Preventive Prosthodontics: Seeing The Unseen

Dr. Shruti P. Mehta*, Dr. Hitendra Shah, Dr. Priyanka V. Sutariya**,**
Dr. Vinita P. Karia*, Dr. Viraj Y. Shah***, Dr.Tanvi S. Goyal***
*HOD and Professor, **Professor, ***PG student,
Department Of Prosthodontics, College Of Dental Science And Research Centre, Ahmedabad.

Abstract: The aim of Preventive prosthodontics should be an attempt to converge to the dictum of DeVan "Perpetual preservation of what remains, rather than meticulous restoration of what is lost". Preventive prophylaxis improves the overall prognosis of the stomatognathic system and the quality of life significantly. Moreover, efforts directed toward disease prevention are fundamentally superior to dental rehabilitation due to disease development. With a paradigm shift in dental care practice in progress during the current pandemic situation, preventive dentistry holds the prospects to reduce the treatment needs of the patients. Preventive prosthetic dentistry is the need of the hour. [Mehta S Natl J Integr Res Med, 2020; 11(6):61-65]

Key Words: Preventive, Primary, Levels, Prevention

Author for correspondence: Dr. Shruti P. Mehta, Head Of Departement, Department Of Prosthodontics, College Of Dental Science And Research Centre, Ahmedabad. E-Mail: mehtashrutip@gmail.com

Introduction: Mandel stated[1], "All the dental procedures must be considered not only in terms of dealing past or present disease, but in terms of preventing future diseases as well". Preventive prosthetic dentistry as a conceptual phenomenon begins at the prenatal phase itself. Preventive prosthodontics aims at prevention of the factors that affects the dento-facial tissues and structures which includes; the tooth, supporting structures such as periodontium, alveolar bone, basal bone and surrounding musculo-skeletal structures like muscles of mastication, salivary glands and the tissues in the head and neck region. Life expectancy has evolved and increased over the years, leading to increased medical and dental needs in population. Thus, preventive prosthodontics aims to reduce treatment needs by providing preventive prophylaxis at early stages starting from prenatal and postnatal stages.

A comprehensive literature search was done (electronic and manual) which included most of the articles published in peer-reviewed journals relating to the subject of preventive prosthodontics. The review itself began with the search of relevant key words linked with prosthetic dentistry like prevention, prosthodontics, primary, dentistry, levels, in various search engines including PubMed, MeDline, etc. The present review focuses on various preventive procedures that can be done in prosthetic dentistry.

Preventive prosthodontics means to preserve what already exists rather than replacing what is missing. The concept of preventive prosthodontics includes all the three levels of prevention- primary prevention (avoiding disease through eliminating disease agents or increasing resistance), secondary prevention/ early detection and treatment, and tertiary prevention/ rehabilitation. Preventive prosthetic procedures and interventions can be seen in each level and their importance to prevent further initiation and regression of disease.

1. Preventive Prosthodontics At Primary Level: It is a prepathogenic phase. It includes the steps that promote health and protection against future diseases.

Prenatal Stage: It begins with the prenatal care and clinical assessment. With respect to dental development, a thorough guideline of nutritional requirement during pregnancy and lactation is essential, followed by prenatal fluoride therapy, prevention of certain antibiotics that may harm the dento-facial growth and reinforcing oral health care in pregnant women.

Postnatal Stage: Preventive prosthodontics at this stage focuses on maintaining integrity of normal developing dentition by including clinical assessment of oral growth and development, pathology, and/or injuries, inclusion of anticipatory guidelines, which include home dental care.

In case of maxillofacial defects, prosthesis like Obturator is given. It is used to close a congenital or acquired tissue opening primarily of the hard palate and contiguous alveolar tissues. Immediate obturator is placed immediately after the surgery with or without surgical packing which is retained by screws or wire fixation, it

helps re-establishing the oral contours, prevents the regurgitation of the fluids in the nasopharynx, protects the wounds from uneventful healing and prevents the cicatrisation or shrinkage.Interim obturator can be given after the removal of the surgical packing. The interim obturator is retained up to 3 months with repeated checking and relining with the tissue conditioner, followed by definitive obturator[2].

Adolescent Stage: Fluoride rinses and fluoridated toothpastes, periodic scaling, sealant therapy and radiographic examination at regular intervals are recommended[3]. The patient is also educated about the chewing habits, tongue postures for better maintenance of the occlusion and maintenance of the prosthesis if any[4]. The primary prevention also involves the protection of the dentoalveolar structures by providing mouth guards in contact sports at the young age. The injuries such as tooth fractures, concussion, crown root fractures, TMJ fractures, dentoalveolar fractures, and soft tissue injuries can be prevented or minimized with the use of mouth guards[5].

Radiation shields / radioprotective stents are used for the patients who are undergoing the radiotherapy. The protection can be provided by various methods like providing the radiation docking (cone positioning) devices, making spacers in the interstitial brachytherapy for tongue cancer and fabrication of tongue shields[6]. Preventive prosthodontics aims to prevent gingival recession, root exposure, cervical abrasion, and attrition by proper guidance for maintenance of oral health, periodic checkups and radiographic assessment and patient education.

2. Preventive Prosthodontics At Secondary Level: Prevention at secondary level comes in action once the disease has initiated and passed beyond the level of primary prevention. It includes the early detection of the disorders and providing prompt treatment to prevent further damage. Preventive prosthodontics procedures, which can be performed at this level, are occlusal interference correction, treatment for bruxism, and treatment for trauma from occlusion, correction of plunger cusps and treatment of obstructive sleep apnea[7].

Occlusal Interference: They produce mandibular deviation during closure to maximum intercuspation (MIC) position or may hinder the smooth passage to and from MIC position[8] If the occlusal interference cross the threshold of adaptive capacity of the temporomandibular joint, muscles of mastication and neuromuscular system, it could lead to muscle hypertrophy, muscle fatigue, spasm, headaches, cranio-mandibular dysfunction syndrome, wear facets, fractured cusps, tooth mobility or parafunctional habits like bruxism. So correction of occlusal interference is recommended in the early stages[9].

Bruxism: If occlusal interferences are present, the patient tries himself to equilibrate the occlusion and thus develop the habit of clenching or grinding of teeth known as bruxism[10]. Treatment of bruxism involves controlling the psychological stress, occlusal correction, coronoplasty and occlusal splints/prosthesis[11].

Plunger Cusps: The cusps, which wedge the food forcefully into the interdental spaces of the opposing arch, are known as plunger cusps. These plunger cusps are usually the functional cusps, (i.e., palatal cusp of maxillary teeth and buccal cusp of mandibular teeth). Preventive prosthetic treatment involves rounding and shortening of the plunger cusps. Splinting the adjacent teeth also protects the opposing interproximal space[12].

Obstructive Sleep Apnea: Sleep apnea is characterized by cessation of airflow through upper airway while diaphragm movement continues[13]. Fabrication of prosthetic mandibular advancement appliances like soft palate lifters, tongue retainers, mandibular repositioners and snore guards[14] could be given for obstructive sleep apnea

3. Preventive Prosthodontics At Tertiary Level: Tertiary level prevention involves limiting the disability of the patient and rehabilitation. Prevention at tertiary level comes in action once the disease has progressed and surpassed the prevention at secondary level.

In the year 1990, the “preventive prosthetic treatment strategy” for treatment of the young patients with a highly mutilated dentition was presented[15]. Tertiary prevention includes

restoration of the teeth, timing of extraction, preservation of occluding pairs of teeth, avoidance of contact between the teeth and the opposite edentulous jaw. In rehabilitation phase, planning for the immediate dentures, treatment dentures or interim dentures, complete dentures and provisional restorations can be done.

Planned Extractions: Planned extraction of highly mutilated teeth prevents the rapid resorption of the alveolar ridges. Extraction of third molar is prevented till middle age, as it influences the growth of tuberosity. Planned extractions after detailed treatment plan prevents loss of alveolar bone in the extracted region, prevents supra-eruption of opposing tooth if present, preserves arch stability and planned rehabilitation of site to prevent further damage to adjacent tooth, underlying mucosa and alveolar bone[16].

Immediate/Interim Restoration: In the case of early loss of the permanent teeth, if the definitive treatment cannot be done for various reasons, immediate/interim restorations are planned that can be utilized as preventive prosthesis to prevent further damage/trauma to the site and preserve the remaining structures. Based on the number of tooth lost/extracted they are:

Provisional Restoration: In case of single or few missing teeth where fixed partial denture is planned, interim provisional restoration can be fabricated to prevent the events like pulpal inflammation, mesial migration, supra eruption and arch integrity, and protection of periodontium[17].

Immediate Denture: In case where a removable partial denture or removable complete denture is planned, an immediate or interim denture can be fabricated. They promote better healing (immediate dentures act as surgical stents), protect the blood clot and aid early healing and promote better ridge form. The immediate dentures apply functional forces within the physiological limit resulting in an edentulous ridge with better form and more resilient soft tissue covering.[18]

Fixed Partial Denture: During the tooth preparation for fixed prosthesis, principles of tooth preparation are followed to prevent the events like pulpal inflammation, protection of tooth preparation margins and protection of periodontium. Resin bonded or resin retained bridges are minimally invasive fixed prostheses which rely on composite resin cements for retention. The main advantage is that, in comparison to conventional bridge preparations, they are conservative of tooth structure[19]. Thus, it is possible to provide a fixed replacement for missing teeth, which is essentially reversible and does not compromise the abutment tooth.

Removable Partial Denture: In case of a few missing teeth a removable partial denture can be given as a permanent treatment option or until the future fixed prosthesis is planned. The forces occurring with removable prosthesis function can be widely distributed and directed, and their effect minimized by appropriate design of the removable partial denture. An appropriate design which follows the principles of design biomechanics, stress distribution, appropriate impression technique, selection and location of components in conjunction with a harmonious occlusion can prevent further unwanted stresses and forces towards adjacent tooth, underlying tissues and unwanted rotation of prosthesis around fulcrum line.

Overdentures: Overdenture therapy is a preventive prosthodontic concept since it aims to conserve the few remaining natural teeth and prevent ridge resorption. Garg S et al.,[20]and Garg R [21]mentioned that an overdenture helps reduce the impact of some of the complete denture wearing consequences: residual ridge resorption, loss of occlusal stability, undermined esthetics and compromised masticatory function. It enhances the proprioceptive feedback by existing periodontal ligaments and thus controlling the occlusive forces and preventing the rapid residual ridge resorption. Arora etal[22] reported that overdenture with attachments are a boon to preventive prosthodontics. The use of attachments can redirect occlusal forces away from weak supporting abutments and on to soft tissue, or redirect occlusal forces toward stronger abutments and away from soft tissues. They act as shock absorbers and stress redirectors as well as provide good retention.

Single Complete Denture/Complete Denture: When the teeth are completely absent in any one of the arch, the fabrication of a Single /Complete denture is recommended to prevent the contact of the teeth and alveolar ridge, to restore function, vertical dimension, esthetics and prevent the development of parafunctional

habits[23]. Pre-prosthetic surgeries, impression techniques based on underlying tissue, occlusal occlusion, neutrocentric concept for optimum stress distribution and function are planned to prevent further regression of oral tissues and structures[24].

Implants: Preventive dentistry is mainly concerned with caries and periodontal disease and little, or no attention is paid to the prevention of alveolar bone loss.

Preventive Implantology is concerned with the preservation of the alveolar ridge of the edentulous jaw.

After tooth extraction, the atrophy of edentulous lower jaws can be prevented or delayed by using implants supporting an over denture or a fixed prosthesis[25].

Kalk et al[26]. proposed the resorption stages of the residual ridges, and treatments that are used in preventive implantology.[12]

schemes such as balanced occlusion, lingualized

Preventive Stage I: After tooth extraction, further resorption can be prevented by implantation of the bone substituents. E.g. a non-resorbable hydroxyl appetite.

Preventive Stage II: After the initial resorption has occurred, placing cylindrical endosteal implants to maintain adequate width and height can prevent further resorption.

Preventive Stage III: For knife edged ridge, bone removal is necessary for implant placement.

Preventive Stage IV: In case where severe resorption of the alveolar ridge has taken place and only basal bone is present, implants are placed directly into the basal bone to prevent total loss of function of the arches.

Summary: To summarize the preventive prosthodontics at the three levels:

Table 1: Preventive Prosthodontics Level(s)

Primary Level	Secondary Level	Tertiary Level
1.Prenatal Stage: Clinical Assesment And Patient Education	Occlusal Interferences: Occlusal Correction	Planned Extractions And Interim Prosthesis
2. Postnatal Stage: Patient Education, Obturators, Nasoalveolar Moulding (Congenital Maxillofacial Defects).	Bruxism: Splints And Occlusal Correction, Stress Reduction	Resin Bonded Bridges, Veneers, Precision Attachments And Fixed Partial Denture
3. Adolescent Stage: Flouride Therapy, Anticipatory Guideline For Habits And Occlusion Development, Mouth Guards	Plunger Cusps	Removable Partial Denture, Design Philosphy
4. Radioprotective Stents And Splints	Obstructive Spleep Apnea: Soft Palate Lifter, Mandibular Repositioner, Tongue Retainer, And Snore Guards.	Overdenture: Tooth Supported/Implat Retaine
		Single Complete Denture, Complete Denture, Implant Therapy

Conclusion: Prevention is an obligation of dentistry as well as critical patient responsibility. Though prosthodontics is a specialized field in replacement of missing teeth and hard and soft tissues, the preventive aspect of prosthodontics cannot be ignored. Different problems can be solved and prevented by systematically executing a preventive prosthodontic practice. Following the various preventive measures and treatment phases at each level from the prenatal and

postnatal stage to rehabilitative stage, further regression of disease can be prevented.

References:

1. Mandel ID. What is preventive dentistry?,J Prevent Dent I974;1:25-29.

2. Popli S, Parkash H, Bhargava A, Gupta S, Bablani D, Kar AK. A two-piece sectional interim obturator. A clinical report. J Prosthodont 2012;21:487-90.
3. Gulland A. People are living longer but are not in best health, global study finds. BMJ 2012;345:e8511
4. Baelum V. Dentistry and population approaches for preventing dental diseases. J Dent 2011;39 Suppl 2:S9-19
5. Scott J, Burke FJ, Watts DC. A review of dental injuries and the use of mouthguards in contact team sports. Br Dent J 1994;176:310-4.
6. Beumer J 3rd, Silverman S Jr, Benak SB Jr. Hard and soft tissue necroses following radiation therapy for oral cancer. J Prosthet Dent 1972;27:640-4.
7. Payne SH. Preventive prosthodontics. J Prosthet Dent 1973;30:491.
8. Simon J. Occlusal interference. Dentistry's great imposter. Dent Today 2003;22:70-3.
9. Ishigaki S, Kurozumi T, Morishige E, Yatani H. Occlusal interference during mastication can cause pathological tooth mobility. J Periodontal Res 2006;41:189-92.
10. Johansson A, Omar R, Carlsson GE. Bruxism and prosthetic treatment: A critical review. J Prosthodont Res 2011;55:127-36
11. PihlstromBL,AndersonKA,AeppliD,SchafferEM. Association between signs of trauma from occlusion and periodontitis. J Periodontol 1986;57:1-6.
12. KhairnarM.Classificationoffoodimpaction-revisitedandits management. Indian J Dent Adv 2013;5:1113-9.
13. Padma A, Ramakrishnan N, Narayanan V. Management of obstructive sleep apnea: A dental perspective. Indian J Dent Res 2007;18:201-9.
14. Lamster IB, Eaves K. A model for dental practice in the 21st century. Am J Public Health 2011;101:1825-30.
15. Kalk W, van Rossum GM, van Waas MA. Edentulism and preventive goals in the treatment of mutilated dentition. Int Dent J 1990;40:267-74.
16. DuaP,SinghJP,AghiA.Aestheticandfunctionalrehabilitation of a case of mutilated dentition and loss of vertical dimensions. J Indian Prosthodont Soc 2011;11:189-94.
17. Perry RD, Magnuson B. Provisional materials: Key components of interim fixed restorations. Compend Contin Educ Dent 2012;33:59-60, 62.
18. Smith DE. Interim dentures and treatment dentures. Dent Clin North Am 1984;28:253-71
19. Durey KA,Nixon P J,Robinson S,Chan M F W Y. Resin bonded bridges: techniques for success.Br Dent J 2011;211:113-118
20. Garg R, Kumar M, Rubina, Saini R, Kaushal S. Preventive prosthodontics- A Boon. International Dental Journal Of Students Research 2013;1:13- 16
21. Garg S, Suresh S, Rajesh B, Sandeep K. Preventive prosthodontics- A clinical approach. BFUDJ 2011;2:25-27
22. Arora A, Upadhayaya V, Goyal I, Chowdry A. Attachments : Boon to preventive prosthodontics: Two case reports. J Dent Res Rev 2014;1:152-6
23. Vamsi Krishna CH, Rao AK, Sekhar NC, Shastry YM. Rehabilitation of maxillary arch with attachment-retained mesh-reinforced single complete denture. BMJ Case Rep 2014;2014
24. Scott BJ, Hunter RV. Creating complete dentures that are stable in function. Dent Update 2008;35:259-62, 265.
25. Denissen HW, Kalk W. Preventive implantations. Int Dent J 1991;41:17-24
26. Kalk W, Denissen HW, Käyser AF. Preventive goals in oral implantology. Int Dent J 1993;43:483-91.

Conflict of interest: None
Funding: None
Cite this Article as: Mehta S, Shah H, Sutariya P, Karia V, Shah V, Goyal T. Preventive Prosthodontics: Seeing The Unseen. Natl J Integr Res Med 2020; Vol.11(6):61-65