

PERIODONTAL PROSTHESIS CONCEPT IN RESTORATIVE THERAPY THE CONTEXT OF PERIODONTAL DISEASE. REVIEW

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Abstract.

Achievement of holistic oral health is dependent upon first carrying out a thorough examination, so as to establish a comprehensive diagnosis of patient etiologies, needs, and required therapies. Restorative therapy often includes splinting of mobile teeth, coverage of sensitive roots, and correction of occlusal abnormalities to improve periodontal prognoses.

The components of a thorough clinical examination include periodontal probing depths, assessment of clinical attachment levels, hard - and soft - tissue examination, models, and face - bow records. However, it is important to realize that a complete examination begins with an open discussion with the individual patient, as a step in determining the patient's needs and desires. In this way, treatment plans may be formulated that are in the best interest of the patient and represent a greater value for the patient. Conclusion. Simple and complex patients may be successfully treated in this periodontally challenging context, with success being defined as long - term stability and maximization of patient comfort, function, and aesthetics.

Keywords: restorative therapy, periodontal prosthesis, periodontal prognoses,

Introductions

The introduction by Amsterdam and Cohen [1] of the concept of periodontal prosthesis almost 50 years ago helped to define this interrelationship.[2,3]

In restorative therapy it is important to realize that a thorough examination begins with an open discussion with the individual patient, as a step in determining the patients needs and desires. In this way, treatment plans may be formulated that are in the best interest of the patient and represent a greater value for the patient.

The components of a thorough clinical examination include periodontal probing depths, assessment of clinical attachment levels, hard - and soft - tissue examination, models, and face - bow records.

However, it is important to realize that a thorough examination begins with an open discussion with the individual patient, as a step in determining the patient's needs and desires. In many situations, initial therapies, such as plaque control instruction, debridement, caries control, and endodontic assessment, must be carried out prior to establishment of the final treatment options. [6-10]

Effective home - care efforts, maintainable probing depths (defined as 3 mm or less), no evidence of furcation involvements, and adequate bands of attached keratinized tissue to provide a stable fiber barrier in various clinical scenaria are well - accepted periodontal endpoints of therapy.[11-13]

Combined with appropriate management of carious and endodontic lesions, replacement of missing teeth, control of parafunctional habits, and establishment of a healthy, stable occlusion, such a periodontal milieu will help ensure maximization of patient comfort, function, and aesthetics in both the short and long terms. [8,14,15]

The Periodontal Restorative Case

A patient presents with significant periodontal concerns, manifesting themselves as hard - and soft - tissue changes, deepening pocket depths, and inflammation. [16,17]

In these situations, restorative therapy may be required to help improve the outcomes of comprehensive periodontal treatment.[18-20]

Restorative therapy often includes splinting of mobile teeth, coverage of sensitive roots, and correction of occlusal abnormalities to improve periodontal prognoses.[2,18]

However, should fixed partial dentures be contemplated to replace a missing tooth or teeth, additional teeth may be required to serve as abutments in the presence of increased tooth mobility, to afford the necessary stability to the fixed partial denture under function.[21] Increasing mobility should be viewed as a highly significant negative factor when determining expected prognoses for various therapies, and may be an absolute contraindication, to performing complex treatments on given teeth rather than removing these teeth and replacing them with implant - supported prosthetics.[22]

The Restorative Periodontal Case

Maximization of long - term restorative treatment outcomes is highly dependent

upon the periodontal milieu into which restorative therapy is placed.[21]

A harmonious occlusion, probing depths of 3 mm or less, no horizontal furcation involvements, stable bands of attached keratinized tissue of at least 3 mm in the apico - occlusal dimension and 2 mm in the buccolingual dimension, and restorative margin positions that are accessible to the patient for predictable home - care efforts are all prerequisites for attainment of successful restorative treatment outcomes.[14,18, 23,24]

Introduction of Orthodontic Therapy Into Either Case Type

Although this is not the format in which to discuss complex full - mouth orthodontic therapy, appropriate utilization of orthodontic treatment approaches in isolated areas will significantly enhance the functional and aesthetic outcomes of therapy in both periodontal restorative cases and restorative periodontal cases. [25,26]

Such orthodontic utilization includes:

- alignment of malpositioned teeth to improve ease of patient home care
- alignment of malpositioned teeth to ameliorate off - angle functional and parafunctional forces
- establishment of more ideal occlusal planes
- establishment of flatter occlusal planes with shallower incisal guidance to help ameliorate forces being placed upon the anterior teeth
- tooth reangulation for ease of prosthetic therapy
- Intrusion in order to establish a more favorable crown to root ratio
- tooth uprighting to help eliminate cemento-enamel junction position induced osseous defects (Figs.1-2), Fuggazzotto (2009)



Fig. 1. A severely tilted second molar demonstrates an “infrabony defect” on its mesial aspect.



Fig. 2. Molar uprighting is proceeding. Note the elimination of the defect on the mesial aspect of the molar.

- tooth supereruption in anticipation of crown - lengthening osseous surgery in the aesthetic zone [27] to allow appropriate restoration and maintenance of a compromised tooth without negatively affecting patient aesthetics and/or allow crown lengthening without compromising the support of the adjacent teeth (Figs.3–5; Fuggazzotto (2009).



Fig. 3. Following supereruption of the root of the mandibular first premolar, crown - lengthening osseous surgery.



Fig. 4. Crown - lengthening osseous surgery has been performed around both mandibular premolars.



Fig. 5. A radiograph taken after post and core fabrication and insertion into the mandibular premolars demonstrates the relationship of the planned restorative margins to the alveolar crests.

Determining Periodontal Treatment Endpoints

Effective patient home care, coupled with regular professional maintenance, are the cornerstones of all successful therapy.[28, 29]

A patient who is unwilling or unable to demonstrate the necessary level of plaque removal efficacy and commitment should never be considered a candidate for interdisciplinary therapy.[30] Rather, all efforts must be made through instructional, motivational, technical, and chemical means to help the patient in question

control plaque levels and thus provide a reasonable milieu for the acceptance of the necessary dentistry.[31,32]

Failure to demand such a level of plaque control results in therapeutic failure, and increased

levels of frustration and anxiety for both the patient and the treating clinicians.[6]

While the patient has an obligation to make every effort to perform appropriate plaque control, it is imperative that the treating clinicians provide the patient with a milieu that is most conducive to effective plaque control, and that provides the

greatest chance of a favorable long – term prognosis.[33,34,]

When faced with active periodontal disease, one of seven therapeutic options may be employed:

1. *No treatment* : Whether such a decision is due to the patient's refusal of active therapy, or

the patient's physical, financial, or psychological inability to undergo the necessary

treatments, it is important to recognize the short - and long - term risks to oral and overall

health represented by such a decision.

Periodontal diseases are self – propagating disease entities. If no active therapy is carried

out to halt disease progress, extension of the disease will result in tooth loss. When a

patient refuses necessary care, every effort should be made to motivate the patient to pursue treatment, and to adapt the treatment to the individual patient.

2. *Subgingival debridement and institution of a regular professional prophylaxis schedule* : In many cases, such an approach does not halt the ongoing periodontal disease processes, but merely slows the rate of attachment loss. This treatment option is indicated for patients who are physically, financially, or psychologically unable to undergo more comprehensive therapy, in an attempt to delay tooth loss. The potential dangers to adjacent teeth must also be recognized.

3. *Surgical therapies aimed at defect debridement and/or pocket reduction*: These treatment

approaches represent a significant compromise in therapy. As a patient who has undergone such surgical intervention is left with a milieu that is highly susceptible to further periodontal breakdown, the need for retreatment and the potential damage to the attachment apparatuses of adjacent teeth must be weighed.

4. *Resective periodontal surgical therapy, including elimination of furcation involvements, in an effort to ensure a post therapeutic attachment apparatus characterized by a connectivetissue attachment to the root surface, followed by a short junctional epithelial adhesion to the root surface, and elimination of probing depths greater than 3 mm*: While such a treatment approach offers the greatest chance of preventing reinitiation of periodontal disease processes, it must be utilized appropriately.

5. *Periodontal regenerative therapy aimed at rebuilding lost attachment apparatus and surrounding alveolar bone*: Due to a history of misunderstanding of the indications and contraindications of periodontal regenerative therapy, and less than fully defined diagnostic systems, treatment outcomes have proven highly inconsistent. The advent of new materials offers the potential for even more impressive regenerative results.

6. *Tooth removal with either simultaneous regenerative therapy and implant insertion or guided bone regeneration with subsequent implant placement and restoration*: Despite their high level of predictability, regenerative and implant therapies must not be viewed as a panacea. To remove teeth that may be predictably maintained through more conservative therapies that will yield acceptable treatment outcomes is unconscionable.

7. *A combination of the above therapies*: Patients are all too often viewed as either “periodontal patients” or “implant patients.” Patients are neither.

Rationale for Pocket – Elimination Periodontal Surgery

Pocket elimination, which has long been advanced as one of the primary endpoints of periodontal therapy, is most frequently accomplished through osseous resective surgery.[15,35,36]

The primary goal of pocket – elimination therapy is to deliver to the patient an

environment that is conducive to predictable, long - term periodontal health, both clinically and histologically.

As such, the objectives are as follows:

1. Pocket elimination or reduction to such a level where thorough subgingival plaque control is predictable for both the patient and the practitioner.
2. A physiologic gingival contour that is conducive to plaque - control measures. Soft - tissue concavities, in the area of the interproximal col and elsewhere, soft - tissue clefts, and marked gingival margin discrepancies are eliminated.
3. The establishment of the most plaque - resistant attachment apparatus possible. This includes the elimination of long junctional epithelial relationships to the tooth surface where possible, and the minimization of areas of nonkeratinized marginal epithelium, especially in the presence of restorative dentistry.
4. The elimination of all other physical relationships that compromise patient and professional plaque - control measures. These include furcation involvements and subgingival restorative margins.
5. A clinically maintainable milieu. This condition will evolve as a result of the previous four criteria having been met. Pocket - elimination therapy helps maintain the plaque - host equilibrium in the host's favor, by closing the window of host vulnerability due to characteristics of the periodontium as much as possible.

The Significance of Furcation Involvements

Horizontal destruction of periodontal support, which results in furcation involvements, is a significant negative factor with regard to long - term prognosis if left untreated. The inaccessibility of

even early furcation involvements to proper plaque control measures is well documented. [11-13] In addition, “maintenance” care, open and closed debridement, chemical treatment of the root surface, and placement of particulate materials without covering membranes have all failed to demonstrate predictable success in the treatment of the periodontally involved furcation.

The Influence of Restorative Margins

Restorative - margin position also influences long - term periodontal health, as plaque accumulation at the restorative - margin - tooth interface is a consistent finding, in both research and clinical practice. [7,8,14,15,17] When a restorative margin extends subgingival, the resultant increased plaque accumulation often leads to acceleration of periodontal breakdown and recurrent caries.[8,18] This fact is especially critical if the attachment apparatus in place includes a long junctional epithelium, as the increased permeability and detachability of a long junctional epithelial adhesion in the face of inflammation lend the long junctional epithelium a greater vulnerability to the increased inflammatory insult inherent in subgingival margin placement.

Conclusion

When utilized appropriately, a multidisciplinary periodontal restorative approach is highly effective in the management of a variety of situations. Simple and complex patients may be successfully treated, with success being defined as long - term stability and maximization of patient comfort, function, and aesthetics.

References

1. Amsterdam M. Periodontal prosthesis:25 years in retrospect. Alpha Omega 1974;67:8 - 52
2. Fugazzotto PA., Hains F, DePaoli S, Periodontal-restorative interrelationships. Ensuring clinical success, Wiley - Blackwell Publishing, 2011.
3. Jaafar Abduo & Karl M. Lyons Interdisciplinary interface between fixed prosthodontics

1. and periodontics. *Periodontology* 2000, Vol. 74, 2017, 40–62
4. Listgarten MA. Periodontal probing: What does it mean? *J Clin Periodontol.* 1980;7:165 – 76.
5. Spray R, Garnick JJ. Position of probes in human periodontal pockets. *J Dent Res.* 1979; 58 (Special Issue A), 176. Abstract no.331.
6. Tabita PV, Bissada NF, Maybury JE. Effectiveness of supragingival plaque control on the development of subgingival plaque and gingival inflammation in patients with moderate pocket depth. *J Periodontol* 1981; 52:88 – 93 .
7. Renggli HH, Regolati B. Gingival inflammation and plaque accumulation by well adapted supragingival and subgingival proximal restorations. *Helv. Odontol Acta* 1972; 16: 99 – 101.
8. Gilmore N, Sheiham A. Overhanging dental restorations and periodontal disease. *J Periodontol* 1971;42:8 – 12 .
9. Buchanan SA, Robertson PB. Calculus removal by scaling/root planing with and without surgical access. *J Periodontol* 1987; 58:159 – 63
10. Rabbani GM, Ash MM, Caffesse RG. The effectiveness of subgingival scaling and root planing in calculus removal. *J Periodontol* 1981; 52:119 – 23 .
11. Ellagaard B, Karring T, Listgarten M, Loe H. New attachment after treatment of interradicular lesions. *J Periodontol* 1973; 44: 209 – 17 .
12. Ross I, Thompson R. Furcation involvement in maxillary and mandibular molars. *J Periodontol* 1980; 51: 450 – 54 .
13. Ricchetti PA. A furcation classification based on pulp chamber – furcation relationships and vertical radiographic bone loss. *Int J Periodontics Restorative Dent* 1982; 2: 51 – 59 .
14. Newcomb GM. The relationship between the location of subgingival crown margins and gingival inflammation. *J Periodontol* 1974; 45:151 – 54 .
15. Karlson K. Gingival reaction to dental restorations. *Acta Odont Scand* 1970;28:895 – 99
16. Stambaugh RV, Dragoo M, Smith DM, Carosali L. The limits of subgingival scaling. *Int J Periodontics Restorative Dent* 1981; 1: 30 – 42 .
17. Waerhaug J. Tissue reactions around artificial crowns. *J Periodontol* 1953;24:172 – 85 .
18. Fugazzotto PA. Periodontal restorative interrelationships: The isolated restoration. *J Amer Dent Assoc* 1985;110:915 – 17 .
19. Fugazzotto PA. Preparation of the periodontium for restorative dentistry. St Louis : Ishiyaku EuroAmerica, 1989: 44 – 54 .
20. Parma - Benfenati S, Fugazzotto PA, Ruben MP. The effect of restorative margins on the postsurgical development and nature of the periodontium. *Int J Periodontics Restorative Dent* 1985; 5:31 – 51 .
21. Fugazzotto PA, Parma - Benfenati S. Preprosthetic periodontal considerations. Crown length and biologic width. *Quint Internat* 1984; 15:1247 – 56 .
22. Fugazzotto PA . Implant and regenerative therapy in dentistry: A guide to decision making. Hoboken, NJ : Wiley - Blackwell Publishing, 2009.
23. Parkinson CF. Excessive crown contours facilitate endemic plaque niches. *J Prosthet Dent* 1976; 35: 424-9.
24. Sackett BP, Gildenhuys RR. The effect of axial crown overcontour on adolescents. *J Periodontol* 1976; 47: 320-3.
25. Luchian I, Vata I, Martu I, et al. Challenges in ortho-perio and general dentistry interrelationship. Limits and perspectives. *Rom. J of Oral Rehab.*, 2016, 8,1:80-83
26. Martu MA, Danila CE, Luchian I, Solomon SM, Martu I, Foia L, Martu S. Effect of Laser

- Therapy On Gingivitis During Orthodontic Treatment. *Int J of Medical Dentistry*, 2017, 7(4): 284-289.
27. Ong M, Tseng S-C, et al. Crown Lengthening Revisited. *Clinical Advances in Periodontics*, 2011;1:233-9.
 28. Lindhe J, Nyman S. Long term maintenance of patients treated for advanced periodontal disease. *J Clin Periodontol*, 1984;11:504 – 14 .
 29. Goldman M, Ross I, Goteiner D. Effect of periodontal therapy on patients maintained for 15 years or longer: A retrospective study. *J Periodontol* 1986; 57:347 – 53 .
 30. Kaldahl WB, Kalkwarf KL, Kashinath DP, Molvar MP, Dyer JK. Long term evaluation of periodontal therapy: I. Response to four therapeutic modalities. *J Periodontol* 1996; 67 : 93 – 102 .
 31. Badersten A, Nilveus R, Egelberg J. Effect of nonsurgical periodontal therapy. II. Severely advanced periodontitis. *J Clin Periodontol* 1984;11: 63 – 76 .
 32. Badersten A, Nilveus R, Egelberg J. Effect of nonsurgical periodontal therapy. III. Single versus repeated instrumentation. *J Clin Periodontol* 1984;11:114 – 24 .
 33. Lindhe J, Haffajee AD, Socransky SS. Progression of periodontal disease in adult subjects in the absence of periodontal therapy. *J Clin Periodontol* 1983;10:433 – 42 .
 34. Rosenberg MM, Kay HB, Keough BE, Holt RL. Periodontal and prosthetic management for advanced cases. Chicago : Quintessence 1988:148 – 56 .
 35. Smith DH, Ammons WF, van Belle G. A longitudinal study of periodontal status comparing fl ap curettage and osseous recontouring. I. Six month results. *J Periodontol* 1980;51:367 – 75.
 36. Olsen CT, Ammons WF, van Belle G. A longitudinal study comparing apically repositioned fl aps, with and without osseous surgery. *Int J Periodontics Restorative Dent* 198 ;5:11 – 33.