



**ORIGINAL RESEARCH PAPER**

**Dental Science**

**PROSTHODONTIC REHABILITATION OF A SEVERELY COMPROMISED MAXILLARY DENTITION: A MULTI-DIMENSIONAL APPROACH.**

**KEY WORDS:** Maxillary Rehabilitation, Zirconia, CAD/CAM, Vertical Dimension.

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**ABSTRACT** Oral rehabilitation is often a challenging situation for the Prosthodontist when there is multiple loss of teeth. Fewer abutments to take support further adds to the problem. In many such instances stress breakers are used to reduce the stress acting on a lone standing abutment tooth. Young adults further have aesthetic and social concerns especially when maxillary anterior teeth are missing or compromised. This clinical report describes a successful approach for the treatment of an aesthetically compromised dentition with the loss of vertical dimension and multiple missing teeth in the maxillary arch in a young adult, using CAD/CAM milled layered Zirconia crowns and a Zirconia stress breaker.

**INTRODUCTION**

The face and its expressions have always played a crucial role as they can greatly affect interpersonal relationships<sup>1</sup>. According to several studies, it is especially the smile that influences the appearance of the face as a beautiful smile seems to convey serenity, safety, and success in the beholder<sup>2</sup>. Therefore, patients who turn to dentists require, an outcome that meets their aesthetic as well as functional needs in order to obtain a natural smile<sup>3</sup>.

Loss of teeth as a young adult can cause a lot of social dejection. Restoration of the severely compromised dentition is one of the most challenging procedures in dentistry<sup>4</sup>. Long standing multiple tooth loss has consequent effects on the vertical dimension. Dealing with a situation in which there are not adequate abutments for support on either side is a difficult task for the clinician.

In compromised situations like a lone standing abutment, selection of the correct type of connector can determine success or failure of the prosthesis<sup>5</sup>. Non rigid connectors or stress breakers can be used in such situations. A stress breaker is a device or system that relieves specific dental structures of the occlusal forces and redirects those forces to other bearing structures or regions.<sup>6</sup>

The introduction of zirconia (ZrO2) as a dental material has generated considerable interest in the dental community.<sup>7</sup> Zirconia is a radiopaque aesthetic abutment with well-documented biocompatibility and is also bioinert<sup>8</sup>. Zirconia is widely used because of its good chemical properties, dimensional stability, high mechanical strength, toughness, and a Young's modulus similar to that of stainless steel alloy. The mechanical properties of zirconia are the highest ever reported for any dental ceramic.<sup>9,10</sup> Zirconia for anterior teeth is veneered. Either the layering technique or the press-over technique can be used for veneering the zirconia cores. The layering technique allows a more individual build-up of the veneering ceramic, leading to superior aesthetic results.

This clinical report describes the management of an aesthetically compromised maxillary dentition with loss of vertical dimensions

and multiple loss of teeth, using zirconia stress breakers and CAD/CAM milled layered zirconia crowns.

**CASE REPORT:**

A 35- year- old female patient was referred to the Department of Prosthodontics, with the chief complaint of inability to masticate and unpleasant aesthetics (Fig1). The intraoral examination revealed missing teeth 12,14,15,24 and 25(FDI tooth numbering system) (Fig 2). There was loss of vertical dimension due to long standing edentulism. Orthopantomograph showed good bone support for all teeth, (Fig 3) hence they could be used as abutments. The treatment options presented to the patients were: A] Implant in edentulous spaces and individual crowns for better aesthetics. B] Fixed partial denture with the non-rigid connector in the 1<sup>st</sup> quadrant and rigid connectors in the 2<sup>nd</sup> quadrant. The patient did not agree for the Implant due to surgical intervention and financial concerns. Therefore, treatment option chosen was to restore with fixed partial denture with the nonridged connector of semi precision attachment in the 1<sup>st</sup> quadrant and rigid connector in the 2<sup>nd</sup> quadrant.

**TECHNIQUE:**

1. Diagnostic impressions were made
2. An acrylic Lucia jig was fabricated in order to deprogram the muscles, to raise the lost vertical dimension(VD) by 2mm( Fig 4)
3. After taking the bite registration in the raised VD a facebow transfer was done and the casts were mounted (Fig 5)
4. Mock wax up was done and putty indices were made.
5. Tooth preparation was done for all the teeth; without touching the occlusal surface (as VD was to be raised) and gingival retraction was done (Fig.6)
6. Final impression was made.(Fig. 7)
7. Facebow transfer was done and casts were mounted in a bite with raised VD.
8. Temporization was done.
9. The cast was scanned and prosthesis was designed and fabricated by CAD/CAM software. (Fig 8)
10. Definitive Prosthesis was made in 4 units with monolithic zirconia and the anteriors were layered with E-Max layering.(Fig. 9)
11. The intracoroanl stress breaker was incorporated between 13

- and 14 region, made with the zirconia block itself. (Fig 10)
- 12. Definitive Prosthesis was cemented with Resin Cement (Rely X). (Fig. 11)
- 13. Mutually protected occlusion was established in protrusion and canine guided occlusion was established in lateral movements on both sides (Fig. 12)

**DISCUSSION:**

Multiple missing teeth, including those in the anterior region, for a young adult is not only a physical loss but also an emotional deprivation for the patient.<sup>11</sup> However so, rehabilitation of the aesthetics alone is a failed approach to the problem.

Several authors have commented on the dynamic nature of the dento alveolar complex and masticatory system.<sup>12-15</sup> Anterior teeth are the dominant factors in determining vertical dimension.<sup>16</sup> Loss of vertical dimension is a sequel to long standing edentulism.

Rationale for altering VD is: - 1.Aesthetics. 2. Alter the occlusal relationship. 3. for prosthetic convenience to allow space for restorations. Increasing VD is a helpful and safe procedure, and any subsequent signs and symptoms tend to be self-limiting.

Incase of a single standing tooth with edentulous spaces on both sides (Pier abutment), rigid connectors cannot be used. The pier abutment, promotes a fulcrum-like situation that can cause the weakest of the terminal abutments to fail, in turn intrusion of the pier abutment. In such cases a non-rigid connector is used. The non-rigid connector acts as a stress breaker between the retainer and pontic. The movement in a non-rigid connector is enough to prevent the transfer of stress from segment being loaded to the rest of the FPD. The most commonly used non rigid connector consists of a T-shaped key that is attached to the pontic and a dovetail key way placed within the retainer.

Zirconia, because of its superior properties of strength and Young's modulus similar to that of stainless steel alloy<sup>17,18</sup> has been used as a stress breaker in this case. The superior aesthetic and mechanical properties and capacity of layering adds to the strength and aesthetic benefits.

This Case report has dealt not only with the aesthetic concerns of the patient by giving Zirconia layered crowns; but has also taken into consideration the biological requirements for a healthy dentition. In doing so the stress breakers were incorporated and the vertical dimension raised for a healthier dentition. Hence it is a multidimensional approach to restoration of the maxillary prosthesis.

**CONCLUSION:**

The approach to the restoration of a debilitated dentition must not be in a single dimension. For the long term success of a prosthesis the aesthetic as well as biological needs of the complex dento alveolar system have to be considered. Increasing the vertical dimension in case of lost VD is a safe and successful procedure. Non rigid connectors act as stress breakers in case of pier abutments. Using Zirconia as the choice of the restorative material is not only a fine aesthetic option but also a good option as a stress breaker. Hence to conclude the report, it is important to consider all the problems associated with the lost dental structures; address the biological and aesthetic concerns and ultimately choose a material and procedure that will be most beneficial to the patient.

**Fig.1 Pre-operative smile**



**Fig. 2 Pre-operative photographs.**



**a. Frontal view.**



**b. Right lateral view.**

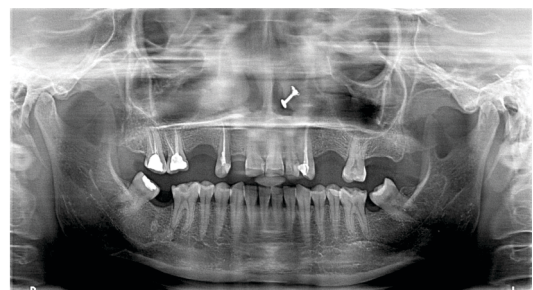


**c. Left lateral view.**



**d. Occlusal view**

**Fig. 3 Orthopantamograph.**



**Fig. 4 Jig for deprogramming muscle engrams**





Fig. 5 Face bow transfer.



Fig. 6 Teeth preparation and gingival retraction.



a. Frontal view

Fig. 7 Final impression (putty wash)



Fig. 8 CAD/CAM designing of prosthesis.



Fig.9 Prosthesis made in 4 units



Fig.10 Stress breaker between 13 and 14.

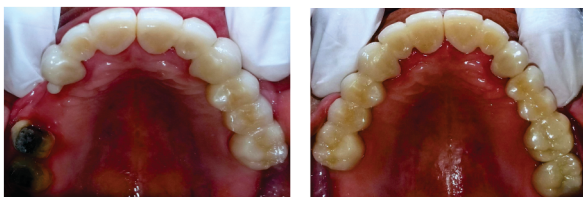


Fig.11 Definitive prostheses.



a. Frontal view.



b. Right lateral view.



c. Left lateral view.

Fig. 12 Occlusion



Mutually protected occlusion.



Canine guided occlusion.

Preoperative

Postoperative



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