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MANAGEMENT OF A PIER ABUTMENT WITH NON-RIGID CONNECTOR – A CLINICAL REPORT.

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Abstract:

Road traffic accident is one of the most common cause for loss of teeth and associated facial structure. It often results in a compromised dentition with varying grades of mobility and bone loss which eventually leads to removal of the teeth. Management of this compromised dentition requires intricate complex procedures which makes it tiresome process for any dental practitioner. However, it can be very effectively managed by following a good clinical protocol which distributes the occlusal force and stabilizing the abutment teeth with prosthesis which leads to a favorable prognosis. This article discusses on the prosthetic management of a pier abutment using a non-rigid connector.

Key words:
non-rigid connectors, road traffic accident, key key-way, tenon, mortise.

Introduction

In the modern era of technology and advancement, where the haulage is a must for the progress of career as well as personal life, the gush of automobiles have escalated in our highways. This has increased the number of accident on daily basis. In concern with dentistry, the road traffic accident has provided evidences ranging from the mobility of teeth, loss of teeth, to complex fracture of maxilla and mandible. However, the compromised dentition following an accident can be saved to some extent by splinting the abutment teeth and stabilizing it through a prosthesis. Fixed partial denture splint is one of the treatment options in such patients. But if the abutment teeth is periodontally compromised with a moderate bone loss, a fixed partial denture splint with a non-rigid connector is preferred treatment modality.

Connectors are that part of a fixed partial denture or splint that join the individual retainers and pontics together[1]. They can be rigid or non-rigid, based on the flexibility or movement at the connector joint. Rigid connectors are the most common type of connectors in fixed partial denture and is indicated in small unit fixed partial denture with single path of insertion[1]. Non-rigid connectors are those connectors which permit movement between two parts relative to each other especially in vertical plane[2]. It is indicated in fixed partial denture with mal-aligned abutments, in abutments with unfavourable prognosis, to relieve stress in long span bridges, in mandibular arch with canine replacement and in cases with disparity in retentive capacity of the abutments[2]. This design of connector provides a " stress breaking effect"[3] in

abutments by providing a mild mobility within the prosthesis thereby protecting them from damage. There are a variety of non-rigid connectors used in dentistry, while the most common ones are the dove tail or key-keyway[4], split pontics type (connectors placed inside the pontics) and tapered pin[2]. Among these connectors, dove tail is most commonly used one in day to day practice. These connectors have a female or mortise part positioned on the retainer and male or tenon part on the mesial part of pontic. They are available as prefabricated resin pattern which can be attached to the wax pattern of the pontic and retainer. Ideally the keyway should be fixed on to the retainer and key on to the pontics. Markley[5] described that the non-rigid connector should be placed at one of the terminal retainers while Gill suggested that non-rigid connector should be placed at one side or both sides of pier abutment. Schillinburg[1] preferred the patrix to be placed distal to pier retainer and the matrix to be placed on the distal surface of the pontic. This precision fabricated device can be either fabricated in the laboratory by carving it on the wax pattern or prefabricated connector pattern can be waxed to the wax pattern of the prosthesis. This paper discusses fabrication of a long span fixed prosthesis with non-rigid connector using a prefabricated resin connector pattern.

Case report

A 30 year old patient reported to Department of Prosthdontics, Sree Mookambika Institute of Dental Sciences, Kulashekaram with a chief complaint of missing upper front teeth. History revealed that the patient lost teeth 2 years back in a road traffic accident. Clinical examination revealed missing 21 and 23 with grade I mobility in 22 and a Seibert's class III edentulous ridge in edentulous region. The abutments were vital with no evidence of pain on percussion and loss of tooth structure. There was adequate bone support in 11 and 24 abutment teeth (fig-1). Radiographic examination showed a crown root ratio of 1:1 in 22 with moderate bone loss (fig-2). Various treatment options were ruled out based on the history and examinations.

Fig1 pre treatment photograph

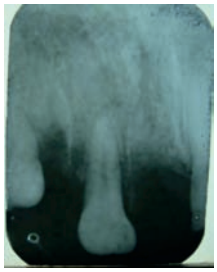

Fig 2 pre treatment radiograph

Fig 3 tooth preparation done

Fig 4 positioning of the mortise on the wax pattern using a surveyor

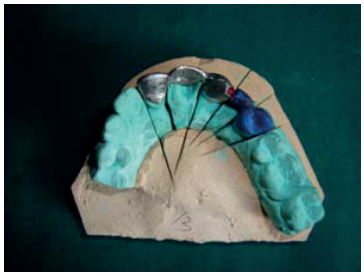

Fig 5 Casting done of the three unit FPD containing the mortise

Fig 6 Metal try-in done.

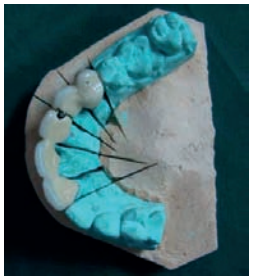

Fig 7 finished prosthesis

Fig 8 post cementation photograph.

An ideal treatment of choice in this case was to fabricate a five unit fixed partial denture with a non-rigid connector on 22. Diagnostic impression was made (Algin-gum Prime Dental Products Pvt Ltd) and a preliminary cast (White gold, Asian Chemicals, Rajkot) was poured. This was followed by a diagnostic wax up procedure (Uniwax, Delta, Bego) using type II inlay wax to verify esthetics and incisal clearance. In the second appointment tooth preparation procedure was performed and a master impression (Zetaplus clinical, Badia Polesine, Italy) was made using putty wash technique (Zhermack)(fig-3). A master cast was poured in die stone (Gyprock, Ralkot), ditching and die section was done on the cast. Wax pattern was fabricated in two segments. In the first stage a three unit pattern was made for 11, 21 and 22. The distal surface of the wax pattern of 22 was trimmed using a wax trimmer after mounting the cast on a surveyor (Shang Jun Precision Ind.Co). Now a box is prepared on the distal surface of pattern of 22 for the placement of the mortise. The resin pattern (Rhein 33,Bologia, Italy) was seated on the recess with the help of an analyzing rod of the surveyor (fig-4). This was further waxed up and casted. The three unit casting was placed back on the working cast and the remaining distal two units are waxed up using type II inlay wax (Uniwax, Delta, Bego)(fig-5). The tenon or the male component resin pattern was placed against the mortise and was waxed up with the two unit pattern. This is invested, casted and cleaned. Extreme care was taken during sand blasting procedure. This was placed back in the cast and the path of placement was verified in a surveyor. Further metal try in was done in the patients mouth (fig-6). This was followed by ceramic veneering procedure and glazing (fig-7). During cementation procedure, the unit with mortise was cemented first with GIC type I (GC Incorporation, Tokyo, Japan) and the two unit with tenon was cemented later (fig-8). Post insertion instructions were given to the patient and was reviewed after a month as well as a year.

Discussion

Prosthodontic rehabilitation of pier abutment with significant bone loss is a challenge to any restorative dentist. Any treatment in such dentition aims for good prognosis of tooth and longevity of the restoration. Various treatment options in this type of patients are removable partial denture prosthesis, five unit fixed partial denture with rigid connector, five unit fixed partial denture with non-rigid connectors and implant supported prosthesis. A five unit fixed partial denture with rigid connector is not the treatment preferred in this case as the crown root ratio of the abutment was less which further leads to undue stress on the abutment leading to its failure.

The ideal treatment of choice in this case is a five unit fixed partial denture with non-rigid connector as it transfers the shear stress to supporting bone of the abutment teeth rather than concentrating them in the connector[7,8,9,10]. This produces a stress breaking effect which protects the abutment teeth and prevents it failure. In contrast, splinting with rigid connector produces flexion in mesiodistal direction leading to failure of the fixed prosthesis due to stress on abutment tooth surface[11]. The flexing is directly proportional to the cube length of the span which can lead to material failure of prosthesis or an unfavourable response. In case of a pier abutment, force are distributed to terminal retainers leading to intrusion of them during function with the middle retainer acting as fulcrum leading to failure of weaker retainer[11]. This can be avoided by incorporating a non-rigid connector in the pier which produces minimum stress concentration in pier abutment in a five unit fixed prosthesis[12]. Hence in the case discussed above wherein there was pier abutment with less bone support associated with long span edentulous saddle, a five unit fixed prosthesis with non rigid connector is the ideal treatment of choice.

Conclusion

The non-rigid connectors acts as stress breaker by neutralizing all the forces acting on the connector thereby protecting the abutment teeth. It provides a safety valve mechanism in long span bridges and maintains the longevity of the restoration. Non-rigid connectors are definitely a boon to dentistry to protect pier abutments with bone loss in long span bridges.

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