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Rehabilitation of Patient with Maxillary Defect Using Polyacetal Resin Obturator Prostheses: A Case Report.

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Abstract: *Polyacetal resin is well known material in medical field for various applications such as for artificial heart valves and artificial hip joints. In dentistry the material among its other applications, is used for removable partial dentures. The article presents rehabilitation of a patient with maxillary defect using polyacetal resin obturator prostheses. The patient was rehabilitated 5 years ago with chrome-cobalt removable partial denture. The patient complained of worn out denture teeth & ill-fitting of existing prostheses. He was also concerned about unaesthetic display of metallic components of prostheses & wanted to replace it with aesthetic alternative. Due to the physical properties, its biocompatibility and the improved esthetics results, polyacetal resin can be a good alternative for the chrome-cobalt removable partial denture. Polyacetal resin is used in present case to meet aesthetic demand of patient. Patient expressed satisfaction with polyacetal resin prostheses at 1-year recall visit.*

Keywords: *maxillary defect, acetal resin, prostheses, aesthetics*.

I. Introduction

Research in polymer science has provided us with an alternative material called "Acetal resin". Also known as Polyoxymethylene (POM), acetal resin is formed by the polymerization of formaldehyde and is a thermoplastic technopolymer with a monomer-free crystalline structure [1]. The homopolymer, Polyoxymethylene (POM) is a chain of alternating methyl groups linked by an oxygen molecule. This material has been shown to have good biocompatibility and this has fostered its use in total hip replacement and as artificial valve occluders**[1]**. It has been used to form a stress absorbing component in a dental implant system (IMZ) [2]. The possible use of acetal resins as denture base materials was considered by Smith [3]. Acetal resins are fast emerging as a successful denture base material, as tooth- colored clasps and in various other dental applications. Herein a case is presented, in which a patient with maxillary defect is rehabilitated using Polyacetal resin obturator prostheses.

II. Case Report

A 54 years old male patient reported to department of Prosthodontics with chief complaint of ill-fitting obturator prostheses with worn denture teeth. Patient gave history of surgical treatment of tumor in maxillary region 5 years back. Resulting surgical defect was rehabilitated with cobalt chrome cast partial denture prostheses (Fig.1, & 2). On examination there was Aramany's class II defect of maxilla (Fig.2). Patient was not satisfied with aesthetics of existing prostheses & wanted to replace it with suitable alternative. Rehabilitation with polyacetal resin prostheses was presented to patient as treatment option & patient accepted it.

Diagnostic impressions were made using irreversible hydrocolloid (Tropicalgin, Zhermack) after putting the gauge into the defect to obtain diagnostic casts. Surveying was done & undercuts of defect were blocked with wax. After mouth preparation final impression was made using poly vinyl siloxane impression material with putty reline technique (Addition Silicon, Aquasil, Dentsply). Impression was poured in type III dental stone (Kalabhai Karson, India) & master cast was obtained. Refractory cast was obtained from master cast by duplication. Wax pattern was fabricated over refractory cast for polyacetal resin framework. Polyacetal resin framework was obtained in A2 shade by injection molding technique by the method recommended by manufacturer (Bio Dentaplast, Bredent, Senden, Germany). Finishing and polishing was done using soft brushes, ragwheel and polishing paste (Abraso-Star K 50, Bredent, Senden, Germany).

Framework was then tried in patient's mouth for fit & comfort (Fig.3). Retention holes were made along posterior border & border along defect side of framework for retention of acrylic resin. Wax rim was fabricated

& jaw relation was recorded using polyacetal framework. After teeth arrangement & try in partial denture was processed in PMMA resin. Teeth bearing portion of acrylic was hollowed to make prostheses lighter in weight (Fig.4). After finishing & polishing prostheses was inserted in patients mouth to check retention, support, speech, aesthetic, & occlusion (Fig.5, & 6). Patient was instructed regarding oral hygiene maintenance & cleaning of prostheses. At subsequent follow up visits at 3 months' interval for 1 year, patient expressed satisfaction with aesthetic & function of prostheses (Fig.7).

III. Discussion

The possible use of polyacetal resin as a denture base material was considered by Smith over 40 years ago [3] A material "Dental D" is the first dental product involving these resins to come into the market. This injection molded resins have been used as an alternative denture base and direct retainer material since 1986, and were promoted primarily on the basis of superior esthetics, which allowed the clasp to better match the color of the abutment tooth [4].

A particular advantage of RPD made of acetal resin applies to the patients with large oral defect as a result of a maxillectomy procedure where postoperative radiotherapy was planned. In these patients, the density of the defect has to be restored to ensure standardized radiation distribution. This is achieved with various types of boluses that often require tissue surface positioning stents to help support them. Traditional metal-clasp retained stents were discarded as the clasps caused backscatter of the radiation beams. A radiolucent material was needed to retain these prostheses. Dental D, an acetal resin, was used in the fabrication of a positioning stent. It was assessed in terms of ease of manufacture, cost, fit, retention, and radiolucency [5]. Arda and Arikan simulated a 36-month clinical use of RPD clasps made of acetal resin and assessed their retentive force and deformation by comparison with similar clasps cast of Co–Cr. The result showed no deformation for the acetal resin clasp after 36 months of simulated clinical use unlike the Co–Cr clasp which presented an increase in the distance between the tips. However, the acetal resin clasps require less force for insertion and removal than Co–Cr clasps even after the simulated period [6]. Due to various advantages of polyacetal resin like aesthetic & biocompatility, it was used in present case to meet aesthetic demand of patient satisfactorily.

Figures

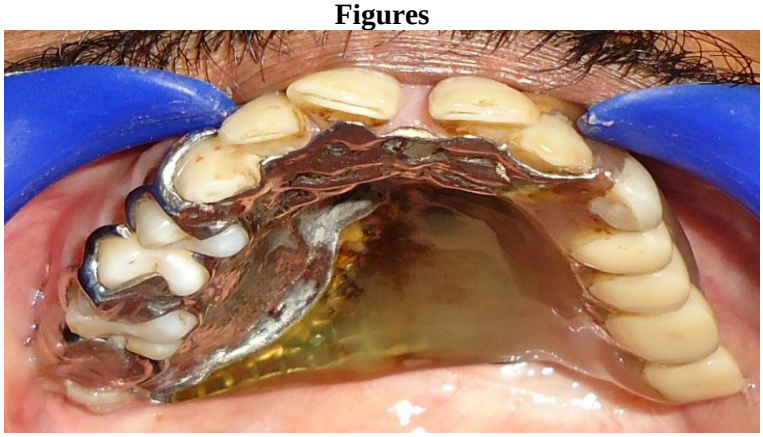

Figure.1: Preexisting prostheses.

Figure.2: Maxillary defect.

Figure.3: Polyacetal resin framework try in.

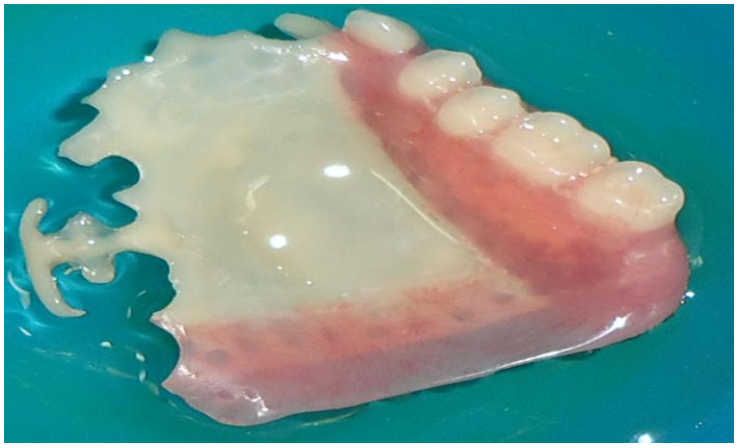

Figure.4: Hollow prostheses floating in water.

Figure.5: Polyacetal resin prostheses in place

Figure.6: Post rehabilitation occlusion.

Figure.7: Happy patient due to esthetic and functional improvement.

IV. Conclusion

It is always a challenge to obtain optimal esthetics while maintaining retention, stability, and healthy tooth structure with cast partial dentures. Acetal resins are highly versatile engineering polymers that bridge the gap between metals and ordinary plastics. Because they offer the strength of metal and the flexibility and comfort of plastic, they make an ideal material for the fabrication of dental prostheses. They are monomer free and offer an innovative and safe treatment alternative for patients who are allergic to conventional resins. For patients who do not wish to have metal in their mouth, for cases where no preparation of teeth is desired, or in periodontally compromised cases where minimum stresses onto the abutments are desired, acetal resin offer a vastly expanded range of applications.

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