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Rehabilitation Of Patient with Mandibular Denture Using Extracoronal Semiprecision Attachment Combined with Custom-Made Non-Rigid Connector – A Case Report

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ABSTRACT

The restoration of a partially edentulous arch can be a great challenge when there is a Kennedy's class I or class II situation with unilateral or bilateral posterior teeth that are completely missing. It all the more becomes challenging in a long span fixed partial denture scenario where the forces would be substantial to the remaining abutment teeth. Successful restoration can be done with various conventional and contemporary treatment options. One such treatment modality is extracoronal semi-precision attachment retained cast partial dentures combined with a stress breaker for the long span fixed partial denture. This article describes a case report with mandibular Kennedy's class 1 modification 2 partially edentulous arch rehabilitated with a cast partial denture having an extracoronal semi precision attachment (RHEIN 83 attachment system) and a customized non-rigid connector using pen refill.

Key Words: *Extracoronal attachments, combined prosthesis, Removable partial denture, Semi precision attachments, Distal extension denture, Non-rigid connector*

1. INTRODUCTION

The oral cavity for each scenario has its own complications and hence every individual case has its own approach keeping in mind the comfort, function, and aesthetics of the patient. Many innovative clinical designs with modifications to the conventional bridges have been proposed over the years to undertake such a scenario most diligently. Selection of the right type of connector is imperative for the success while undertaking such a case.(1)

A rigid connector design is most commonly used in fixed Prosthodontics however; at times, the rigid connector may not be suitable as the amount of force exerted on the anterior segment may be different than the posterior segment, resulting in a higher rate of debonding, microleakage and caries. Non-rigid connector (NRC) plays an important role in the prevention of this failure. It breaks the stress and also directs it along the long axis of the abutment tooth. NRC is a connector that permits limited movement between otherwise independent members of a FPD.(2)

Removable partial dentures (RPD) for a Kennedy class I or class II situations one treatment modality where in the success of it is determined by proper and meticulous treatment planning for improved aesthetics and function of the same. Hence a conventional fixed partial denture would not be favorable, instead a non-rigid connector is added to reduce the stress concentration to the abutments and the pontic by preventing the transfer of excessive forces to the abutments.[3]

2. CASE REPORT

A 58-year-old female patient reported to department of prosthodontics with a chief complaint of difficulty in chewing and eating due to missing teeth. On examination, partially edentulous maxillary arch with clinically present 13 and 22 (Kennedy's class I mod 1), 23 and mandibular arch (Kennedy's class I mod 2) with clinically present 33, 34, 35, 43 and 45. The patient underwent uneventful extraction of her teeth due to periodontal disease at various intervals over a period of two year. The remaining teeth were healthy with good crown root ratio and with excellent bone support except for the maxillary left lateral incisor with grade 3 mobility was advised for extraction aided in the retention and fabrication of the maxillary and mandibular dentures.

After complete preoperative clinical (Fig:1) and radiographic examination (Fig:2), a prosthetic treatment plan was done. Rehabilitation of patient with a stud attachment reinforced with prefabricated connectors (Rhein 83) for the maxillary denture and a custom-made stress breaker combined with a extracoronal semiprecision attachment for the mandibular denture were planned. Maxillary and mandibular preliminary impressions were made using irreversible hydrocolloid (Algitex, India) (Fig:3). A post and core preparation was done with respect to 13 and 23 and post space impression was made using silicone impression material followed by teeth preparation was done in relation to 33, 34, 35,43 and 45 which were chose as abutment teeth due to good crown root ratio and with excellent bone support after radiographic assessment of the abutment teeth and final impression (Fig:4) was made using silicone impression material (Zhermack,Germany,India). The temporization of the prepared abutment teeth was done. Wax pattern was fabricated (Fig: 5) using inlay wax type 1 using indirect technique and the extracoronal rhein stud attachment was attached to the wax patterns using a surveyor with the help of a parallelometer mandrel (Fig: 6) with relation to 35 and 45. A customized stress breaker was fabricated using a pen refill (Fig:5) that was attached to the wax pattern in relation to the distal part of 43 (Fig:7) which was connected to the mesial part of the wax pattern in relation to 44 which created a tenon-mortise pattern (Fig:7) and was casted to break the stress for the long span fixed partial bridge. The fabricated wax pattern along with the extracoronal attachment was casted using Ni- Cr alloys. A Metal try-in in relation to 33, 34,35 and 44, 45 with extra coronal attachments incorporated was checked for margin fit and accuracy later ceramic application followed by porcelain firing was done. The Metal ceramic crowns with the extracoronal attachment and the customized stress breaker comprises the primary component of the prosthesis (Fig: 8). The Fabrication of wax pattern for the secondary component (Fig: 9) that comprises the distal extension cast partial framework having lingual bar as major connector consisting of mesh wax pattern and the patrix part of the attachment was attached to the matrix part followed by casting of the framework was done.[4] The finished and polished metal framework was tried into the patient's mouth checking for fit and accuracy (Fig: 10). The inner surface of the OT cap was protected using black lab caps during the entire try-in and finishing procedure. The metal ceramic crowns in relation to 33,34, 44 and 45 were cemented using GIC Type 1 luting consistency (GC Fuji).

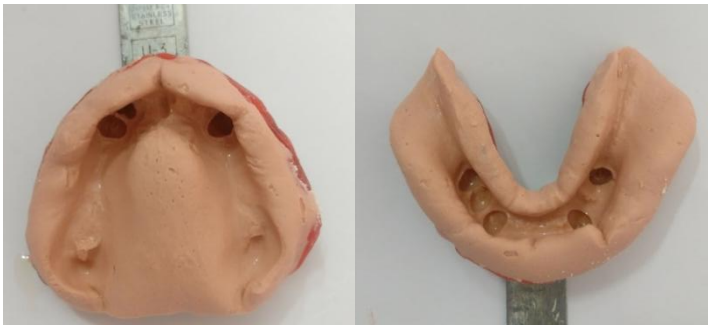
The secondary component was placed into the patient's mouth and a jaw relation was recorded (Fig: 11) with help of wax rims on the edentulous span in relation to both maxillary and mandibular arches. Teeth arrangement was done using acrylic teeth and a final try in was done with both the primary and secondary components in place (Fig:12). The trial dentures were processed and the cast partial denture was finished and polished for denture insertion.

Both the maxillary stud attachment retained overdenture and the mandibular cast partial denture with extracoronal semi-precision attachments were inserted with retentive sleeves inserted to the housing for better retention on tissue side of the denture as shown in (Fig: 13) and denture insertion done (Fig: 14) to the patient and proper post insertion instructions were given. A 24 hours post insertion follow up was done. A periodic follow up was done and the patient had a good esthetics with good stability and retention of the denture (Fig: 15).

MAXILLARY ARCH MANDIBULAR ARCH (KENNEDY'S CLASS I MOD 1) (KENNEDY'S CLASS 1 MOD 2)

PREOPERATIVE INTRAORAL VIEW (Fig:1)

PREOPERATIVE OPG (Fig:2)

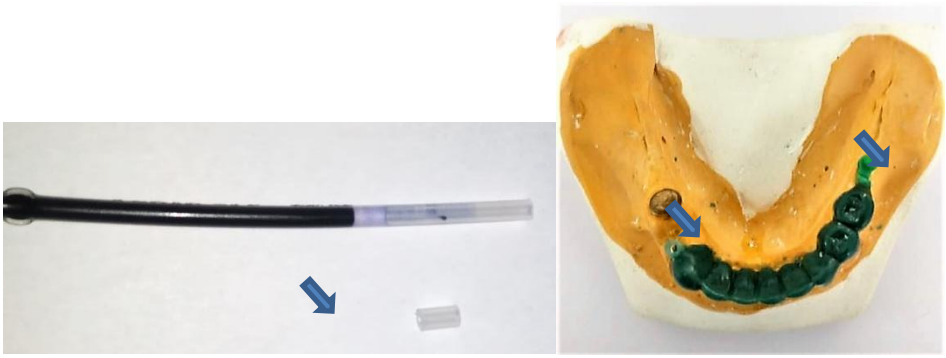


MAXILLARY ARCH MANDIBULAR ARCH

PRELIMINARY IMPRESSIONS (Fig: 3)

IMPRESSION OF THE POST SPACE MANDIBULAR ARCH SPACE IN RELATION 13 AND 23

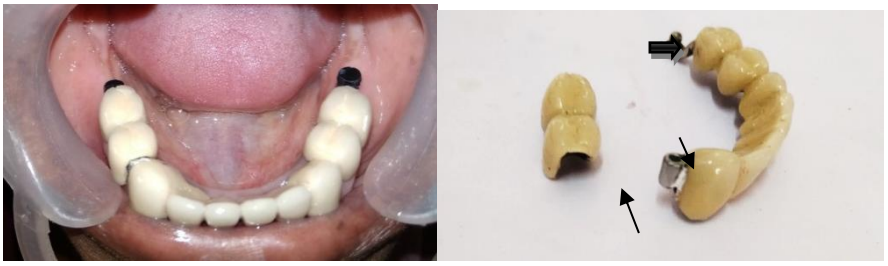
FINAL IMPRESSION (Fig:4)



WAX PATTERN FABRICATION WITH CUSTOMIZED STRESS BREAKER ON 43 USING PEN REFILL WITH STUD ATTACHMENT IN 35 (Fig:5)

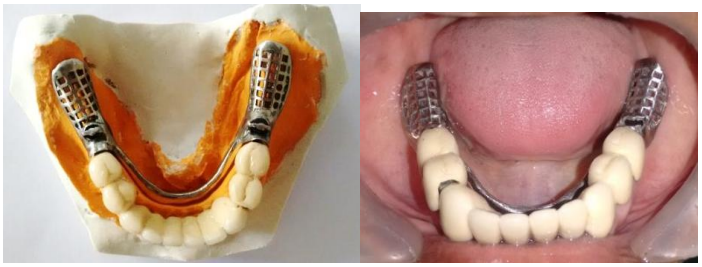
PLACEMENT OF RHEIN ATTACHMENT USING DENTAL SURVEYOR (Parallelometer) (Fig:6)

TENON MORTISE PATTERN OF THE COUNTERPART WAX PATTERN(Fig:7)

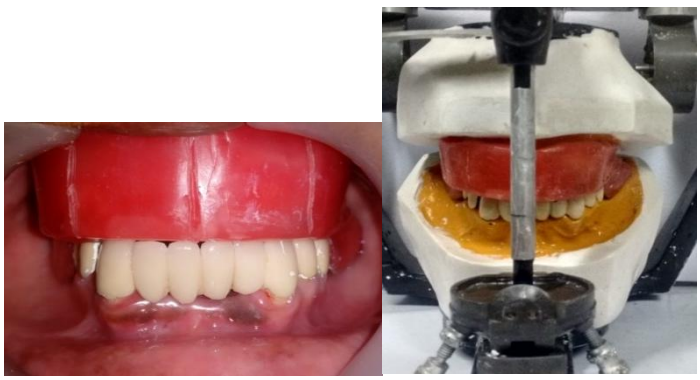


MANDIBULAR FPD UNIT TRY-IN WITH TENON-MORTISE PATTERN INCORPORATED WITH STUD ATTACHMENTS ON 35 AND 45(Fig:8)

WAX PATTERN FABRICATION ON THE REFRACTORY CAST FOR CAST RPD FRAMEWORK (SECONDARY COMPONENT) (Fig:9)



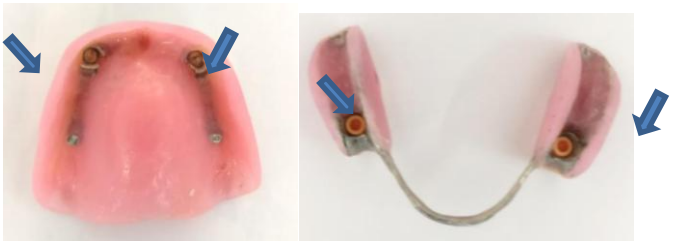
METAL TRY-IN OF THE CAST PARTIAL FRAMEWORK DONE (SECONDARY COMPONENT) (Fig:10)



JAW RELATION (Fig:11)

RIGHT LATERAL VIEW **LEFT LATERAL VIEW**

TRY-IN (Fig: 12)



MAXILLARY AND MANDIBULAR DENTURE WITH RETENTIVE SLEEVES (Fig: 13)

FRONTAL VIEW

RIGHT LATERAL VIEW **LEFT LATERAL VIEW**

DENTURE INSERTION (Fig:14)

POST OPERATIVE VIEW (Fig:15)

3. DISCUSSION

FPD is the most common way to restore edentulous spaces. The success of any fixed partial depends upon its type of connector, shape, size and its location. The main aim of using NRCs is to direct the masticatory stress along the long axis of the abutment tooth.[2]

A **stress breaker** is a mechanical device or design element incorporated into the prosthesis to **dissipate or redirect occlusal forces**, minimizing the transmission of harmful stresses to the abutments and supporting structures.

Non rigid connector may be fabricated by the incorporation of prefabricated plastic/metal inserts into the wax pattern (precision attachments) or through a custom milling process after the first casting has been obtained (semi-precision attachment).[5] These attachments can be intracoronal and extracoronal and can be used with pier abutment, malaligned teeth, long-span bridges and questionable distal abutment.[2] Shillingburg proposed the connector to be placed at the distal aspect of pier abutment. [3]

The most commonly used Non Rigid connector is of the tenon-mortise pattern consisting of a key (tenon or patrix) and a keyway (mortise or matrix), wherein a T-shaped key is locked in a dovetail- shaped key way, such that the cylindrically shaped keyway (mortise) is parallel to the path of the key (tenon).[8]

The excessively long cantilever would have resulted in abutment failure, either by connector breakage, debonding of retainers, destruction of the periodontium, or intrusion of abutment teeth. Inrtusion of an abutment could lead to debonding or bond failure of its retainer, leading to marginal leakage and dental caries.[9]

Therefore placing a non rigid connector between the retainers and the pontics would be the best alternative when dealing with such long span fixed partial dentures.

4. CONCLUSION

The bonhomie of rigid and nonrigid connectors can increase the life span of an abutment in five-unit FDPs as it transfers less stress on the abutments. Abnormal stresses can lead to the failure of long-span bridges. The selection of connectors in FPDs plays a key role in the success and failure of such bridges. The use of rigid connectors in such cases can lead to failure of the treatment, therefore Non rigid connector plays a vital role here. [6]

In this case report, also focused on reducing the forces on the abutments with biomechanically sound designs including stress-breaking elements. They serve as safety valves against the extreme leverage forces created by the rigid connectors which were promptly put-forth by Miles Markley in the Broken-stress principle. [7] **Goodacre et al. (2003)** highlighted that the use of non-rigid connectors can improve the longevity of FPDs by distributing forces more evenly, particularly in long-span bridges or when using compromised abutments. [10]

A small amount of time spent can be a miracle in the long run. The selection of right type of connector is an important step when sorting treatment plan

REFERENCES

[1] Patil A, Sethi T, Doddamani MH, Shah R, Patil AG, Vora A, Dave T, Joshi D. Split It! Let's Break That Stress-A Case Report. Journal of Evolution of Medical and Dental Sciences. 2021 Jun 7;10(23):1803-7.

[2] Rani P, Malhotra P. Breaking the stress with a non-rigid connector. Nigerian Postgraduate Medical Journal. 2020 Oct 1;27(4):391-3.

[3] Shillingburg HT Jr., Hobo S, Whitsett LD, Jacobi R, Brackett SE. Fundamentals of Fixed Prosthodontics. Chicago: Quintessence; 1997. p. 531-2.

[4] Yaqoob A, Rasheed N, Ashraf J, Yaqub G. Nonrigid semi-precision connectors for FPD. Dentistry and Medical Research. 2014 Jan 1;2(1):17-21.

[5] Preiskel HW. Precision Attachments in Dentistry. London: Henry Kimpton; 1968.pp.16-21.

[6] Shillinburg HT,Jr,Sather DA, Wilson EL, Cain JR, Mitchell DL, Blanco LJ, et al. Vol 4. Chicago: Quintessecnce; 2012. Fundamental of Fixed Prosthodontics; pp. 91-2.

[7] Mishra A, Palaskar J, Madhav VN, Chopade SR. Pier Abutment : Break the stress. Ann Prsthod Rest Dent. 2016;2:126-8.

[8] Rosenstiel SF, Land MF, Fujimoto J. 4th ed. ST Louis: Mosby Elsevier Inc.; 2006. Contemporary Fixed Prosthodontics; pp. 673-93.

[9] Sreedevi K, Anulekha CK, Gudapati B. Smile Design with Customized Non-rigid Connector as Stress Breaker!!--A Case Report. Journal homepage: www. nacd. in Indian J Dent Adv. 2023 Apr 1;13(2):74-8.

[10] Goodacre CJ, Bernal G, Rungcharassaeng K, Kan JY. Clinical complications in fixed prosthodontics. The Journal of prosthetic dentistry. 2003 Jul 1;90(1):31-41.