Rehabilitation strategies for partially edentulous-prosthodontic principles and current trends

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ABSTRACT

The prosthetic considerations for treatment of partially edentulous patients involve evaluation of important aspects such as presence of certain functional or skeletal deficits, orientation of the occlusal plane, free-way space, size and location of edentulous areas, number, strategic location and quality of the likely abutment teeth, vertical dimension, and the type of occlusion.

A comprehensive evaluation, multidisciplinary approach and a sequential treatment plan, worked out in harmony with the patient's perceptions are important factors to ensure a successful outcome. This article discusses the principles, current trends and importance of clinical decisions in designing a treatment strategy when confronted with complex situations of partial edentulism.

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Key Words: full mouth rehabilitation; implant supported prostheses; partial edentulism

INTRODUCTION

The treatment options for partially edentulous patients with missing single or multiple teeth range from a provisional removable partial denture, a definitive cast partial denture, a resin bonded prosthesis, fixed partial denture or osseointegrated prosthesis. Clinical decision making is critically dependant on the status of the abutment teeth, which are often periodontally involved themselves. Treatment for partially edentulous patients with advanced periodontal disease involves selective retention of few strategically located key abutments for subsequent overdentures, or for extensive FPD treatment or for implant supported fixed prostheses. Implant supported prostheses have introduced new hope for the 'edentulous cripples' and have become an acceptable treatment modality.

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DISCUSSION

Prosthodontic 'Decision Making'

The prosthodontist is daily confronted with making decisions to replace missing teeth or defective restorations, to retain or extract periodontally compromised potential abutment teeth, or to prescribe a specific occlusal scheme for a restored dentition. This process is an extension of the clinician's opinion based on his knowledge and clinical experience and strongly influences the treatment modality chosen for a particular patient.

Tooth Loss—'Functional Loss'

A healthy occlusion is characterized by absence of pathology, satisfactory function and adaptive capacity. Loss of one or more teeth disturbs the functional balance of the remaining teeth and may result in migration, widening of proximal contacts and food impaction, bone resorption, occlusal interferences, loss of vertical dimension, altered mastication, anterior overloading, temporomandibular dysfunction with para-functional activities, altered phonetics, and aesthetics and psychological problems such as affected self-esteem and confidence.¹

A partially edentulous dentition can be practically classified into two groups:

1. Uncomplicated impaired dentition where tooth loss is the only anomaly.
2. Complicated impaired dentition, which is characterized by presence of complicating factors such as poor oral hygiene, caries, periodontal disease, and migration due to tooth loss.

Clinically, the uncomplicated impaired dentition can be treated immediately. However, in complicated cases, the causative factors should be identified and treated first and only then should the prosthetic rehabilitation be started.

Current Treatment Options for Patients with Missing Single or Multiple Teeth

In cases of a missing single tooth the options are interim removable partial denture, cast partial denture, resin bonded prosthesis, fixed partial denture, and implant retained prosthesis.

In cases of missing multiple teeth the options are interim removable partial denture, cast partial dentures, resin bonded prosthesis (restricted by length of edentulous span and residual ridge morphology), fixed partial denture (FPD), cast partial/FPD combinations or implant supported prosthesis.

Current Treatment Options for Partially Edentulous Patients with Advanced Periodontal disease

These include periodontal therapy, selective treatment and retention of few teeth which serve as 'key-abutments' for overdentures or cast partial dentures or FPD if feasible, immediate dentures followed by complete dentures, implant supported overdentures, and implant retained fixed prostheses.

Treatment Sequence

Treatment is rendered in three phases namely, 'systemic phase,' 'stabilizing or preparatory phase' and 'definitive or corrective phase.' The first two phases involve the elimination or control of patient's systemic disorders that will affect the overall treatment outcome and ensuring that the patient is well maintained to undergo definitive therapy. The definitive phase includes oral surgery, periodontal surgery, implant placement, endodontic therapy, occlusal modifications, occasional orthodontic therapy, and final prosthetic rehabilitation. Anterior teeth influence the border movements of the mandible and also the shape of the occlusal surfaces of the posterior teeth. Therefore, these are restored before posterior teeth. An efficient occlusal scheme can be developed by restoring opposing posterior segments at the same time through application of additive wax technique. One side of the mouth should be completed before the other side is treated.² The objective of post-therapeutic maintenance phase is to preserve and maintain the results that have been achieved and to prevent relapse. This requires regular clinical re-evaluation of the patient and appropriate interceptive measures.

Treatment Strategies

An efficient strategy includes consideration of medical, dental, sociological and economical factors and the aesthetic and functional needs of the patient. During clinical evaluation, the retainable teeth, hopeless teeth and the ones with doubtful prognosis should be evaluated. This evaluation helps to identify the 'key-abutment teeth'. The possibility of maintaining these key teeth determines the extent and complexity of a future reconstruction. The clinical condition of these teeth (restored, endodontically treated, or tilted, single or multi-rooted, root surface area, shape and angulations, periodontal involvement) plays a vital role in their future use as abutments. The other vital factors are span of edentulous areas, anterior or posterior location, extent of residual alveolar ridge resorption, and radiographic evaluation of the bony support.³

Key Teeth as Abutments for Complex Restorations

Certain teeth play an important role in patients treated with complex reconstructions. The loss of such abutments usually results in the need for total reconstruction of the occlusion and it may often be impossible to treat such patients by more conservative means. It is, therefore, of utmost importance to use all efforts possible to treat and conserve the key abutments in existing reconstructions, in order to avoid new and costly remakes.

In case of reduced dentitions, the distal abutments should be specially evaluated for periodontal involvement. In most instances, one root may be maintained as an end abutment but

technical problems arise in situations where roots are small or following endodontic and post-core therapy. Thus, the possibility of replacing such an abutment by an 'endosseous implant' should be considered. The shortened dental arch concept where teeth beyond the first molar are not replaced is also a current option of treatment.⁴

Sequence of 'Occlusal Rehabilitation'

1. Quadrant arch technique⁵—one quadrant is treated at a time. This technique has the advantage that the vertical dimension can be maintained and lengthy appointments are avoided.
2. Simultaneous arch technique—maxillary and mandibular arches are reconstructed simultaneously. The occlusion can be better established, aesthetics achieved is better, and number of appointments is reduced. However, this is more complicated, requires a skilled operator and technician, and may be difficult for beginners.
3. Segmented simultaneous arch technique—this technique enjoys advantages of both the above techniques and is able to provide the best alternative.

Osseointegrated Oral Implants

An implant is a welcome alternative to complex fixed or removable prosthesis as it simplifies the complex reconstructions. Three major indications specified for implants are: increased subjective chewing comfort, preservation of natural tooth substance or existing reconstructions and replacement of strategically important abutments. Determination of ideal implant position requires thorough diagnosis and treatment planning and depends upon the type of prosthesis planned (single tooth replacement, FPD, overdentures on bars or retentive anchor elements). The technical and biological complications encountered in distal extension cases can be avoided by placement of one or more implants in the distal extension region. For a fixed reconstruction, evaluation of the dimensions and distances between missing teeth is required while replacing abutments in a strategically correct position. Similarly the dimensional orientation of implants is also significant. Non-parallel implant abutments often involve technical complications such as difficult build-ups or abutment constructions for the superstructures. Hence, if implants are chosen to replace strategically important missing teeth, an optimal functional rehabilitation of the entire dentition should be planned.^{1,6}

Increase in Vertical Dimension

In complex situations resulting in a complete change of maxillo-mandibular relationships, a change in vertical dimension is imminent. According to Morales and Mohl⁷ the health of the masticatory system is intimately related to the occlusal vertical dimension.⁷ Carlsson et al⁸ and Christensen⁹ have documented symptoms such as soreness and fatigue of masticatory muscles due to increase in vertical dimensions of occlusion. Hence it is advisable to provide the patient a transitional prosthesis in the form of a partial denture, occlusal bite-plane or provisional restorations at the planned vertical dimension especially in situations where increase in vertical dimension of occlusion is indicated.

Success and Longevity of Fixed Prosthesis

Bell et al emphasized how the failures in complex cases of fixed rehabilitation could be avoided.¹⁰ Ceramometal and 'all-ceramic' restorations are currently the most common restorative options in use for fixed prostheses. A good coronal preparation, proper gingival retraction technique, accurate elastomeric impressions and excellent laboratory support go a long way in the success of the restorations. A thorough knowledge on the selection of ideal alloy and the ideal porcelain for ceramometal or 'all-ceramic' restoration is a must and affects the longevity of the restoration.

Current and Future Trends

Newer ceramic, resin based composite materials and innovative ceramic processing strategies have been introduced in restorative dentistry since the early 1980s. Notable recent progresses include the introduction of 'all ceramics'—inlays and onlays, laminate veneer restorations, aesthetic complete coverage and partial coverage crowns, ceramic post-cores, and indirect composite restorations.^{11,12} The newer technologies include introduction of CAD/CAM, improved materials, ceramic bonding and repair techniques, lasers etc. Implants have revolutionized prosthetic dentistry especially removable prosthodontics. Current trends in implant dentistry focus on material research as well as clinical field, such as implant surface characteristics, microbiology of peri-implant tissues, complications, removable vs fixed prostheses, implant supported or implant-tooth supported restorations and methods to improve aesthetics with single tooth restorations. Immediate loading of implants has shown promise and is the focus of present day research. Present day prosthodontics focuses on a better understanding of the clinical response to a particular restoration and factors that influence clinical longevity of the restoration.

CONCLUSION

Aim of prosthetic reconstructions is to preserve and restore health, aesthetics, and function. The current treatment trends for partially edentulous patients with missing single or multiple teeth range from an interim removable prosthesis, definitive cast partial denture, resin bonded prosthesis, foundation restorations, fixed partial denture or an osseointegrated prosthesis. Decisions to replace missing teeth, to retain or extract

periodontally compromised potential abutment teeth or to prescribe a specific occlusal scheme for a restored dentition, confront the clinician on a routine basis. A comprehensive evaluation, multidisciplinary approach and a sequential treatment plan worked out in harmony with the patient's perceptions are important for a long-term successful outcome.

CONFLICTS OF INTEREST

None identified.

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