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Prosthetic Rehabilitation of Crowded Maxillary Anterior Teeth: A Case Report

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Abstract

The success of aesthetic rehabilitation never depends on clinical procedures only but also a proper dental technique is required as well as the respect for some biomimetic principles to obtain the aesthetic final result.

Keywords: Diagnostic Procedures, Gingival Contouring, Tooth Preparation Techniques

Introduction

The success of aesthetics and restorative dentistry depends upon the clinician's understanding of natural tooth form[1]. Recent advances in adhesive dentistry, dental materials and dental technology have increased the ability of the clinician to mimic the natural dentition[2,3]. In patients who are dissatisfied with the appearance of crowded teeth, orthodontics is the ideal treatment[1,4]. However, in some of these cases patients are not prepared to go forward with this treatment due to time constraints and quicker restorative modalities are requested that require a combination of smile analysis, diagnostic procedures, gingival contouring and tooth preparation techniques, but always visualising the end result for success[5,6].

Case Report

A 30-year-old male patient reported with the chief complaint of misaligned upper front teeth. He was not comfortable in smiling due to the presence of the crowding in anterior tooth region and he was not willing for any orthodontic treatment (Fig. 1). After ensuring that the patient is a good candidate for smile correction treatment. It was clear that in order to reach an acceptable aesthetic it was not enough to perform only

an orthodontic treatment. Taking into account the state of the teeth, a prosthetic rehabilitation was also needed.

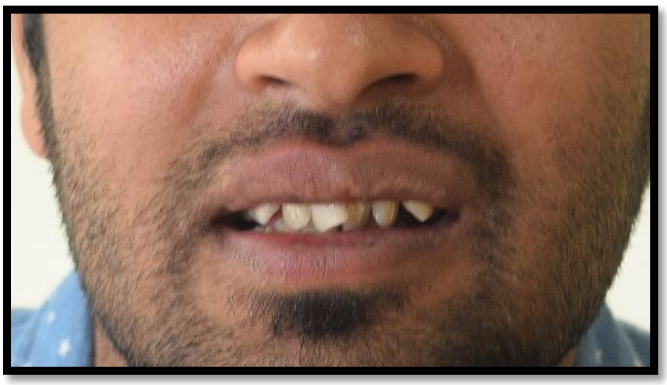

Fig.1: Pre operative photograph

On the first appointment, during the examination the following dental anomalies were observed: crowded and slightly rotated upper and lower incisors, deep bite, irregular curvature of the maxillary incisal edge, discoloured tooth. To establish the proper treatment plan, preoperative radiographic and photographic documentation was made, as well as a preliminary impression (alginate) in order to make the study-cast (Fig.2). Tooth preparation done on the study cast and mock-up done to educate the patient about final treatment outcome (Fig. 3). After a thorough study of this documentation, two treatment options were suggested to the patient. The first option was orthodontic treatment followed by a prosthetic rehabilitation, and the second one was only a prosthetic treatment with full ceramic crowns which, of course, required a bigger sacrifice of healthy dental tissue in order to make the correction of the crowded teeth. The patient refused the orthodontic treatment, because of the duration and aesthetic drawbacks of the treatment, preferring the second option for maxillary arch.

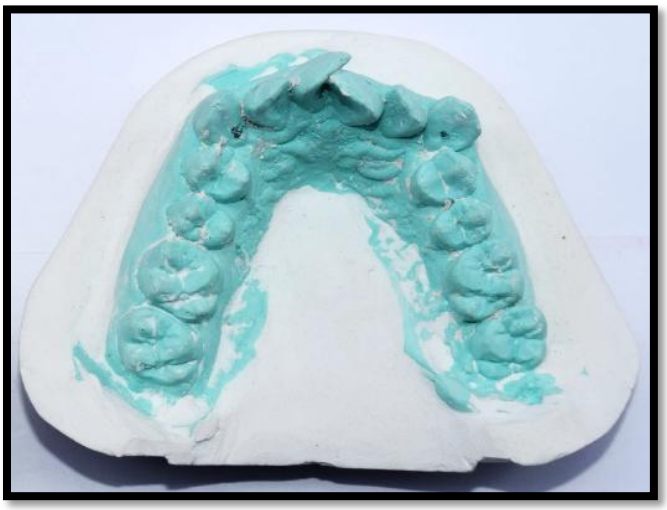

Fig.2 Study cast

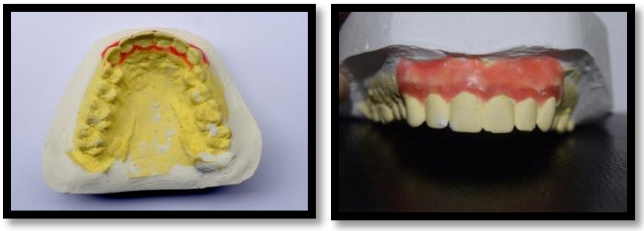

Fig.3: Mock up done

On the next appointments the pre-prosthetic treatment on the superior dental arch followed:

Root canal treatment and post and core were performed with labial approach for left lateral, right central and right lateral incisors, and palatal approach for left canine, left central incisor and right canine tooth (Fig.4). Tooth preparation was done to receive All-Ceramic crowns. The patient agreed to the publication of his data and the institution where the patient had been admitted, approved the publication of the case. Measurements were made on the photos and study cast before the prosthetic treatment, and the results were compared to the characteristic values of the ideal denture. During the analysis of the photos, the visible mesio-distal width of the maxillary anterior teeth and their proportion were examined (Fig.5). Because of the curvature of the dental arch, there was a difference between the width of the tooth when viewed frontally and its real width. When analysing an aesthetic, attractive smile from a frontal

view, the best way to determine how a tooth's width compares to the one next to it, is by using the ideal situation provided by the golden proportion. According to this, the visible width of the upper lateral incisor is 62% of the width of the upper central incisor, while the visible width of the upper */canine is, again, 62% of the width of the upper lateral incisor.

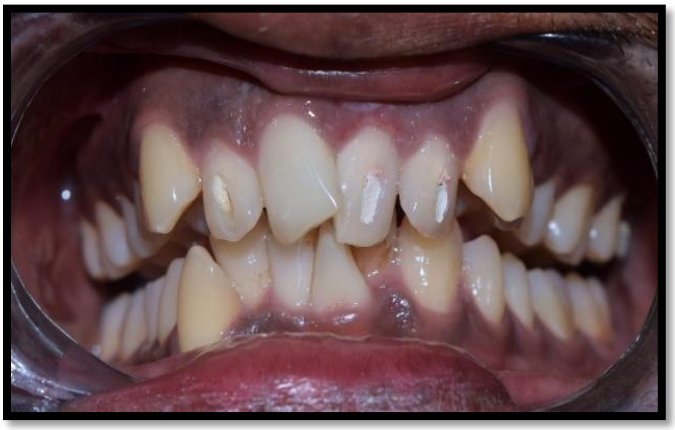

Fig. 4: Root canal treatment

As in our case the superior incisor teeth were crowded, this proportion was changed: the visible width of the upper right central incisor was 86% of the left central incisor's width, and the upper right lateral incisor's visible width was 66.6% of the left lateral incisor's width. In order to get the most aesthetic result, we had to aim to make this value approach the ideal one. Research has confirmed that the width of the central incisor crown has to be 75–80% of the height of the crown in an aesthetic denture. This proportion had to be taken into account when planning, because the width of the crown needed to diminished, in order to restore the teeth that were crowded due to the lack of space. We also had to pay attention not to narrow the teeth too much and make them look less aesthetical. It was important to examine the incisal arch when planning; in our case this was uneven, irregular. The ideal incisal arch is parallel with the curve of the lower lip. We have to aim for the formation of a symmetrical incisal arch, which follows the curve of the lower lip. After the examination of the dental study cast, calculating the difference between the space at our disposal and the necessary space for the teeth, we could calculate the lack of space we were faced with. The measurement of the space at our disposal was carried out measuring the wire led from the mesial portion of the upper right first molar to the mesial portion of the upper left first molar, over the vestibular cusps of the premolars, cusps of the canines, as well as over the incisal edge of the incisors. In order to ascertain the necessary space, we measured the mesiodistal width of the premolars, the canines and the incisors. By subtracting the first value from the second one, we calculated how much space was missing. From this value we could deduce to what degree we should decrease the width of the crowns, in order for them to fit symmetrically in the teeth arch space was missing. From this value we could deduce to what degree we should decrease the width of the crowns, in order for them to fit symmetrically in the teeth arch.

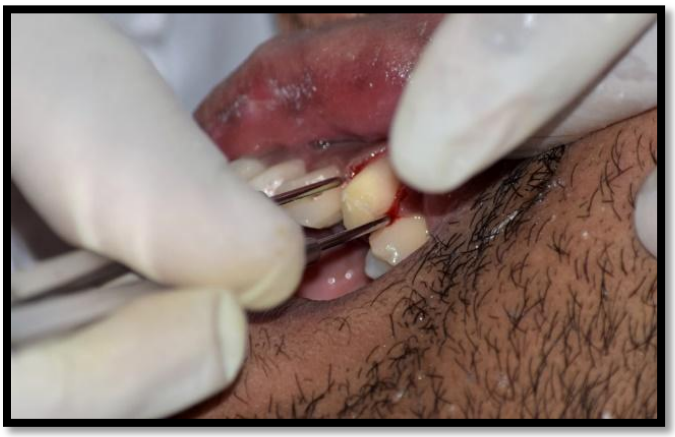

Fig.5: Measuring the Mesio-distal width of tooth

During the prosthetic treatment, the central incisors and canines were prepared for the ceramic crowns (Fig.6). The gingival margin of the preparation was aligned in a juxta-gingival position for easier cleaning and for better aesthetical effect. In order to determine the correct angulation of the anterior teeth alignment, we used a

suitable instrument, the Clinometer (Amann Girrbach, Koblach, Austria) attached to the Artex Facebow The determination of the shade was performed digitally, using the Vita Easy shade system (Vita-Zahnfabrik, Bad Säckingen, Germany): B2 for the crown part, A2 for the cervical part. In order to obtain the desired tooth shade, we also determined the color of the tooth stumps with the help of the IPS Natural Die Material shade guide (Ivoclar Vivadent, Schaan, Liechtenstein).

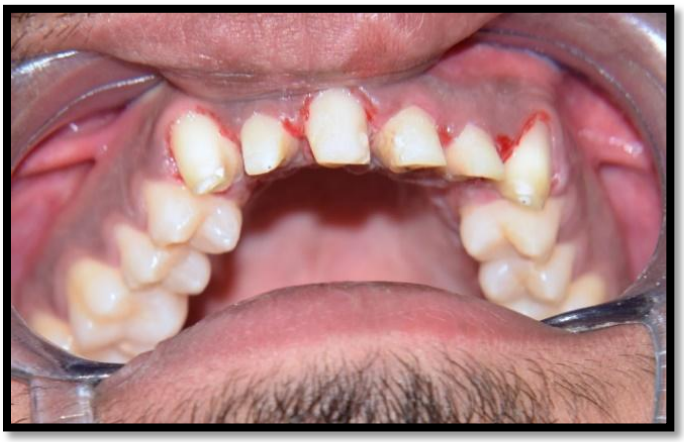

Fig.6: Tooth preparation

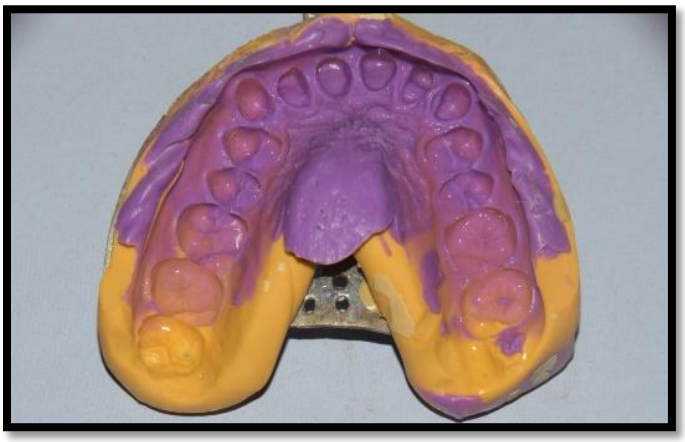

Fig.7: Final impression

The gingival displacement before the final impression of the four incisors and canines was made with the double cord technique for a better visualization of the preparation margins. The first thinner cord (00-Elite cord, Zhermack, Badia Polesine, Italy), which was not impregnated, remained in the gingival sulcus during the making of the impression. The second cord was thicker (0-Elite cord, Zhermack), it was impregnated (Gingiva Liquid Roeko, Coltene, Altstätten, Switzerland), and it was taken away before making the impression. The final impression was made with A-silicone (Elite, Zhermack) withthe one step mix technique (final impression), while the impression of the antagonist dental arch was made with C-silicone (Zeta Plus + Oranwash, Zhermack), and the registration of the intermaxillary relations with A-silicone (Fig. 7). The provisional crowns were made from PMMA blocks with CAD-CAM system to ensure a good marginal fit of the crowns. Their bond was made with Temp-Bond NE (Kerr, Orange, CA, USA) temporary dental cement. The final ceramic crowns were made from IPS E-max press ceramic (IvoclarVivadent) (Fig. 8). This choice was made due to its excellent characteristics: exceptional translucency corresponding to natural teeth, high mechanical strength, as well as superior fracture toughness. It also presented a superior opalescence/fluorescence and low bacterial adhesion.

Fig.8: All ceramic crowns

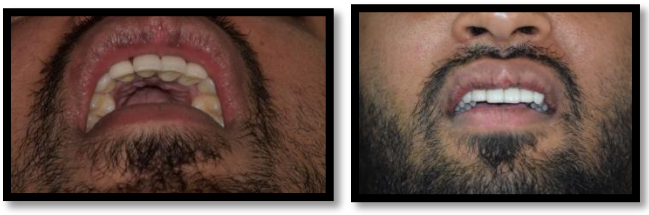

Fig. 9: All ceramic crowns try in

On the occasion of the crown try-in the marginal adaptation, the contour and the colour were verified (Fig.

9). After the preparation of the teeth surface and of the crowns, the bonding of the crowns into place with SR Nexco Paste (Ivoclar Vivadent) composite followed. After checking the occlusion, the final polish was achieved. After taking photos of the final result, the patient was given oral hygiene maintenance instructions, and he was put under recall appointment after six months.

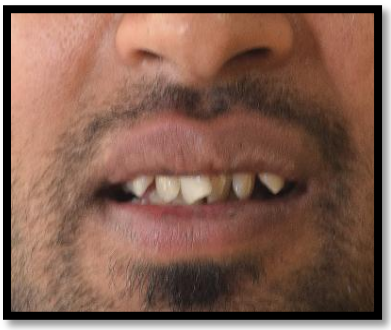

Fig.10 Pre-op photograph

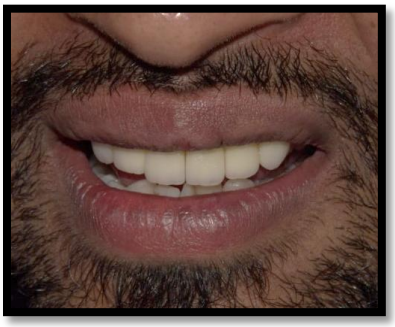

Fig.11Post-op photograph

Discussion

Comparing the preoperative and postoperative photos, we were able to assess to what extent the aesthetic effect was improved by the prosthetic treatment[1,2]. We managed to approach the proportional number indicating the mesiodistal width of the teeth compared with each other, viewed from the front, with the described values of an ideal denture (golden proportion, 62%), i.e. we have managed to shrink the 86% visibility of the right lateral incisor compared to the central incisor to 72%, and the 66% visibility of the left lateral incisor compared to the angulation determination Provisional crowns central incisor to 63%[3,4,5].

The correction of the irregular curvature of the maxillary incisal edges contributes to the formation of an aesthetic smile, which can be seen as the outcome of the treatment[6].

Conclusion

During the prosthetic planning, these measurements may serve as a guideline to the dentist. The judgement of what we consider an aesthetic smile or denture, respectively, is totally subjective. The ideal values we used in certain measurements are considered by several studies as characteristic for aesthetic dentures, and thus, during planning may serve as an objective basis for the formation of an aesthetic denture and a more aesthetic smile.

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