper Periodontal Maintenance. J Periodontol.2003; 74(9):1395–401.
31. Claffey N, Nylund K, Kiger R, Garrett S, Egelberg J. Diagnostic predictability of scores of plaque,

bleeding, suppuration and probing depth for probing attachment loss. J Clin Periodontol .1990;17(2):108–14.
32. Lang NP, Adler R, Joss A, Nyman S. Absence of bleeding on probing an indicator of periodontal stability. J Clin Periodontol.1990;17(10):714–21.
33. Ramfjord SP. Maintenance care for treated periodontitis patients. J Clin Periodontol. 1987; 14:433–7.
34. Grady, M. D., & Drisko, J. Thorough clinical assessment: The hidden foundation of evidence-based practice. Families in Society.2014; 95(1), 5–14
35. Farooqi, O. A., Wehler, C. J., Gibson, G., Jurasic, M. M., & Jones, J. A. (2015). Appropriate Recall Interval for Periodontal Maintenance: A Systematic Review. The Journal of Evidence -Based Dental Practice.2015; 15(4), 171 –181. https://doi.org/10.1016/j.jebdp.2015.10.001
36. Needleman, I., Nibali, L., & Di Iorio, A. Professional mechanical plaque removal for prevention of periodontal diseases in adults - systematic review update. J Clin Periodontol.2015;42, S12 –S35. https://doi.org/10.1111/jcpe.12341
37. - Worthington, H. V, Clarkson, J. E., Bryan, G., & Beirne, P. V. Routine scale and polish for periodontal health in adults. In H. V Worthington (Ed.), Cochrane Database of Systematic Reviews.2013. (p. CD004625). http://doi.org/10.1002/14651858.CD004625.pub4
38. American Academy of Periodontology.Parameter on Periodontal Maintenance. J Periodontol.2000;71, 849 –850. http://doi.org/10.1902/jop.2000.71.5 -S.849
39. Trombelli, L., Franceschetti, G., & Farina, R. Effect of professional mechanical plaque removal performed on a long - term, routine basis in the secondary prevention of periodontitis: a systematic review. J Clin Periodontol.2015; 42, S221 –S236. http://doi.org/10.1111/jcpe.12339
40. petersilka, G. J., Ehmke, B., & Flemmig, T. F. Antimicrobial effects of mechanical debridement. Periodontology 2000 .2002;28, 56 –71. http://doi.org/10.1034/j.1600 - 0757.2002.280103.x
41. Gomes, Sabrina Carvalho, Piccinin, F. B., Susin, C., Oppermann, R. V., & Marcantonio, R. A. C. Effect of Supragingival Plaque Control in Smokers and Never -Smokers: 6 - Month Evaluation of Patients With Periodontitis. J Periodontol.2007;78(8), 1515 –1521. https://doi.org/10.1902/jop.2007.060462
42. Dahlén, G., Lindhe, J., Sato, K., Hanamura, H., & Okamoto, H. (1992). The effect of supragingival plaque control on the subgingival microbiota in subjects with periodontal disease. J Clin Periodontol.1992;19, 802 –809. http://doi.org/10.1111/j.1600 - 051X.1992.tb02174.x
43. Sato, K., Yoneyama, T., Okamoto, H., Dahlén, G., & Lindhe, J. The effect of subgingival debridement on periodontal disease parameters and the subgingival microbiota. J Clin Periodontol.1993; 20, 359 –365. http://doi.org/10.1111/j.1600 - 051X.1993.tb00373.x
44. Tonetti M.S., Eickholz P., Loos B.G., Papapanou P., van der Velden U., Armitage G.,

Bouchard P., Deinzer R., Dietrich T., Hughes F., et al. Principles in prevention of periodontal diseases. *J. Clin. Periodontol.* 2015;42:S5–S11. doi: 10.1111/jcpe.12368. [PubMed] [CrossRef] [Google Scholar]
45. -Schwarz F., Derks J., Monje A., Wang H.-L. Peri-implantitis. *J. Clin. Periodontol.* 2018;45: S246–S266. doi: 10.1111/jcpe.12954. [PubMed] [CrossRef] [Google Scholar]
46. Konstantinidis I.K., Kotsakis G.A., Gerdes S., Walter M.H. Cross-sectional study on the prevalence and risk indicators of peri-implant diseases. *Eur. J. Oral Implantol.* 2015; 8:75–88. [PubMed] [Google Scholar]
47. . Salvi G., Lang N. Diagnostic parameters for monitoring peri-implant conditions. *Int. J. Oral Maxillofac. Implants.* 2004; 19:116–127. [PubMed] [Google Scholar]
48. . Zangrando M.S., Damante C.A., Sant'Ana A.C., Rubo de Rezende M.L., Greghi S.L., Chambrone L. Long-term evaluation of periodontal parameters and implant outcomes in periodontally compromised patients: A systematic review. *J. Periodontol.* 2015; 86:201–221. doi: 10.1902/jop.2014.140390. [PubMed] [CrossRef] [Google Scholar]
49. Menini M., Setti P., Pera P., Pera F., Pesce P. Peri-implant Tissue Health and Bone Resorption in Patients with Immediately Loaded, Implant-Supported, Full-Arch Prostheses. *Int. J. Prosthodont.* 2018; 31:327–333. doi: 10.11607/ijp.5567. [PubMed] [CrossRef] [Google Scholar]
50. . Atieh M.A., Alsabeeha N.H.M., Faggion C.M., Duncan W.J. The frequency of peri-implant diseases: A systematic review and meta-analysis. *J. Periodontol.* 2013; 84:1586–1598. doi: 10.1902/jop.2012.120592. [PubMed] [CrossRef] [Google Scholar]
51. Humphrey S .Implant maintenance. Dent Clin North Am.2006;50(3):463-78.
52. -Martin W, Lewis E, Nicol A .Local Risk Factors for implant therapy. Int J Oral Maxillofac Implants.2009; 24(Suppl.):28-38
53. Gerber JA, Tan WC, Balmer TE, Salvi GE, Lang NP .Bleeding on probing and pocket probing depth in relation to probing pressure and mucosal health around oral implants. Clin Oral Impl Res.2009;20(1):75-8.
54. Sennerby L, Meredith N. Implant stability measurements using resonance frequency analysis: biological and biomechanical aspects and clinical implications. Periodontology 2000.2008; 47:51-66
55. -Bouri A Jr, Bissada N, Al-Zahrani MS, Fadoul F, Nounen I .Width of keratinized gingiva and the health status of the supporting tissues around dental implants. Int J Oral Maxillofac Implants .2008;23(2):323-6.
56. Lang NP, Berglundh T, Heitz-Mayfield LJ, Pjetursson BE, Salvi GE, Sanz M .Consensus statements and recommended clinical procedures regarding implant survival and complications. Int J Oral Maxillofac Implants.2004; 19(Suppl):150-4.
57. Lindhe J, Meyle J .Group D of European Workshop on Periodontology. Peri-implant diseases: Consensus Report of the Sixth European Workshop on Periodontology. J Clin Periodontol.2008; 35(8 Suppl):282-5
58. Todescan S, Lavigne S, Kelekis-Cholakis A .Guidance for the

maintenance care of dental implants: clinical review. J Can Dent Assoc2012;78:c107

59. Mombelli A, Lang NP. The diagnosis and treatment of periimplantitis. Periodontol 2000 1998;17:63–76

60. Wilson TG Jr, Hale S, Temple R.The results of efforts to improve compliance with supportive periodontal treatment in aprivate practice. J Periodontol.1993; 64(4):311–4.
61. Checchi L, Montevecchi M, Gatto MR, Trombelli L .Retrospective study of tooth loss in 92 treated periodontal patients. J Clin Periodontol .2002;29(7):651–6.
62. Ng MC, Ong MM, Lim LP, Koh CG, Chan YH .Tooth loss in compliant and non-compliant periodontally treated patients: 7 years after active periodontal therapy. J Clin Periodontol.2011; 38(5):499–508.
63. Lorentz TC, Cota LO, Cortelli JR, Vargas AM, Costa FO .Prospective study of complier individuals under periodontal maintenance therapy: analysis of clinical periodontal parameters, risk predictors and the progression of periodontitis. J Clin Periodontol.2009; 36(1):58–67.
64. Chambrone LA, Chambrone L. Tooth loss in well-maintained patients with chronic periodontitis during long-term supportive therapy in Brazil. J Clin Periodontol. 2006;33(10):759–64.
65. Manresa C, Sanz -Miralles EC, Twigg J, Bravo M. Supportive periodontal therapy (SPT) for maintaining the dentition in adults treated for peri - odontitis. Cochrane Database Syst Rev. 2018. https://doi.org/10.1002/ 14651858.CD009376.pub2/full.
66. Becker W, Becker BE, Berg LE. Periodontal treatment without maintenance. A retrospective study in 44 patients. Journal of periodontology 1984 Sep; 55 (9): 505-9.
67. Tan A. Periodontal maintenance. Aust Dent J. 2009;54: S110-S117. https://doi.org/10.1111/j.1834-7819.2009.01149.x
68. -Lee CT, Huang HY, Sun TC, Karimbux N. Impact of patient compliance on tooth loss during supportive periodontal therapy: a systematic review and meta-analysis. J Dent Res. 2015;94(6):777-786. https://doi.org/10.1177/0022034515578910
69. Chapple ILC, Mealey BL, Van Dyke TE, et al. Periodontal health and gingival diseases and conditions on an intact and a reduced periodontium: Consensus report of workgroup 1 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. J Clin Periodontol. 2018;45(Suppl 20):S68- S77. https://doi.org/10.1111/jcpe.12940
70. Matuliene G, Pjetursson BE, Salvi GE, et al. Influence of residual pockets on progression of periodontitis and tooth loss: Results after 11 years of maintenance. J Clin Periodontol. 2008;35(8):685- 695. https://doi.org/10.1111/j.1600-051X.2008.01245.x
71. Salvi GE, Mischler DC, Schmidlin K, et al. Risk factors associated with the longevity of multi-rooted teeth. Long-term outcomes after active and supportive periodontal therapy. J Clin Periodontol. 2014;41(7):701-707. https://doi.org/10.1111/jcpe.12266

Table 1: Merin's classification(Merin RL ;2003)

Merin Classification	Characteristics	Recall interval
First-year	Routine therapy and uneventful healing for the first-year patient.	Three months
	A difficult case with a complex prosthesis, furcation involvement, low crown-to-root ratios, or questionable patient cooperation for a first-year patient.	1-2 months
Class A	Excellent outcomes that have lasted for at least a year. The patient has adequate dental hygiene, minimum calculus, no occlusal issues, no complicated prostheses, no pockets, and no teeth with less than 50% alveolar bone left.	Six months to 1 year
Class B	Good outcomes are generally sustained for a year or more, but the patient exhibits some of the following characteristics: 1. Oral hygiene that is inconsistent or poor 2. Heavy calculus buildup due to inconsistency or poor oral hygiene 3. A systemic condition that increases the risk of periodontal disease. 4. A few pockets that are still available 5. Issues with the occlusion 6. Complicated prosthetic 7. orthodontic therapy 8. Recurrent dental caries 9. Some teeth with less than 50% alveolar bone support 10. Smoking 11. Having a positive family history or passing a genetic test 12. More than 20% of pockets bleed when pockets are probed.	3-4 months
Class C	Poor periodontal therapy results in general and/or several negative factors from the following list: 1. Poor dental hygiene or inconsistency 2. The creation of a heavy calculus 3. A systemic condition that increases the risk of periodontal disease. 4. There are many pockets left. 5. Issues with the occlusion 6. Difficult prosthetic 7. Recurrent dental caries 8. Several teeth with less than 50% alveolar bone support 9.Smoking 10. Familial history of good health or a genetic test 11. On probing, more than 20% of pockets bleed. 12. For medical, psychological, or economic reasons, periodontal surgery is recommended but not undertaken. 13. Diseases that are too advanced to be helped by periodontal surgery	1-3 months

Table 2: AKUT- Protocol by Lang et al., 2004.

Stage	Result	Therapy
	Pocket depth (PD) <3mm, no Plaque or bleeding.	No need for therapy
A	PD<3mm, plaque and/or bleeding on probing.	mechanical Cleaning and polishing instructions for Oral hygienic
B	PD 4-5mm, radiographically no Bone loss.	Mechanical cleaning, polishing, and instruction of oral hygiene, as well as local anti-infective therapy (.e.g:CHX)
C	PD>5mm, radiographically bone loss<2mm.	Mechanical Cleaning, polishing, microbiological testing, and local and systemic anti-infective therapy
D	PD>5mm, radiographically bone loss>2mm.	Respective of regenerative Surgery.

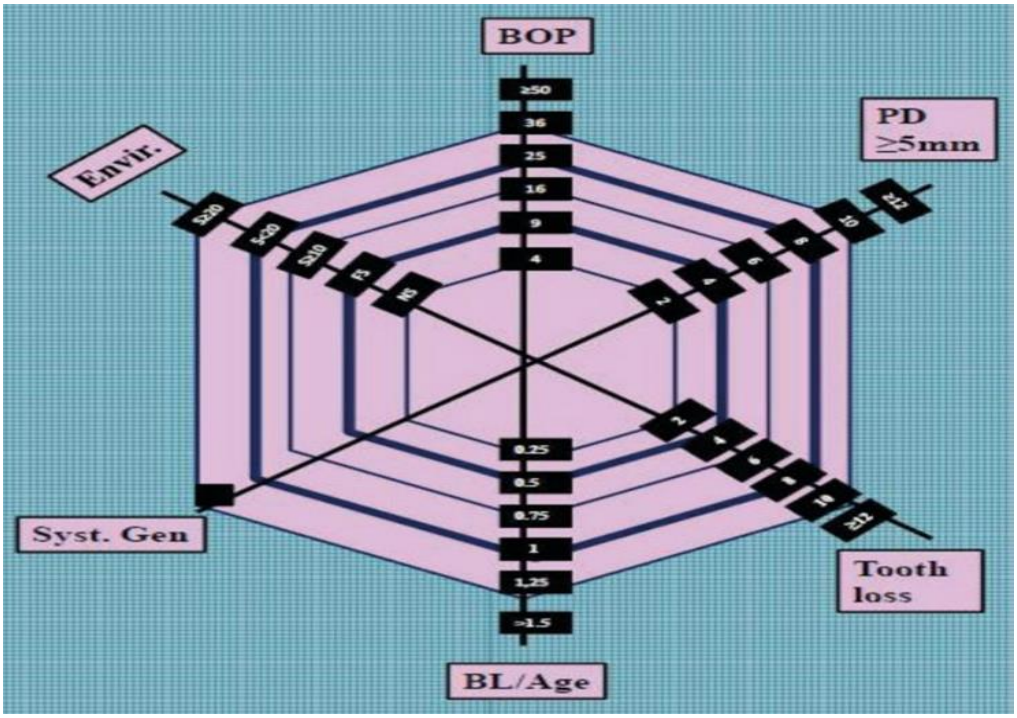

Fig. 1: A functional diagram assesses the patient's risk of periodontitis recurrence[26,27].

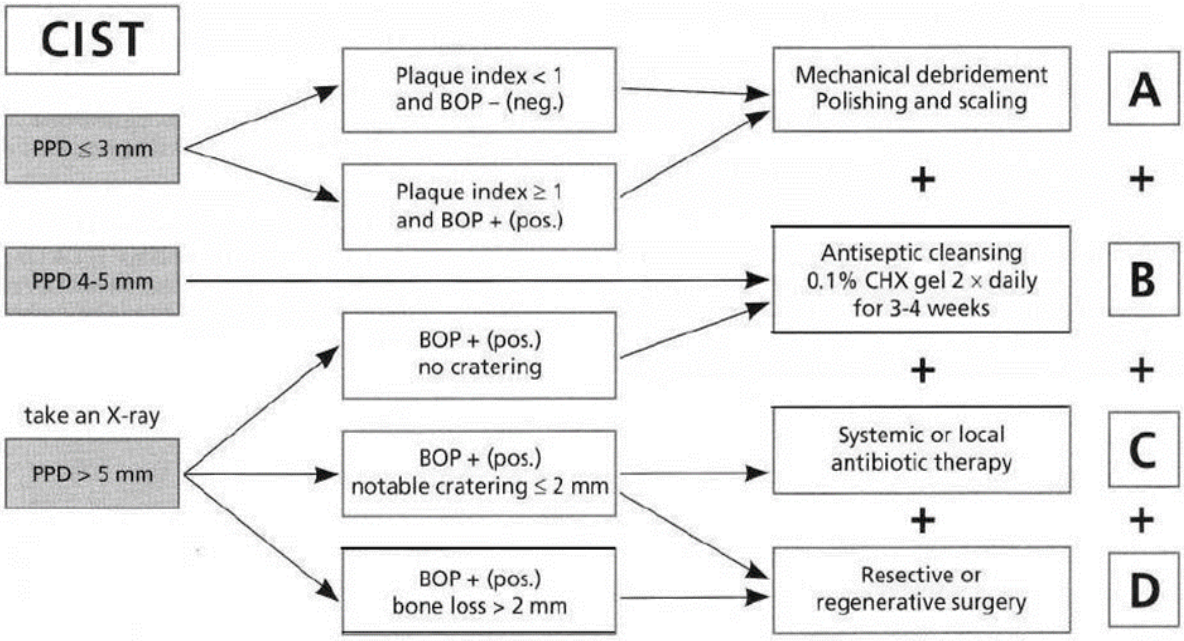

Fig 2: cumulative interceptive supportive therapy (CIST)" concept (Mombelli A and Lang NP;1998).