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Full Mouth Rehabilitation Using CAD CAM Zirconia Monolithic Prosthesis: A Systematic Approach

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Introduction

The term attrition derives from the Latin Verb named Atrium, which explains the action of rubbing against something. Dental attrition is the act of wearing or grinding down by friction or the mechanical wear resulting from mastication or parafunction, limited to contacting surfaces of the teeth.[1] The factors contributing to attrition are bruxism, deep bite, clenching and night grinding. A Full Mouth Rehabilitation(FMR) restores the oral function, comfort and appearance. Bruxism causes tooth wear resulting in sensitivity, pulpalnecrosis, and pain due to loss of dental tissue.[2]In bruxers, metal-ceramic restorations are preferred as they provide adequate strength improving the longevity of the restorations, but with the development in zirconia, it has been a viable alternative.[3]A systematic review about the clinical success of zirconia-based crowns suggests that the success rate is adequate, similar, and comparable to that of conventional porcelain-fused-to-metal crowns.[4]This case report describes a systematic approach for FMR using CAD CAM Zirconia monolithic prosthesis.

Keywords: Deep bite, Attrition, Bruxism, Full Mouth Rehabilitation, CAD CAM Zirconia Monolithic Prosthesis.

Case History

A 65 year old male patient reported with a chief complaint of pain and sensitivity in upper and lower front region of the jaw on examination the teeth were abraded, attired with a deep bite [Figure1]. Case history revealed the patient was a bruxer, with a history of RCT, crown and extraction past 5 years. The reason of RCT was pain due to attrition [Figure2]. The treatment plan of FMR was proposed, risks and limitations were explained and then the informed consent was obtained.

The vertical dimension was assessed and the new vertical to be restored was established with pattern resin (Pattern Resin, GC, Tokyo, Japan) [Figure3]. The amount of posterior separation was recorded using the bite registration material (Dental Avenue, Pvt Ltd, India).Face bow (Elite Facebow, BioArt) transfer was done.Diagnostic impression was made using Condensation Silicone (ZetaPlus C Silicon, zhermack, Italy). The impression was poured with type III gypsum product (Kalabhai Karson Pvt Ltd Mumbai, India).The fabricated pattern resinwas given as a deprogrammer to the patient after adapting heat pressed thermoplastic sheet (3A Medes,Korea)over it [Figure4]. The patient was asked to wear it for 21 days and instructed to remove it while having food and beverages [Figure5].

The digital shade selection was done prior to tooth preparation (Vita Easy Shade V). The left posterior teeth were prepared first and the preparation was assessed placing the deprogrammer and the pre preparation right bite record. Then the post preparation left bite was recorded. Similarly the right posterior teeth were prepared keeping the post prepared left bite record and the deprogrammer. Finally the anterior teeth were prepared and the preparation was assessed by placing the post prepared bite records (Dental Avenue, Pvt Ltd, India). By following this technique the vertical dimension was maintained as established prior to the preparation [Figure6]. Gingival retraction was done using gingival retraction cord (000 sure endo, Korea) and the impressions were made using addition silicone (Zetaplus hydroise, zhermack, Italy).The face bow transfer was recorded [Figure7,8] and the new obtained models were mounted using the post preparation bite records [Figure9].

The mounted models (A7 Plus, Bioart) were scanned (Medit, Seoul, Korea) and digitally designed [Figure10]. The protrusive and lateral movements assessed for disocclusion [Figure11, 12, 13]. On patient's approval, the CAD CAM provisional restorations were fabricated (Bloomden Bioceramic CoLtd, Changsha, Hunan,China) [Figure14]. They were assessed for the functional and esthetic purpose and cemented(OraTemp C&B, Prevest DentPro, Jammu, India) [Figure 15]. At follow-up, protrusive and the lateral movements were assessed [Figure16,17,18]. The same parameters were used to fabricate CAD CAM Monolithic Zirconia prosthesis (Cercon, Dentsply Sirona) and bisque trial was obtained and were tried in for shade, marginal fit, shape, symmetry and contacts [Figure19]. The obtained definitive prosthesis [Figure20] were then seated on to the prepared teeth, re-evaluated and were luted with resin modified glass ionomercement (3M Rely X, USA) [Figure21,22,23]. The protrusive and lateral functional movements were verified for disocclusion [Figure24,25,26].The patient was recalled after 48 hours and mandibular impression was made to fabricate occlusal splint. Initially a soft occlusal splint was fabricated which was later heat pressed by hard splint and they were fused with cyanoacrylate [Figure27,28]. The splint was inserted in patient's mouth and the instructions for use were explained. [Figure29]. The image showing patient's smile [Figure30].

Discussion

A FMR needs interdisciplinary approach wherein case planning plays a vital role in the prognosis of the treatment.

FMR includes restoration in harmony with the stomatognathic system along with restoration of vertical dimension, occlusion and esthetics.

Occlusal wear causes reduction of vertical dimension of occlusion (VDO) so the assessment of vertical dimension

is important. Turner and Missirlian classified the relation between wear and VDO: [5]

Category - 1; Excessive wear with loss of VDO.

Category - 2; Excessive wear without loss of VDO but with space available.

Category – 3; Excessive wear without loss of VDO but with limited space.

The presented case belonged to category I, there was a need of restoring the vertical.

Amongst the various techniques for management of attrited teeth, Panky Mann Schyler (PMS) and Hobo are widely used. Hobo is based on the mathematical calculations and restoring with predetermined values in which there is a possibility of losing the vertical, where as in PMS there is no fear in loss of vertical dimension.

In presented case CAD CAM PMMA Provisional were fabricated which plays a significant role in esthetics, function and serves as a template for final restoration.[6]Moreover due to the higher fracture resistance they can be used as long term Provisional's.

Metal-ceramic restorations have been considered as "the golden standard" for FMR. But due to the development in ceramics, the second and third generation of zirconia, they can used in FMR even in heavy grinders. [7]While selecting the choice of prosthesis, the wear of antagonist is an important factor in presence of parafunctional habits. Amer et.al, concluded that the enamel wear associated with monolithic zirconia was similar to conventional feldspathic porcelain. Whereas Stober et al, revealed that monolithic zirconia crowns generated more wear of opposed enamel than natural teeth, but concluded that, because of the greater wear caused by other dental ceramics, the use of monolithic zirconia crowns can be justified.

There is lack of studies about the clinical outcomes with zirconia monolithic prosthesis in patients presenting with high occlusal stress. However manufacturers recommend monolithic zirconia restorations as an indication in bruxers. [8] Occlusal splints play a key role in reduction of the act of bruxism, [9]here in this case dual splint was fabricated. The advantage of dual splint was the inner soft splint provided comfort and the outer hard splint prevented grinding of the teeth.

Conclusion

The use of CAD CAM monolithic zirconia has become popular because of their high flexural strength, resemblance to natural tooth, less wear on the antagonists teeth and minimum tooth preparation. [10]The presented treatment approach is reliable option with high esthetics, function and strength minimizing technical complications. Long-term randomized control trials on the use of all ceramics on grinders are necessary in order to evaluate the predictability of these restorations. In this case, successful FMR with monolithic zirconia prosthesis was accomplished with patient's satisfaction in terms of comfort, function and esthetics.

Figure 1: Preoperative Deep Bite

Figure 2: Preoperative Image Showing Attrition And Abrasion

Figure 3: Fabrication of Deprogrammer With Pattern Resin

Figure 4: Heat Pressed Thermoplastic Sheet Over The Deprogrammer

Figure 5: Deprogrammer In Patient's Mouth

Figure 6: Tooth Preparation

Figure 7: Face bow Transfer

Figure 8: Face bow Transfer Assembled on Articulator

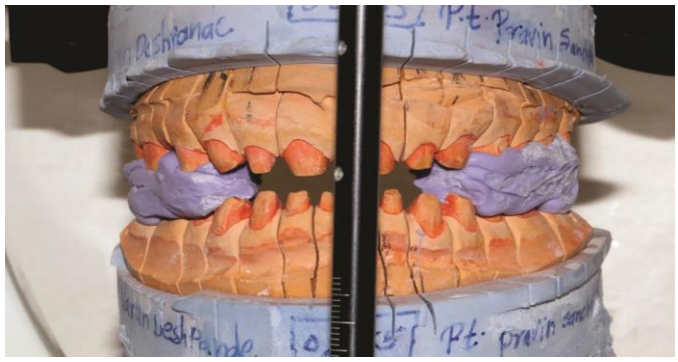

Figure 9: Post Preparation Bite Record

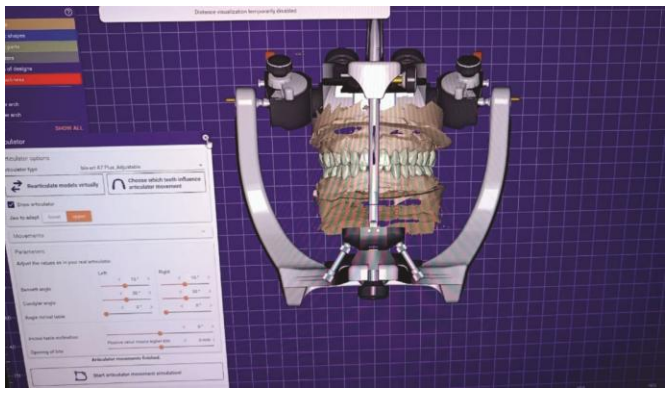

Figure 10: Digital Designing Using CAD CAM Software

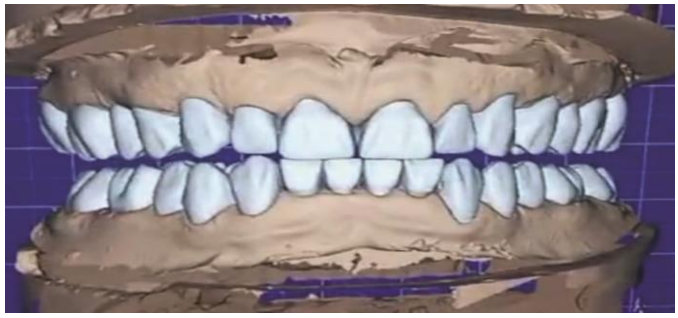

Figure 11; CAD CAM Assisted Protrusive Movements

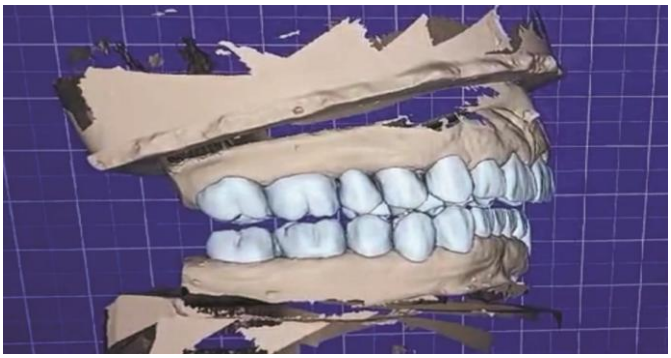

Figure 12: CAD CAM Assisted Right Lateral Movements

Figure 13: CAD CAM Assisted Left Lateral Movements

Figure 14: PMMA Milled Provisional's

Figure 15: Provisionals In Patients Mouth

Figure 16: PMMA Protrusive Movements

Figure 17: PMMA Right Lateral Movements

Figure 18: PMMA Left Lateral Movements

Figure 19: Zirconia Prosthesis for Bisque Trial

Figure 20: Definitive Zirconia Prosthesis

Figure 21: Zircoinia Prosthesis Luted

Figure 22: Right Side Occlusion

Figure 23: Left Side Occlusion

Figure 24: Protrusive Movement

Figure 25: Right Lateral Movement

Figure 26: Left Lateral Movements

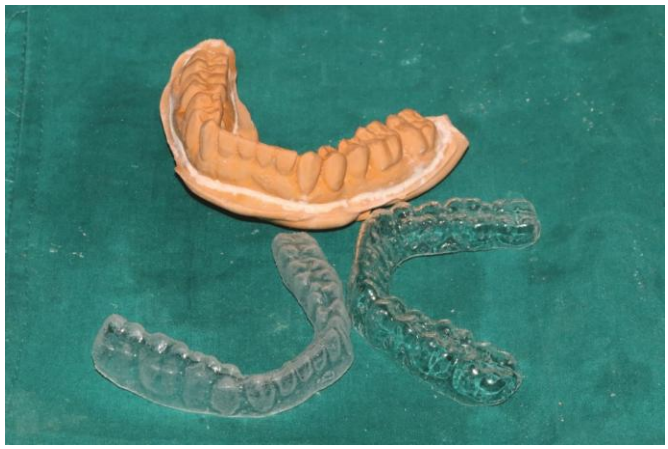

Figure 27: Soft And Hard Splint

Figure 28: Inner Soft Splint And Other Hard Splint

Figure 29: Splint placed In Mouth

Figure 30: Postoperative Smile

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