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BIOESTHETIC POSTS- AREASON TO SMILE: A REVIEW

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Abstract: Preservation of natural tooth is the ultimate objective of dental treatment. After endodontic treatment, tooth becomes brittle and prone to fracture . In order to strengthen crown some anchorage within teeth is necessary which is gained by rigid structure known as post. Despitehaving varied types of commercially available posts, none of them meet all the ideal biological and mechanical properties. In this context a Biological Postserves as a homologous recipe for intraradicular rehabilitation of a fractured endodontically treated tooth by virtue of its biomimetic property. This review article addresses the esthetic and functional restoration of a fractured, endodontically treated maxillary left lateral incisor , through the preparation and adhesive cementation of a Biological Post made from a freshly extracted, intact maxillary canine. The use of a biological post can be considered as a novel alternative technique for the rehabilitation of an extensively damaged tooth.

Key words: Extracted tooth, Biological post, Dentin post, Metal posts, Esthetic posts

Context:

"They sure are handy when u smile. So keep your teeth around a while" Preservation of natural tooth is the ultimate objective of dental treatment .Endodontic treatment saves the tooth but the tooth becomes brittle and prone to fracture.^[1]

In order to strengthen crown some anchorage within teeth is necessary which is gained by rigid structure known as post. Metallic posts have dominated in the past because of their superior physical properties^{.[2]}Nevertheless because of their metallic color: aesthetics in anterior all ceramic restorations are compromised, particularly when a high lip-line or a broad smile reveals the entire restoration.

Only beauty is a phenomenon that cannot be measured. Today's patients not only expect us to provide them with healthy teeth but also desire beautiful teeth. The general

trend is towards aesthetic dentistry. ^[1]Esthetic concerns have led to the use of esthetic posts that offer biocompatibility, aesthetics, reinforcement of the remaining root, prosthesis retention and no corrosion.^[2]

Despite having varied types of commercially available posts, none of them meet all the ideal biological and mechanical properties. Biological Post serves as a homologous recipe for rehabilitation of a fractured endodontically treated tooth by virtue of its biomimetic property.^[3]

C.H. Swarupa et al [4]reported of a 19-year-old male patientwith a complaint of fractured endodontically treated left maxillary lateral incisor. Clinical and radiographic examination revealed satisfactory obturation of the root canal and crown fracture extending till the junction of the cervical to middle 1/3rd. [Figure 1]shows Preoperative intra oral view.

The patient and his parents were given a detailed information regarding the advantages and disadvantages of all the feasible treatment options. Having agreed for the biological post, the proposed treatment plan included intraradicular biological post, followed by Porcelain fused to metal crown fabrication. Prior to the execution of the proposed treatment, a consent form duly signed by the patient was taken.

Post Space Preparation and Impression

The post space was prepared using Peeso reamers besides preserving a 5 mm of apical Seal.A direct wax impression of the post space was made .[Figure 2]

Fabrication of Biological Post

A freshly extracted, intact maxillary canine tooth waschosen and subjected to autoclaving at 121^oC for 15 minutes.[Figure 3]The donor was subjected to a thorough review of medical history and routine blood investigations before the initiation of the procedure.As the extraction of healthy anterior maxillary teeth is quite uncommon, one

can make use of Tooth Banks—nonprofit institutions that store and provide teeth for didactic, clinical, and scientific use .As a freshly extracted tooth was used, the biomechanical properties of the dentine would be well preserved.The tooth was then sectioned bucco-lingually along the long axis using a diamond disk. The direct wax impression of the prepared post space servedas a guide for the shape, thickness and

length of the post.[Figure 4]Using the wax impression, further contouring of the sectioned toothinto a dentin post and core was done.^[4]

P Fariaet al [5] have reported a successful esthetic and functional recovery of extensively damaged maxillary central incisors through the preparation and adhesive

cementation of biological posts and crowns in a young patient. The technique used by them for the fabrication of dentin post was, retrieval of an acrylic resin pattern of the canals from a plaster model, which was then used as a reference for shaping the dentin post. SimilarlyP.S Mandroli [6], Ranires Romito et al., [7] also reported successful

management of grossly mutilated deciduous teeth in pediatric patients using biological posts and crowns.

Adaptation and Cementation of Post to Root Canals

The dentin post[Figure 5]was periodically verified in the prepared post space throughout the process of contouring. Following satisfactory adaptation of the biological post clinically and radiographically,the post was cemented in the rootcanal using Self- Adhesive Resin Cement following the manufacturer's instructions.

P.Faria et al., [5] have conditioned the posts and the inner portion of the canals with 37% phosphoric acid for 15 seconds. Next, the adhesive system (ADPER SINGLE BOND 2,3M ESPE) was applied and the post was polymerized. The self-cured resin cement (C & B Cement, Bisco) was applied to the inner portion of the canals with the help of a lentulo spiral and lightly applied to the surface of the posts, which were then

Inserted into the canals under constant digital pressure until the end of the cement polymerization.

Crown Preparation and Cementation Procedures

The core was further modified using Filtek[™] Z250 Universal Dental Restorative.[Figure 6]Following tooth preparation to receive Porcelain fused to metal crown, gingival tissue retraction was done and a rubber base impression was made. The PFM crown was fabricated and cemented using Self-Adhesive Resin Cement[Figure 7] because it allows asingle step luting process, thereby eliminating any procedural techniquesensitivity.^[9]Self adhesive resin cements include in a single product the ease of handling of conventional cements as well as the mechanical properties, dimensional stability and micro- mechanical

retention of resin cements.^[10]

The availability of extracted natural teeth would allow the use of biologic restorations to preserve the integrity of patient's natural dentition. "Biological Post" presents several

advantages when assessing the recovery of tooth function and esthetics.^[4]

Comparison of properties of different posts

The modulus of elasticity of glass fibre posts is ~ 40GPa whereas the modulus of elasticity of root dentin is ~13.5GPa. This difference might create stresses at different interfaces and the possibility of post separation and failure. Dentin has a complex microstructure and a modulus of elasticity 13-18GPa, varying in different locations and directions, which may provide a mechanism that inhibits crack propagation in dentin.^[8] Even the flexural strength of fiber[Figure 8]and metal posts[Figure 9]is found to be

4-7 times high respectively, than root dentin^{.[9]}

The dentin post closely resembles dentin in all physical properties like modulus of elasticity, viscoelastic behavior, compressive strength, thermal expansion,etc. Furthermore the fracture toughness of dentin has been found to be better than most of the current restorative materials. A dentin post forms a micromechanical homogenous unit with the root dentin that results in uniform stress distribution. The similarity in elasticity of a dentin post to root dentin may allow post flexion to mimic tooth flexion so that the post acts as a shock absorber, transmitting only a fraction of the stresses placed upon the tooth to the dentinal walls^[8]

The use of natural, extracted teeth (homogeneous bonding) for restorations does, however, present limitations, such as the difficulty of finding teeth with a similar color and shape as that of the destroyed element, or the patient may refuse to accept a tooth fragment obtained from another patient, which prevents the execution of the restoration.^[5]

Concerning the ethical aspect, it is necessary to clarify to the patient and/or his parents or guardian that the post is made from duly donated and properly sterilized extracted teeth, thus preventing biosecurity risks.^[11]

Summary

"Biological Restorations" take on special importance in restorative dentistry as they are one of the variants of biomimetic restorations. These biologic restorations being less expensive, makes this practice a feasible option within Dental Institutions that attend mostly to people of a lower economic strata. Owing to the limited number of cases reported in literature we cannot accurately predict the success rate of biological dentin posts, however, Ambica K et al., [8] and Kathuria A et al., [9] in their in vitro study reported that dentin posts demonstrated higher fracture resistance than Carbon Fiber posts and Glass Fiber posts. Hence,thenovel biological post technique for the management of endodontically treated teeth appears as a promising alternative to various commercially available post systems in permanent as well as deciduous dentition.

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Technique for fabrication of interim closed hollow bulb obturator in a patient with Class II Aramany's defect

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Abstract:

Maxillary defects are prosthetically rehabilitated with obturators which prevent the oro-nasal communication, better speech and deglutition possible. Hollow bulb obturator has the advantage of being light weight and also provides resonance for speech. This article describes a technique for fabrication of an interim acrylic hollow bulb obturator for a patient with class II aramany maxillary defect. The prosthesis is entirely made of heat cure acrylic resin and uniform space is maintained in the bulb portion with the help of custom ice used.

Introduction:

Defects of the maxilla can be congenital or acquired. Acquired defects occur due to trauma, from road traffic accident, gun-shot wound or, surgical resection of the maxilla due to carcinoma. Patients with maxillary defects have problems associated with speech, swallowing and eating due to the presence of oro-nasal communication. Prosthodontic treatment mainly involves separation of the oral and nasal cavities by means of an obturator to prevent the communication, speech, deglutition^{1,2}.

"An obturator is defined as a maxillofacial prosthesis that replaces part or all of the maxilla and associated teeth lostdue to surgery or trauma" $(GPT-8)^3$. It is of three types: surgical, intermediate and definitive obturator. The definitive obturator can be made hollow in-order to reduce the weight of the prosthesis. Hollow bulb obturator can be of open or closed type. The closed type is advantageous over the open type which tends to accumulate nasal secretions and needs frequent cleaning. The advantage of hollow bulb obturator is the light weight of the prosthesis, which will prevent the dislodgement of the maxillary prosthesis against gravity, better patient comfort^{4,5}.

Various techniques have been proposed by authors for fabrication of hollow bulb obturator⁶⁻⁴⁶. Schneider used crushed ice to create a matrix inside the bulb to maintain the hollowness during processing¹⁴.Matalon and Parel used sugar whereas Srinivasan et al used lost salt technique for the fabrication of hollow bulb obturator^{11,15,41}.Other materials were also incorporated to create the

hollowness. Chalianused an acrylic resin shim in the defect area whereas Tanakaet al incorporated polyurethane foam^{9,12}.

This article describes a technique for fabrication of a closed hollow bulbobturator processed using a single flask with double body pour technique and custom freezed ice for fabrication of the bulb portion.

Case report:

A 63 year old male patient reported to the department with the complaint of loose maxillary obturator. History revealed that the patient underwent surgical resection of the maxilla in the right posterior quadrant 6 months before due to oral squamous cell carcinoma. The patient hadAramany'sclass II maxillary defect⁴⁷. Patient was planned for an interim acrylic hollow bulb obturator until the complete healing of the defect. Impression was recorded using irreversible hydrocolloid impression material (Algitex, DPI). Cast was poured with type III dental stone (Fig. 1). Bite registration was done and wax try in was done. Retentive clasps were given in 13, 25, 26 in the trial denture.

Technique:

Flasking and processing was done in two stages but with the same master cast.

1. For the fabrication of the bulb portion, addition silicone Putty (Aquasil, Dentsply) was adapted to the walls of the defect and it was also used to block the tooth portion of the master cast (Fig.2).



BLOCKING OF THE TEETH PORTION WITH PUTTY

- 2. Flasking of this blocked out master cast was done in the base of the flask with Type II dental plaster and the body pour of the flasking was completed in a routine manner after applying separating medium (Cold mold seal, DPI).
- 3. Once the plaster was set, the flask was opened and the putty adapted to the walls of the defect was removed.
- 4. Separating medium was applied on both the halves of the flask and allowed to dry. The flask was packed with heat cure acrylic resin (Heat cure acrylic, DPI) and processing of the bulb portion was done.

5. After processing, the bulb portion was carefully retrieved from the master cast without breaking it from the base pour of the flask(Fig. 3). The bulb portion was filled with water and freezed in a refrigerator.



PROCESSED BULB PORTION

6. The trial denture was placed back on the master cast in the base pour of the flask and fused to the cast (Fig. 4). After applying separating medium to the base pour, the second pour was carried out and flasking was completed.



FLASKING OF TRIAL DENTURE

7. After dewaxing, just before packing of the heat cure resin, the bulb portion with the freezed ice was placed back in the defect (Fig. 5). The prosthesis was processed, finished and polished.



BULB WITH_ICE PLACED BACK IN THE DEFECT

8. The removal of water from the melted ice in the bulb portion was done with the help of a syringe after which the hole was closed with visible light cure resin (Fig. 6).



REMOVAL OF WATER WITH SYRINGE AND THE HOLE SEALED WITH LIGHT CURE ACRYLIC

Discussion:

Acquired defects of the maxilla are prosthetically managed with obturators. Hollow bulb obturators are preferred because of decreased weightand better speech by adding resonance to the voice. Decreasing the weight may result in increased retention, better patient acceptability and comfort. Wu in his study found that hollow bulb obturators have reduced the weight of the prostheses from 6.55% to 33.06% depending on thesize of the defect when compared to solid obturators⁴⁸.

The bulb portion can be processed together with the oral portion or separately and later joined together with auto-polymerizing acrylic resin, light cure resin^{4,29,31,35}. Numerous techniques have been described to fabricate the obturator in one piece or two piece⁶⁻⁴⁶. The advantages of one piece obturator are; it is hygienic and there are no lines of demarcation between heat cure and autopolymerizing resin.

In this case, the bulb portion is fabricated first and used as a receiver for the custom ice which was used for creating the hollowness and joined with oral portion with heat cure resin. Making the obturator completely of heat cure acrylic resin minimizes the stain, reduces leakage and also increases the durability and longevity of the prosthesis. The custom ice space created here allows for uniform space to be maintained in the bulb portion unlike the crushed ice which may collapse and get merged with the resin in previous techniques¹⁴.

Other advantage of this technique is the same base pour of the flask with the master cast was utilised again to fabricate the other part of the obturator. The water in the bulb was aspirated out with a syringe and closed with visible light cure resin avoiding significant damage to the bulb portion.

Summary:

This technique helps in fabricating a lightweight, durable obturator prosthesis made of heat cure acrylic resin using custom ice for creating the hollow bulb portion.

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IMPLANT ABUTMENT CONNECTIONS: A REVIEW

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INTRODUCTION

The concept of replacing missing teeth with artificial substitutes has been a part of dentistry for centuries now. Clinical research in oral implantology has led to advancements in the biomechanical aspects of implants, implant surface features and implant componentry thus widening the applications of implant dentistry from restoration of a single tooth to multiple missing teeth with predictable success. A **dental implant abutment** is formally defined as "that portion of a dental implant that serves to support and/or retain a prosthesis".¹

Crest module is that portion of implant fixture that provides connection to abutment and consists of a platform & anti rotation features.² The success of implant not only depends on osseointegration but also on prosthetic elements. Particularly, the connection between implant and abutment is a key junction because it is the primary determinant of long term stability and strength of implants which in turn determines the final outcome of implant therapy. The implant abutment interface ensures optimal load distribution along with lateral and anti rotational stability.Currently, there are some 20 different implant/ abutment interface geometric variations available.³

SEARCH STRATEGY:

An electronic search was performed of articles on Medline and Ebsco from September 1983 to February 2017. Keywords, such as implant abutment interface, external hexagon implants, internal hexagon implants, morse taper implants, spline dental implants, biomechanics etc were used alone or in combination to search the database. The option of 'related articles' was also used. Finally, a search was performed of the references of review articles and the most relevant papers following which everything was combined.

TYPES OF IMPLANT ABUTMENT INTERFACE:

The implant abutment interface can be categorized into the following types:⁴

1. Whether or not there exists an extension of a geometric figure above the body of the implant:

External Hex: There is an extension above the implant surface.

Internal Hex: the connection is recessed into the implant body.

2. Depending on the space between the connecting parts:

<u>Slip fit</u>: slight space exists between the connecting parts, and the connection is passive.

Friction Fit:no space exists between the components and the parts are literally forced together

3. Angulation between the connecting parts:

Butt Joint: the connecting surfaces are at 90 degrees to one another.

Bevel Joint: The connecting surfaces are at an angle internally or externally.

4. According to the geometrical configuration:

- a. Octagonal,
- b. Hexagonal,
- c. Conical,
- d. Cylinder hex and
- e. Spline, etc.

EXTERNAL HEXAGON

Historical background:

The history of implant dentistry dates back to 1980s with the development of the Branemark Protocol. The original protocol was a two-stage procedure. The first stage involved the placement of a titanium screw into the bone followed by a healing period of 3 months. Stage 2 involved the exposure of the implant and attachment of a transmucosal element. Here, the implant abutment connection used was an external hexagon of 0.7mm height.⁵ It was an effective torque transfer coupling device. This implant system was developed for the restoration of a completely edentulous arch with multiple implant connected to one another with a metal bar.²

Since then implant dentistry has evolved continuously and has expanded its usage in the restoration of one or few missing teeth, maxillofacial prosthetics. The disadvantages of the Branemark external hex make it unsuitable for these applications. The original hex was not an effective antirotaional device.⁶

Abutment screw loosening was reported in about 6%- 48% of the cases.⁷ Also, dynamic micromotion was reported with external hex of height 0.7mm.⁸ To overcome these complications, various implant connections have evolved from it.

Modifications of External Hex:

The external hex is now available in heights of 0.7, 0.9, 1.0 and 1.2 mm and with flat-to-flat widths of 2.0, 2.4, 2.7, 3.0, 3.3 and 3.4 mm, depending on the implant platform.²Also, a variety of modifications of the external hexagon, such as the tapered hexagon, external octagon and the spline dental implantare now available. 9 (Fig 1, Table 1)

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NEW DESIGN	FEATURES	COMPARISON WITH TRADITIONAL EXTERNAL HEX		
TAPERED HEXAGON (Hex lock Innovation)	A 1.5 degree taper to the hex flat and a corresponding close- tolerance hexagonal abutment recess that is friction fitted onto the hex. It was first introduced by Swede-Vent TL (Paragon Implant Co, Encino, CA	Reduced freedom of rotation. So, less screw loosening. Due to friction fit added stability is there.		
EXTERNAL OCTAGON	The external octagon is an eight-sided external implant- abutment connection. Commercially, it was first marketed as a 1- piece narrow diameter (3.3 and 3.5 mm) implant (ITI Narrow Neck) The tall, octagonal extension allowed for 45-degree rotation.	More number of positions to place the implant. Since the geometry is similar to circle less rotational resistance.		
SPLINE DENTAL IMPLANT	The spline dental implantsystem was developed by Calcitek (Calcitek, Carlsbad, CA) in the year 1992. The implant consists of six spline teeth that project outward from the body of the implant and fit into six grooves between the projections from the corresponding abutment. The series of opposing parallel splines match integrally with the corresponding grooves of the opposite member.	Snug fit with excellent locational accuracy. Wider better than narrow.		

Table 1: Modifications Of External Hex 4.9



Figure 1 Tapered, octagon and spline External Hex

INTERNAL HEX CONNECTION:

Dr. Gerald A Niznick designed first form : 1.7mm deep hex below a 0.5mm wide 45 degree bevel.¹⁰ Advantages:

- Reduced vertical height which resulted in**Better esthetics**
- Distribution of lateral loading deep within the implant
- Shielded abutment screw that caused less abutment screw loosening
- Internal wall engagement: less freedom of rotation.
- Wall engagement with the implant that **buffers vibration**, the potential for a microbial seal
- Extensive flexibilty

The internal connection implants can be divided into the following groups:⁴ (Figure 2)

1. Passive fit/slip fit joint

• 6-point internal hex:

- Center pulse-core vent/screw vent
- Friadent-Frialit-2
- 12-point internal hex
- 3i-osseotite certain
- 3-point internal tripod
- Alatech technologies, Camlog
- Nobel biocare/Replace select
- Internal octagon: Omniloc, Sulzer Calcitek

2. Friction fit

Locking taper/morse taper:

- 8 degree taper (ITI straumann, Avana, 3i TG, Ankylos)
- 11 degree taper (Astra)
- 1.5 degree tapered rounded channel (Bicon).



12 point internal hex



Internal Octagon



3 point internal tripod

Morse Taper

Figure 2: Types of internal connection

BIOMECHANICAL FACTORS AFFECTING IMPLANT ABUTMENT INTERFACE (EVIDENCE BASED DECISION MAKING)

1. STRESS DISTRIBUTION

a) Internal vs External

Chun et al ¹¹investigated the effect of 3 abutment types on the stress distribution in bone with inclined loads using finite element analysis. The abutment connections tested were single body, external hex and internal hex implant systems.

It was found that the internal hex implant system generated the lowest Von Mises Stresses for all loading conditions because of reduction in the bending effect by sliding in the tapered joints between the implant and the abutment.

Maeda et al ¹²stated that almost the same force distribution pattern was found under vertical load in both systems.

Fixtures with external-hex showed an increase in strain at the cervical area under horizontal load, while in internal-hex fixtures the strain was at the fixture tip area.

Within limitations of the model study, it was suggested that fixtures with internal-hex showed widely spread force distribution down to the fixture tip compared with external hex ones.

Balik et al¹³investigated the strain distributions in 5 different implant-abutment connection systems under similar loading conditions. External hexagonal connection showed the highest strain values, and the internal hexagonal implant-abutment connection system showed the lowest strain values.

b) Internal connections Comparison

Saidin et al ¹⁴ analysed stress distribution at the connections of implants and four types of abutments: internal hexagonal, internal octagonal, internal conical and trilobe.

The internal hexagonal and octagonal abutments produced similar patterns of micromotion and stress distribution due to their regular polygonal design. The internal conical abutment produced the highest magnitude of micromotion, whereas the trilobe connection showed the lowest magnitude of micromotion due to its polygonal profile.

c) Conical vs Butt joints

Merz and Hunenbart¹⁵studies that conical abutment connections were superior mechanically and helped to explain their significantly better long-term stability in clinical applications.

Norton et al¹⁶ stated that with respect to strength characteristics between conical and external hex butt joints, the conical joint is approximately 60% stronger.**Hansson**¹⁷found that the peak bone-implant interfacial shear stresses generated by the conical implant-abutment interface were less than those produced by the flat-top interface. The implant with the conical interface can resist a larger axial load than the implant with the flat-top interface.

Sutter et al ¹⁸ had shown that the conical angled design could reduce screw loosening by creating a friction lock. In addition, they found that the screw rotation is minimal in the morse taper integrated screwed-in thread abutment system when compared with the external hexagonal connection.

Levine et al ¹⁹demonstrated that the external hexagonal connection system is more susceptible to screw loss than the solid conical abutment connection.

2) FATIGUE RESISTANCE

The design of the implant-to-abutment mating surface and the retentive properties of the screw joints affect the mechanical resistance of the implant-abutment complex.Fatigue is a progressive, localized and permanent structural damage that occurs in a material subjected to repeated or fluctuating strains.

Steinebrunner ²⁰concluded that implant systems with long internal tube-in-tube connections and camslot fixation showed advantages with regard to longevity and fracture strength compared with systems with shorter internal or external connection designs.

Rebeiro et al²¹ evaluated fatigue resistance of 3 implant-abutment connections (external hexagon,

internal hexagon and cone- in-cone) analyzing the prosthetic screw and determined their failure modes. The external hexagon interface presented better than the cone-in-cone and internal hexagon interfaces. There was no significant difference between the cone- in-cone and internal hex interfaces.

Khraisat et al²²concluded that the fatigue strength and failure mode of the ITI system were significantly better (P > .001) than the Brånemark system.

3) CRESTAL BONE LOSS

The literature indicates that type of implant abutment connection influences the stresses and strains induced in peri implant crestal bone.

M.I. Lin et al²³ conducted a study which showed that the crestal bone change in 1^{st} 6 months after loading were all within the success criteria proposed by **Albrektsson et al**²⁴i. e. bone loss< 1.5mm in the first year. The mean changes were less than 1mm in first year for all implants.Crestal bone loss did not differ significantly. Slightly greater—60% for external hex and 52% for both internal octagon and internal Morse taper—during the healing phase (before occlusal loading) than during loading phases 1 and 2 (3 and 6 months after occlusal loading, respectively).

4) MICROLEAKAGE

Microgaps between the implant–abutment interface may cause microbial leakage. Bacterial leakage along the gaps and cavities as a consequence of poor adaptation of components in the two-part dental implants has been reported and suggested as a possible etiology of implant failure.

F.Gil et al²⁵ concluded that the external connection showed more microleakage (Micro gap of 1.22 microns) than the internal connections (micro gap of 0.97 microns).

Steinebrunner ²⁶evaluated microbial leakage in 5 different types of implants. Branemark, Frialit-2, Camlog, Replace Select, Screw Vent.All specimens showed bacterial leakage.

S. Harder et al²⁷investigated the tightness against endotoxins of 2 implant systems(Astra Tech and Ankylos) On an average Astra implants showed a higher tightness than Ankylos implants.

Nascimento et al²⁸ concluded that Morse cone–connection implants showed the lowest bacterial counts when compared with internal and external connection implants under both loaded and unloaded conditions, with no significant differences between them.

5) PLATFORM SWITCHING

The nature of saucerization varies according to implant type (one-stage or two-stage) and abutment connection type. PLS refers to the use of a smaller diameter abutment on a larger diameter implant collar. This type of connection shifts the perimeter of the implant—abutment junction (IAJ) inward toward the central axis of the implant. **Lazzara and Porter**²⁹reported that a concept of platform switching could bring the inflammatory cells infiltration, which would reduce the peri-implant crestal bone change. It requires that the abutment –implant microgap be placed away from the implant shoulder and closer toward the axis thus mesializing the inflammatory zone away from the crestal bone.Subsequent studies have supported the advantages of platform- switching designs.

6) EFFECT OF ABUTMENT MATERIAL

Earlier the abutments were made of titanium until the recent introduction of ceramic abutments. The problems with titanium abutments are the micro gap, consecutive fatigue and wear at the interface.

Yuzugullu et al³⁰assessed the implant-abutment interfaces after the dynamic loading of titanium, alumina, and zirconia abutments. After the dynamic loading, there was no significant difference between the aluminum oxide, zirconium oxide, and titanium abutment groups regarding the micro gap.

Another study by **Yuong Jo et al**³¹evaluated the influence of abutment materials on the stability of the implant-abutment joint in internal conical connection type implant systems using abutments fabricated with commercially pure grade 3 titanium (group T3), commercially pure grade 4 titanium (group T4), or Ti-6Al-4V (group TA). Provided that biological risks can be excluded, it would be recommendable to use abutment materials with high strength and low frictional coefficients to improve the mechanical stability of the implant-abutment interface.

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MORSE TAPER CONNECTIONS:

Mangano et al ³²studied the survival rate and clinical, radiographic and prosthetic success of 1,920 Morse taper connection implants: results after 4 years of functional loading

Success Rate	96.61%
Survival rate	97.56%
Prosthetic complications	0.65%

DISCUSSION

Dental implants have been widely accepted as a predictable and reliable tool for dental rehabilitation ranging from replacement of a single tooth to complete dentition. This calls for a detailed study of implant biomechanics in which implant abutment connection plays a crucial role. It is the primary determinant of strength and stability of an implant-supported prosthesis, which in turn dictates the success rate of implants. The implant abutment connection can be either an internal or external. The distinctive factor that separates the two groups is the presence or absence of a geometric feature that extends above the coronal surface of the implant.

The foundation of implant dentistry dates to the formulation of the Brånemark Protocol in the United States in the 1980s. Since then, implant dentistry has evolved continuously. The original design was an external hexagon connection of 0.7mm in height. However it was not an effective anti rotational device and could not withstand occlusal forces. This has led to the evolution of new designs like internal hexagon, internal octagon, conical etc. to improve the joint stability, which is one of the most important goals in implant therapy.

Several implant–abutment connection designs are now available, and the clinician faces the challenge of choosing an appropriate implant system and connection design. This literature review discusses the evolution of various implant–abutment connections, from the traditional external hexagonal implant to Morse taper implants, to provide the clinician with an overview of commercially available implant–abutment connections.

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CONCLUSION

The implant–abutment interface determines the lateral and rotational stability of the implant-abutment joint, which in turn determines the prosthetic stability of the implant- supported restoration. Internal connections have better prosthesis retention and consequently higher stability, which decrease the stress on the cervical region of the implants and retention screws. Conical implant–abutment interface in combination with retention elements at the implant neck reduce the amount of micromotion. All types of prosthetic platforms can provide high success rate of the implant treatment by following a strict criteria of their indication and limitation. Therefore, a reverse planning of implant treatment is strongly indicated to reduce implant overload.

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ALTERNATIVE METHOD TO FABRICATE SPECIAL TRAY FOR CUSTOM

OCULAR PROSTHESIS- A CASE REPORT

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Abstract:

Eyes are generally the first feature of the face to be noticed and the presence of a pair of eyes is quite essential to maintain the balance and the aesthetics of the face. The loss of an eye can have a psychologically damaging effect on the patient. Such defects are commonly restored with ocular prosthesis. Ocular prosthesis can be stock or custom-made. Custom made prostheses are more comfortable to the patient but are time consuming and need meticulous impression making. This article explains an easy and time-saving method to fabricate a custom tray in order to make accurate ocular impressions.

Key Words: Custom-made, Ocular prosthesis, Custom tray, Ocular impression

Introduction

Eye is a vital organ not only for function but also from an aesthetic point of view. Defects of eye can be broadly classified into enucleation, evisceration and exenteration.¹ These defects have aesthetic, psychological and physiological impact on the patient. Prosthetic rehabilitation of these defect oftenincludes ocular and orbital prostheses. Acrylic ocular prosthesis can be stock or custom-made. Stock prosthesis are used for interim and post-operative purposes.² Custom ocular prosthesis involves impression making of the affected socket and subsequently molding the scleral blank to achieve excellent adaptation with tissues. Custom ocular prosthesis has several advantages like better eyelid movements, reduced incidence of ulceration, improved fit, comfort, improved facial contours, and enhanced aesthetics gained from the control over the size of the iris, pupil and colour of the iris and sclera.³The article

presents an alternate technique for fabrication of a chair-side custom-impression tray for ocular prosthesis.

Case Report

A 25-year-old male patient with the chief complaint of poorly fitting artificial eye in the right socket reported to the Department of Prosthodontics. He reported of losing his right eye in a factory accident before 10 years and was wearing the present prosthesis since 3 years. Examination revealed enucleation of right eye with healthy socket mucosa.(Fig. I) The socket depth was deemed sufficient to retain a custom made acrylic prosthesis for optimal fit and aesthetics. Petroleum jelly was applied to the eyebrow, eyelashes and skin around the socket to prevent impression material from sticking to them.



PRE-OPERATIVE- ENUCLEATION OF RIGHT EYE



ADAPTED OVER THE DEFECT

CONFINE TO SOCKET PERIPHERIES

ELASTOMERIC IMPRESSION MATERIAL

To make a chair-side custom tray impression compound was softened in warm water and patient was asked to close his eye. The warm impression compound was adapted over the patient's eye covering the socket externally. (Fig. II) It was then progressively trimmed to fit the confines of the socket. (Fig.III) Three holes were made in the tray one to receive syringe nozzle and two for excess material to flow out. Light body polyvinyl siloxane impression material was mixed and loaded in a 10-ml plastic disposable syringe.Impression material was slowly injected into the socket. (**Fig.IV**)The impression was carefully removed from the socket and checked for any air bubbles.

The impression was separated from syringe and invested in type III gypsum stone to make a two-part mould. Molten wax was poured in this mould to obtain scleral wax pattern. (Fig.V)It was tried in the patient and checked for proper contour and retention while performing various eye movements. For iris positioning the patient was asked to maintain a straight gaze at an object kept 4 feet away.(Fig.VI) Shade was selected as per opposite side sclera.Flasking was done in a two-part metal flask followed by dewaxing, packing and curing. The retrieved prosthesis was trimmed, polished and inserted. (Fig.VII)



Prior to insertion of the finished prosthesis, it was disinfected using 70% isopropyl alcohol and 0.5% chlorhexidine solution. After thoroughly cleaning the prosthesis with saline solution to prevent chemical irritation, it was inserted and checked for fit, contour, and movements.

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Discussion

Ocular impressions can be categorized as follows: direct impression/external impression, impression with stock ocular tray or modified stock ocular tray, impression with custom ocular tray, impression using stock ocular prosthesis, ocular prosthesis modification, and wax scleral blank technique.⁴ Although custom tray and stock tray methods are efficient in impression making they require increased chair-side time and patient appointments. The method explained in this article combines benefits of both these techniques. The custom tray is made chair side in the same appointment without added laboratory steps which makes this a faster and easier method.

Loss of eye has functional, aesthetic and psychological impact on the patient⁵. Rehabilitation of such defects with ocular prosthesis can improve his/her physiological and psychological well-being. An ocular prosthesis should replicate correct gaze, shape, and colour of the natural eye.⁶ It should prevent collapse or loss of the shape of the lids, accumulation of fluid in the cavity and provides proper muscular action of the lids.⁷A well-fabricated prosthesis not only restores function and aesthetics but also restore patient's self-confidence and psychological health.

Conclusion

Fabrication of a well-adapted custom prosthesis starts with a good impression. The technique described in this article provides fast and efficient way to fabricate a chair-side custom tray which will help in making an acceptable impression.

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MINIMALLY INVASIVE MANAGEMENT OF NON-SYNDROMIC OLIGODONTIA INAN

ADULT – A CASE REPORT

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Abstract:

Oral rehabilitation of oligodontia requires interdisciplinary approach and better outcome can be

obtained if treated at a younger age. This article describes a case of non syndromicoligodontia in an

adult who reported with midline diastema, overerupted maxillary central incisors, retained laterals

and canines and missing permanent teeth. Collaborative efforts of prosthodontic, periodontic and

endodontic procedures were carried out to establish a better smile line and esthetics.

Keywords: oligodontia, hypodontia, agenesis, prosthetic treatment

Introduction:

Anodontia is a condition wherein the teeth are congenitally missing.Hypodontia refers to a condition wherein, the missing of teeth are less than five permanent teeth. Oligodontia is the agenesis of six or more teeth excluding the third molars^[1]. The etiology of congenital absence of teeth can be due to heredity or developmental anomalies. Oligodontia usually occurs due to mutation of MSX1 and PAX9 gene^[2,3]. Various syndromes associated with oligodontia are ectodermal dysplasia, Rieger's syndrome, oto-palato-digital syndrome, Down's syndrome, Pierre Robin syndrome, EhlerDanlos syndrome, Witkop

syndrome, oro-facial-digital syndrome, oculo-facial-cardio-dental syndrome or incontinentiapigmenti. It can also occur isolated with no systemic conditions which is called as non-syndromic oligodontia which occurs in 0.16%^[4]. When associated with syndromes, concomitant presence of systemic features affecting the skin, hair and nails are seen^[5]. Congenitally missing maxillary lateral incisors, second premolars, and mandibular central incisors are commonly seen in oligodontia cases^[6]. Other oral findings include delayed eruption, retained deciduous teeth, enamel hypoplasias, increased free-way space and cleft lip/palate, diastema, and deep bite^[7,8].

This condition requires comprehensive treatment planning with good coordination between various

disciplines of dentistry like endodontics, periodontics, orthodontics, prosthodontics and if detected at

an early age pedodontics and surgery also offer help in rehabilitation.

Case report:

A 26 year old male patient reported to the department of prosthodontics with the chief complaint of unaesthetic smile and required immediate solution. On examination, there was absence of 8 permanent teeth (12, 13, 15, 22, 23, 24, 31, 41) and also presence of retained deciduous teeth (52,53,62,63,55,71). 11 and 21 were supraerupted with midline diastema; due to the supraeruption, the marginal gingiva on the central incisors were placed inferiorly as



Fig. 1 Pre-treatment intra-oral view of 11, 21 with RD 52,53,62,63 Fig. 2 Radiograph of the patient

compared to the adjacent teeth (Fig. 1). Ortho-pantamographrevealed absence of permanent maxillary laterals and canines, mandibular central incisors (Fig. 2). History revealed no genetic or familial association of anodontia. No abnormality was seen in either hair or nails, perspiration was normal and no congenital clefts of lip or palate was seen. So, the condition was diagnosed as non-syndromic oligodontia as it was not associated with any other clinical systemic signs and symptoms. The patient was not willing to go in for extensive and long term treatment options. The patient requested he required a pleasant smile for an impending wedding.

The treatment plan involved esthetic correction with minimally invasive procedures without extraction of retained deciduous 52, 53, 62 and 63. Mock wax up of 52, 53, 11, 21, 62, 63was done to evaluate the final outcome. (**Fig.3**) Correction of smile line was done by reducing the level of 11 and 21 after root canal treatment and tooth preparation was completed to receive temporary crowns. (**Fig.4**) Cast was made from the diagnostic mock wax up model for template fabrication. The template was made using clear thermoplastic sheet in-order to make direct composite veneers in 52, 53, 62, 63. (**Fig.5**) Trial was done with bis-acryl provisional material (Pro-Temp, 3M ESPE, USA). Direct composite veneering (Filtek,3M ESPE, USA)was done in 52, 53, 62, 63. Gingival architecture was corrected byosteoplasty and gingivectomy in 11 and 21 and new temporaries were fabricated for 11 and 21 to the new level of gingival zenith. (**Fig.6**) After 3 weeks of healing, final impression was made with putty wash technique using polyvinyl siloxane impression material (Aquasil, Dentsply, USA). Metal ceramic crowns were fabricated for 11 and 21 and cemented with Type I glass ionomer cement(GC Gold Label 1 Glass lonomer, GC,Japan) to achieve an optimal esthetics. (**Fig.7**)The patient has been followed up for two years.





Fig. 7 Post-operative view of patient after cementation of metal ceramic crowns in 11,21 June 2017, Volume: 1, Issue: 3

Discussion:

Non-syndromic familial oligodontia in most caseshas been shown to be inherited as autosomal dominant trait. MSX1and PAX9 genes play a key role in early tooth development. All mutations of PAX9 identified to date have been associated with non-syndromic form of tooth agenesis^[2,3]. In this case, there is no systemic syndrome associated so it was concluded as non-syndromic type of oligodontia.

Congenital missing teeth can create dental and facial disfigurement which can lead to social withdrawal and psychological stress. Oral rehabilitation of oligodontia patient is therefore important for functional, esthetic and psychological reasons. Treatment options depend on the age, number of missing teeth, severity of the condition and patient's perceived need for care. Multidisciplinary approach enhances the success of the final aesthetic outcome especially if detected at an early age. In this case, the patient was an adult and mainly concerned with correction of smile in the maxilla, warranted immediate aesthetic care with minimally invasive procedures. So it was decided to go with non-extraction of retained deciduous teeth and veneering with composite. Ideally, orthodontic correction by intrusion anduprighting of steep inclined and supraerupted incisors should be done to correct the occlusal plane^[9]. As the patient wanted the treatment to be done in a short span of time, correction of plane was done by reduction of crown height after endodontic treatment and correction of gingival contour by osteoplasty and gingivectomy. Metal ceramic crowns were given instead of all ceramic as the patient wanted a less expensive option. Meticulous planning involving interdisciplinary team approach will provide success of the final outcome^[9,10]. Interdisciplinary approach of endodontics and periodontics together with prosthodontics helped in restoring the smile line and gingival contour providing better aesthetics with a minimally invasive approach

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LAMINATE HANDLING TOOL - A NOVEL DEVICE.

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Abstract:

The routinely fabricated porcelain laminate veneersmeasure about 0.5mm-0.8 mm in thickness replacing the reduced enamel. These porcelain laminatesveneers are very difficult to handle due to their minimal thickness and slight careless handling can result in chipping of the margins and at times even fracture. In this article a porcelain laminate suction holder is designed and used for handling the porcelain laminateveneers during the cementation procedure which can also provide uniform pressure during luting.

Key words: porcelain laminate, silicone, suction cups.

Introduction:

Porcelain laminate veneers were first introduced by Charles Pincus in 1938^[1] to provide temporary aesthetic improvement to patients in the film industry, but the development of enamel etching and porcelain surface treatment in the early 1980s allowed this to become a more widely used procedure for aesthetic correction.^[2-4]Porcelain laminate veneers are used in the correction and alteration of tooth position, shape, size and color. They require a very minimal amount of tooth preparation measuring in

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thickness of about 0.5mm-0.8 mm; therefore they are more conservative restoration than a crown, which requires significant removal of sound tooth structure.

Following tooth preparation the porcelain laminatesveneers are fabricated in the dental laboratory based on the requirements and sent back to the dentist for final cementation. Due to their minimal thickness, it is usually very demanding, on the part of the dentist to handle such veneers.Handling porcelain laminate veneers requires at mostcare, so that it does not slip down or there should not be of much pressure while holding it between the fingers resulting in fractured margins.

The suction holder described here is designed and used for holding and easy handling of porcelain laminateveneers during the cementation procedures. The suction holder is made of stainless steel with 10 cm length and 10mm diameter. It consists of a 2mm diameter needle connected to the nozzle of the metal holder containing a vacuum chamber. Two silicone suction cups, one with 5mm diameter and another with 3mm diameter were made to be connected with the tip of the needle (fig -1,2,3).



Fig.2_porcelain laminate suction holder





Fig.3_components of porcelain laminate
Suction Holder

FIG.1 LINE DIAGRAM

Procedure:

- 1. Select the correct size of suction cup required for holding the porcelain laminates veneers.
- 2. Connect the suction cup to the tip of the hollow 2mm needle and attach the needle to the connecting nozzle of the stainless steel housing..



Fig.4 positioning of porcelain laminate suction holder

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3. Position the suction cup in the center of the porcelain laminate veneers and press the switch so that the air is sucked by the vacuum chamber and suction is created in the suction cups (fig-4).



Fig.5 porcelain laminate being held using the suction holder

- 4. Now remove the porcelain laminate veneers from the cast (fig-5) and loaded it with resin cement and position it over the prepared tooth and release the suction by pressing the switch again.
- After usage, remove the suction cups and dispose them. Sterilize the metallic components of the instrument and place them in the storage area and close the plug (fig-6).



fig.6 storage compartment

The instrument is very simple and works with the basic suction mechanism. The suction cups and the vacuum chambers were made of biocompatible silicone material and the stainless steel metal housing

can be easily detached and sterilized. The suction cups are designed to hold up to 10 grams in order to perform efficiently. The storage compartment in the instrument is designed to store the suction cups.

In comparison with the existing optrastick adhesive stick, this instrument can provide uniform pressure on the surface of the laminate during luting, which helps in uniform escape of the excess cement. The wide diameter of the suction tipprovides a uniform and complete adhesion of the laminate. Additionally, the suction tips are disposed off for infection control.

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Conclusion:

The instrument mentioned above has been tried clinically and have proved to a useful aid in handling porcelain laminateveneers and also for handling full veneer anterior crowns during cementation procedures, which is not possible with existing laminate holders. The soft silicone surface of the suction cup aids in better suction over the polished surface of the porcelain laminate and also prevents scratches during handling.

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COMPARATIVE EVALUATION OF LIGHT TRANSMITTANCE OF THREE

HIGH TRANSLUCENCY MONOLITHIC ZIRCONIA

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ABSTRACT:

Context: Original article- invitro study

Aims: This study was aimed to compare the light transmittance of three newer high translucency monolithic zirconia systems. **Methods and Material**: The monolithic zirconia systems were divided into three groups: Group 1: ZIRKON ICE-HT, Group 2: PRETTAU ANTERIOR and Group 3: CERAMILL ZOLID HT. From each group 5 specimens were fabricated (15mm X 15mm X 1mm) by handmilling. Each group were sintered according to manufacturer's instructions and glazed. Specimens were mounted on a black board and light transmittance for each specimen was obtained using Digital SpectroHazemeter with transmittance mode. The light transmittance value were obtained in percentage. **Statistical analysis used**: The measured percentage of transmittance were analyzed with Two Way-ANOVA and Tukey test (p<0.05). **Results**: There was no significant difference between group 1 and group 3(p>0.05). Group 2 – Prettau Anterior showed significantly higher light transmittance than group 1 and group 3(p<0.05). There were no significant difference between the specimens in each group (p>0.05). **Conclusions**: Within the limitations of this pilot study, it can be concluded that the newer zirconia system -Prettau anterior has an improved light transmittance when compared with the other high translucency monolithic zirconia systems.

INTRODUCTION:

Ceramic has been the material of choice for esthetic restoration, due to the durable physical and optical properties.All ceramic restorations combine the esthetic veneering porcelain with stronger

ceramic core for highly demanding esthetic management.(1) How ever studies on all ceramic restoration have listed cohesive failure of the veneering porcelain as the primary cause.(2-4)

The need for veneering over high strength ceramic and subsequent cohesive failure was eliminated with the introduction of monolithic Zirconia. The white opaque nature of monolithic zirconia limited their use as posterior restorations. Manufacturers have introduced monolithic zirconia with higher translucency to expand their use to the esthetic region. Translucency is defined as the relative amount of light transmission or diffuse reflectance from a substrate surface through turbid medium.(5) Translucency is an important factor apart from the color of the restoration to produce life like finish. The translucency is dependent on the chemical nature of the crystals, size of the particles, microstructure, pores, impurities and sintering temperature.(6) In a study by Li Jang et al in 2011 stated that partially nanostructured powders (ZrO₂-3 mol.%Y₂O₂) sintered densely at 1350-1500°C produced higher translucency.(7). With the introduction of numerous high translucency monolithic zirconia.

Materials and Methods:

Specimen Preparation:

Five presintered discs of size 15 mm X 15 mm and 1 ± 0.2 mm thickness were fabricated by handmilling for each of following monolithic high translucency zirconia systems. Group I-ZirkonICE(Zirkon Zahn,Italy), Group II- Prettau Anterior(Zirkon Zahn, Italy) and Group III-CermillZoid (AmannGirrbach, Germany). All the discs were fabricated with the shade corresponding A2 Vita shade guide. A total of fifteen specimens (n=5 per group) were polished to a flat surface with diamond-impregnated discs. The thickness was standardized using a digital caliper before sintering.(Figure 1) Specimens were embedded with alumina refractory beads in alumina crucible. The sintering procedure for each group was adapted according to manufacturer's recommendations. Group I- Heat up phase –room temperature to 1500°C at 8°C/min, dwell time – 2 hrs -Cooling phase – final temperature to room temperature at 8°C/min

Group II- Heat up phase – room temperature to 1450°C at 5°C/min, dwell time – 2 hrs

- Cooling phase – final temperature to room temperature at 5°C/min

Group III- Heat up phase – room temperature to 1450°C at 7 K/min, dwell time – 2 hrs

- Cooling phase – final temperature to room temperature at 5°C/min.

Sintered discs were obtained and finished on both sides with diamond polishing paste to achieve smooth finished surfaces. The sintered discs were then mounted on a black board such that the black

board covers the edges of the discs allowing the transmission of light through the center of the disc. (Figure 2).





Figure 1: Presintered Zirconia discs

Figure 2: Sintered zirconia disc mounted on a black board

Light transmittance measurement:

The transmittance of specimens was evaluated using Digital Spherical SpectroHazemeter(ASTM D1003-BS2782 Diffusion system) with transmittance mode.(Figure 3). The SpectroHazemeter works on the same principle of spectrophotometer that has light source with specific wavelength (monochrome) and a photometer within an integrated sphere. The specimen is placed between the light source and the sphere just before the light enters the port.(Figure 3). The photo detector with in the sphere detects the voltage signal delivers it to a galvanometer from which the digital reading from the computer is acquired. The amount of light transmittance through the zirconia is obtained in unit percentage. (0 % - completely opaque, 100%- completely transparent).



Figure 3:Digital Spherical SpectroHazemeter Figure 4: Illustration on the principle of Spectrohazemeter

Statistical Analysis:

Two-way analysis of variance (ANOVA) was performed to compare the light transmittance between the groups. Tukey test was done to determine the group with highest light transmittance with α = 0.05 using SPSS11.0(SPSS Inc., Chicago,USA) Satistical software.

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Results :

The light transmittance of three high translucency zirconia were shown in Table 1 and 2 .Transmittance of the zirconia ranged from 19.65% to 36.75%. As seen from the statistical result, there is a significant difference in light transmittance between the groups (p<0.005). And Tukey test showed that light transmittance was significantly higher in group II than group I and Group III. Table 3, 4

Group	Mean Light Transmittance	SD	
Group I	20.5667	.57518	
Group II	36.4167	.53463	
Group III	23.3833	3.96779	

Table 1 Descriptive Statistics of Light

transmittance of three high translucency zirconia

system

Tests of Between-Subjects Effects						
Dependent	t Variable: N	/alues				
Source		Type III	df	Mean	F	Sig.
		Sum of		Square		
		Squares				
Intercept	Hypothesis	6458.801	1	6458.801	978.071	0.001 ***
	Error	13.207	2	6.604		Over All
Group	Hypothesis	429.024	2	214.512	43.974	0.002 **
	Error	19.513	4	4.878		Between Groups

Table 2: Two- Way ANOVA - Between the Groups

** - There is statistical significance difference between the Group I, Group II and Group III at 95%

[p< 0.05]

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Values					
Tukey					
Group	Ν		Subset		
			1	2	
Group I		5	20.5667		
Group III		5	23.3833		
Group II		5		36.4167	

Table 3: Tukey Test- Comparison of light transmittance

between the groups



Table 4: Light Transmittance of the specimens in percentage.

Discussion:

Natural teeth demonstrate translucency, opalescence and fluorescence, which are the light dynamics that needs to be recreated to provide successful esthetic restoration. Translucency is an intermediary between complete opacity and complete transparency.(8) The quantitative measurement of translucency is obtained by measuring the transmittance of the material. Transmittance is a physical parameter representing the ability of light to pass through certain medium. Several factors influence the value of translucency such as the presence or absence of color, thickness of the material and surface texture.(9) In this study the shade was standardized among the group by selecting a standardized A2 Vita shade. As the Law of Lambert states, $T=e^{-\alpha x}$ states that the thickness of a material is inversely proportional to the transmittance.(6) Thus specimen thickness was standardized to 1 ±0.2 mm to eliminate their influence in light transmittance. One more important factor that influences quantification of light transmittance is Edge – loss. It is a phenomenon that occurs with

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translucent materials whenever the light within the sample is scattered to the edges without being absorbed.(10,11) Therefore, the sensor does not detect this lost light. In this study mounting the specimen on a black board to prevent the scattering of the light eliminated the edge-loss effect.

Zirkon ICE and CeramillZolid are high translucent monolithic zirconia with their use restricted to posterior restorations. However the translucency was claimed to be better than zirconia, which were used for all ceramic substructure. A newer monolithic zirconia, PrettauAnterior, Zirkon Zahn , Italy was introduced in 2015, indicated mainly for the anterior restorations, with higher translucency than other monolithic zirconia. However there is no literature on composition, manufacturing process and comparison of light transmittance of prettau anterior with other high translucency zirconia. In this study, light transmittance of Prettau Anterior was significantly higher than the other high translucency zirconia as claimed by the manufactures. This significant increase in translucency may be attributed to the increased sintering temperature, particle size, porosity, density, microstructure and impurities in zirconia. According to Li-Jang et al(7) light transmittance of zirconia increased with decrease in particle size. According to Carrabba et al 2017,(13) increase in translucency decreased the strength of the zirconia, and on the contrary to the previous study by Li Jang et al the translucency increased with increase in average grain size among the groups evaluated. In our study it is noted that the modification of microstructure of zirconia through patented processing have influenced the transmittance in Prettau anterior. The importance of esthetics to produce a successful restoration has become in the ever-growing trend in restorative dentistry. Multilayered zirconia incorporating the high translucency and pre-colored technology produced by the process of electrodeposition has been on research since 2013 and were recently introduced in the market in 2016. Further research on the factors that modify the translucency of zirconia, other optical properties and their influence on the mechanical properties, properties of newer multilayered zirconia is essential for a clinician to understand and provide a esthetically successful restoration.

Conclusion:

Within the limitation of the study, the newer Prettau Anterior, Zirkon Zhan had increased transmittance than the other high translucency monolithic zirconia

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Cu-sil dentures – A novel approach to conserve few remaining teeth: A Case report.

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ABSTRACT:

The present prime concern in dentistry is on preservation of remaining natural teeth. Presence of few teeth in oral cavity help in preserving alveolar ridge integrity, maintain the proprioception, and gives psychological benefit to the patient. Transitional denture provides us with alternative treatment plan for the patients willing to replace their missing teeth while retaining their very few remaining teeth.

A relatively newer type of transitional denture is Cu-sil denture and it is the simplest removable partial denture. A Cu-sil denture is a denture with holes, lined by a gasket of silicone rubber or soft liners, the holes thus providing space for remaining natural teeth to emerge into the oral cavity through the denture.

This case report represents a simple chair side technique to fabricate Cu-sil dentures in usual dental set-up.

Keywords: Cusil denture, Transitional denture, soft liners.

Introduction:

De van stated" The perpetual preservation of what remains is more important rather than the meticulous restoration of what is missing"

Even a single healthy tooth in the arch can help in preservation of alveolar ridge height. Preserving natural teeth also helps in maintenance of proprioceptive ability of periodontium. Single remaining teeth in the arch can increase the stability of the entire denture many fold over a completely edentulous arch. Treatment options are such arches with very few remaining teeth includes over dentures, immediate dentures and transitional dentures. Over dentures may not always be a favorable option in all such patients because of contraindications, need for endodontic treatment for which the patient may not be willing for, poor positioning of remaining teeth, requirement of more patient visits and economic reasons.

Transitional dentures prove to be a good treatment option for such patients who are not willing for the extraction of the remaining healthy teeth. CuSil denture is one such transitional denture which is rarely opted for treatment in dental practice but can prove an easy and affordable treatment option for such arches.

A CuSil denture is essentially a full denture with holes through which natural teeth protrude without compromising the retention which usually holds the denture in place. These holes are surrounded by gasket of silicone rubber or soft liner which envelops the natural teeth, allowing a natural suction to form under the denture. In addition it also gives mechanical stability offered by the immobility of the natural teeth. These are especially useful in situations in which the remaining teeth are on the same side of the arch.

This case report describes a newer approach to save the few remaining teeth via the CuSil denture.

INDICATIONS:

- Mobile, isolated or periodontally involved teeth
- A patient who does not want to lose his remaining teeth but cannot be adequately treated with fixed or other removable partial dentures
- A patient with a few remaining teeth whose mucosa, supporting bone, or general health, suggests a poor prognosis for complete dentures.
- When natural maxillary teeth are to oppose a mandibular complete denture.

CONTRAINDICATIONS

• When there are Multiple teeth

• Severe Undercuts

CASE REPORT:

A 60 year old male patient reported to the department of prosthodontics, AME's Dental College and Hospital, Raichur with the chief complaint of difficulty in mastication and poor appearance due to several missing teeth. The patient has been partially edentulous since 2 years. Intraoral examination revealed Kennedy's Class I mod 1 condition with missing 17, 16, 15, 14,11, 27, 26, 25, 22, 21 in maxillary arch and Completely edentulous mandibular arch (Figure 1). It was decided to fabricate a partial denture for the maxillary arch and complete denture for the mandibular arch as the patient was not willing for extraction



(Figure 1)

Procedure:

1. Upper impression was made with irreversible hydrocolloid impression material (Alginate-

dentsply) and lower impression was made with impression compound. (Figure 2)



2. The special tray was constructed using autopolymerising resin. Border molding was done with DPI green stick compound then impression was made with zinc oxide eugenol and over that pick up impression was made using alginate. (Figure 3)



(Figure 3)

3. Secondary cast was made. Jaw relation(figure 4), tryin(figure 5) ,denture processing was done in

conventional manner.



(Figure 4)

(Figure 5)

4. Denture was finished and polished. In the 12,13 and 22,23 region, space of 4-5mm was created in the denture. Acrylic based soft liners (GC RELINE SOFT LINER) is applied to occupy the space between denture and natural teeth(figure 6). Denture was inserted in patient's mouth and held in

position(figure 7). After setting of the soft liner material ,denture was removed and the excess was trimmed.



(Figure 6)

(Figure 7)

 ${f 5.}$ Post insertion instructions were same as for any removable prosthesis. As there are chances of

fungal growth on the soft liner material, special care has to be taken regarding maintenance of excellent oral and denture hygiene. Use of denture cleansers with antimicrobial agents can be recommended.



(Figure 8)

DISCUSSION:

Cu-Sil dentures are designed to preserve the remaining natural teeth and thus the alveolar bone. They have effect on retention and stability of dentures. In addition, it gives the patient psychological satisfaction of retaining the natural teeth as they were. Vertical dimension and proprioception is maintained by retained natural teeth. Attachment devices are avoided entirely. This treatment modality does not require any tooth preparation and extra patient visit. It does not require any special armamentarium and material. If a tooth is lost in future, existing denture can be modified to occupy its place. They serve as a solution for single standing or isolated teeth present in dental arch. They are not indicated for patients with large number of teeth evenly distributed across the dental arch. These dentures are associated with some disadvantages. The functional duration of soft liner used is minimal and it needs frequent corrections.

ADVANTAGES:

- Simple with ease in fabrication.
- Cu-sil denture cases require no adjustments upon insertion.
- Denture stability and retention is achieved even when only one or two permanent teeth are present

- Proprioception is maintained, the potential psychological impact is avoided, and patient can achieve clarity of speech, mastication and aesthetics.
- Cu-sil dentures eliminates the clasps as these dentures stabilize, cushion and splint teeth with an elastomeric gasket that provides retention and seals out food, therefore, maintains a good oral hygiene
- Cu-sil like denture is a promising alternative for paediatric group of patients with unique edentulous conditions wherein multiple primary teeth are missing with very few permanent teeth erupted which cannot be used as abutment teeth for space maintainer.

DISADVANTAGES:

- The functional duration of soft liner used will be of short duration
- Entire gingival margin of remaining teeth which is covered may lead to plaque accumulation.
- Cu-sil lower dentures are prone to fracture when grounded against the upper natural teeth **CONCLUSION:**

Cu-Sil like dentures serves as a viable treatment alternative for patients with very few remaining teeth. They rest on the soft tissues while provide a snug fit over existing, healthy tooth structures. An elastic gasket seals itself around the cervical part of each tooth, thereby providing a stable and healthy fit. It promotes healthy stimulation to maintain alveolar bone. Retention is improved, attachment devices are avoided, and vertical dimension and proprioception are maintained. Factors to be considered during treatment planning include number of teeth present, their distribution across the arch, periodontal status and undercuts.

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