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Fixed partial denture treatment planning

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Abstract

The treatment planning is based on the identification of the need of a patient, ascertaining expectations and comparing these with the available techniques. Thereafter a sequence of treatment may be initiated for therapy, symptomatic relief, stabilization, and follow up. This paper focuses on the importance of properly sequenced treatment planning for fixed partial denture cases.

Keywords: Treatment planning, abutment teeth, FPD, preservation, periodontal diseases

Introduction

Treatment planning consists of determining a sequence of treatment logically designed to restore the patients' dentition to good health, with optimal function and esthetics. An appropriate plan informs the patient about the present conditions, the proposed dental treatment, personal and professional follow up required for success. For the long term success of FPD, the abutment teeth assessment must be done carefully. The treatment plan should be properly sequenced as part of an on-going comprehensive dental treatment program.

Determination of Patient Needs

- Successful treatment planning is based on the proper determination of patient needs. Treatment is required to achieve one or more of the following objectives:
- Correction of existing disease
- Prevention of future disease
- Restoration of function
- Improvement of appearance

Available Techniques

Fixed Partial Dentures: FPD is indicated where one or more teeth are missing or require removal. In this condition, these teeth are replaced by Pontics that are designed to fulfill the functional and esthetic requirements of missing teeth. Pontics are connected to retainers, which are restorations on prepared abutment teeth. If FPD is designed in such a way that the forces are directed along the long axis of the teeth, the success rate of FPD is higher. The success of such FPD is further enhanced in patients maintaining oral hygiene.

Implant supported prosthesis: Single or multiple missing teeth can be replaced with an implant supported prosthesis which involve successful Osseo integrated technique where the bone is drilled a traumatically to receive precisely fitting titanium cylinders^[1]. These are left without loading for few months until they are invested with bone, then function and esthetics are restored with prosthesis.

Selection of abutment teeth

Replacement of single missing teeth: A single missing teeth can be replaced by a three unit FPD having one mesial and one distal abutment tooth. A three unit FPD consists of a pontic, two retainers on each side of Pontic and connectors which connect pontic to retainers. The pontic replaces the missing tooth. The retainers are cemented to the prepared abutment teeth. FPDs in which only one side of Pontic is attached to a retainer are referred to as cantilevered. The long term prognosis of a single abutment cantilever is poor^[2]. Forces are best tolerated by periodontal supporting structures when directed in the long axis of the teeth^[3].

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In such cases, a three unit FPD is used. A cantilever will induce lateral forces on the supporting tissues, which may harm & lead to tipping, rotation of the abutment. The potential harmful nature of such FPDs have been confirmed by laboratory analysis^[4, 5]. Clinical experience with resin retained FPDs have suggested that cantilever designs may be preferred, especially since readhesion after failure is greatly facilitated & often leads to predictable long term success^[6]. Cantilevers with implant supported prosthesis may be used successfully.

Assessment of abutment teeth

Pulpal health assessment is done by evaluating the response to thermal & electrical stimulation and with the help of radiographs. Existing restorations, cavity liners & residual caries are removed^[7]. & teeth are carefully checked for possible pulpal exposure if any. Teeth in which pulpal health is doubtful must be Endodontically treated before fixed prosthodontic treatment is initiated.

Abutments treated by endodontic procedures

Teeth with appropriate endodontic treatment with post and core are suitable abutments. Failures may occur on teeth with short roots or teeth with little remaining coronal tooth structures. To obtain maximum retention for the post & core, a careful attention is necessary.

Abutments without Restorations: A tooth without any restoration or any dental pathology will serve as an ideal abutment. It can be conservatively prepared for a strong retentive restoration with optimum esthetics.

Mesially Tilted Second Molar: FPD is made preferably after Uprighting the tilted abutment Orthodontic ally by using simple fixed appliances or with modified preparation designs or with a non rigid connector.

Replacement of several missing teeth

To ensure a successful result, the prosthesis is planned by waxing the intended restorations on articulated diagnostic casts. This step is required for complex fixed prosthodontic treatments involving corrections of an irregular occlusal plane, alteration of the vertical dimension of occlusion, therefore implant supported prostheses is suggested in such cases.

Overloading of abutment teeth: The ability of abutment teeth to withstand the applied forces without becoming mobile or drifting should be estimated as it influences the success of the prosthodontic treatment plan.

Direction of forces: The most favourable direction of forces is along the long axis of teeth. An FPD is designed keeping this under consideration. An FPD design should confine the potentially damaging lateral forces to anterior teeth & also include a longer lever arm to reduce these forces.

Root surface area: It should be assessed by Ante's law. Ante⁸ suggested in 1926 that the combined root surface area of the abutment teeth should exceed the combined root surface area of the teeth being replaced.

Root shape & angulation: A better support is provided by a molar with divergent root, a single rooted tooth with elliptic cross section & a well aligned tooth.

Periodontal disease: A careful assessment of periodontal health is needed for potential abutment teeth where a significant bone loss is noted. A successful fixed prosthesis can be fabricated for teeth with severely reduced periodontal support provided periodontal tissues have been returned to excellent health & long term maintenance has been ensured^[9, 10]. Healthy periodontal tissues are a necessary requirement for fixed restorations.

Span length: Failure of a long span FPD may occur due to excessive flexing under occlusal load. The relationship between deflection & length varies with the cube of the length of the span. Pontics & connectors should be made as bulky as possible to ensure optimum rigidity when fabricating long span FPD without jeopardising gingival health. High strength & high rigidity materials are preferred for prosthesis fabrication.

Replacing several missing teeth

Special considerations in this situation include problems associated with esthetics & requirement to resist tipping forces directed laterally. When maxillary incisors are being replaced forces directed against a maxillary incisor pontic will tend to tip the abutment teeth due to curvature of the arch. Tipping forces must be resisted by means of two abutment teeth at each end of long span anterior FPD. Thus, when replacing four maxillary incisors, the clinician should generally use canines & first premolars as abutment teeth^[11]. The four mandibular incisors can usually be replaced by FPD with retainers on each canine. It is not usually necessary to include first premolars.

Replacing multiple posterior teeth

When replacing multiple posterior teeth, it is advantageous to restore the posterior segments at the same time as this leads to the development of an efficient occlusal scheme. Treatment of all four posterior segments together might lead to complications and difficulties for the patient as well as the dentist. It is preferable to complete treatment of one side before starting treatment on the other side.

Discussion

The success of a treatment depends on careful planning which involves assessment of the dentition and choosing the best suitable option from available techniques as discussed above. Fixed partial dentures are indicated where one or more teeth are missing. Such missing teeth are replaced by pontics which perform the functional and esthetic requirements. In certain cases where invasive procedures are not feasible fixed partial dentures are an option of preference over implants.

Conclusion

Treatment planning is very important for successful treatment and patient satisfaction. It should be decided after consideration of patient needs. Successful treatment of fixed partial dentures depends on the appropriate selection of the abutment teeth and the number of missing teeth which are to be replaced.

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