Imitating nature in prosthetic rehabilitation

Abstract / Treating single-tooth edentulism with implants is a successful method used in Dentistry. However, restoring function with esthetic quality and natural gingival contour is a challenge that depends on the skills and esthetic sense of the professionals involved. This article aimed at discussing the clinical aspects of single-tooth edentulism by reporting a clinical case. / Keywords / Dental prosthesis. Dental esthetics. Dental implant.

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The patients displayed in this article previously approved the use of their facial and intraoral photographs.

INTRODUCTION

Rehabilitation of patients with anterior dental absences comprises multifactorial problems strongly related to esthetics, function and self-esteem.[1]

The search for solutions to these problems regards not only replacement of the lost tooth, but also its correct positioning, as well as combined dental esthetics and periodontal tissues health, which constitute facial harmony and allow solutions in a social context.[2]

The most viable options for the rehabilitation treatment of a single tooth include the technique of dental implants.[3,4] The biggest challenge is to achieve perfect implant positioning, emergency profile and mimetic coloring in comparison to adjacent teeth.[5] Factors regarding local morphology, damaged structures and patient's acceptability may hinder local reconstruction.[5,6]

The objective of the present study is to briefly analyze single-tooth implant rehabilitation, illustrated by a clinical case report; and verify the possibility of restoring the natural beauty of a lost tooth.

LITERATURE REVIEW

Single-tooth rehabilitation treatment of anterior teeth, particularly upper central incisors, is a challenge when the aim is to establish a balance between esthetic, functional and biological aspects.[7]

Dental implants are indicated to treat such cases, even though a meticulous analysis of previously existing osseous and gingival conditions is necessary in order to minimize potential tissue alterations such as papillae loss, tissue recession, ridge defects and loss of keratinized tissue.[8]

The relationship between implant and natural gingival tissue is established by the interaction of different factors among which an adequate positioning of the implant is highlighted. Proper positioning allows a prosthesis to be fabricated with satisfactory emergency profile, height, width, shape, color, tooth surface texture and periodontal health of red tissues.[9,10]

Single-implant cases are frequently associated with extraction followed by immediate implant placement. For this reason, the quality and amount of bone volume must be closely and strictly inspected, so as to allow the morphology of the mucosal tissue of adjacent teeth to be copied.[11]

Some authors report that smile harmony depends on factors such as: 1) Leveled margins of upper central incisors; 2) Margin of upper central incisors 1 mm higher than the margin of lateral incisors, and at same level of that of canines; 3) Gingival and labial margins contour that mimic teeth cementoenamel junction; and 4) Papilla between teeth that should be equidistant from the incisal edge to the cervical gingival contour in the center of the crown.[10,12]

In this context, several surgical techniques have been suggested to apply esthetic knowledge, among which proper mesiodistal positioning is highlighted, given that it determines the presence or absence of papillae. Salama et al[13] report six classifications that can be employed to establish proximal tissue according to the type of abutment restoration. In case of single spaces adjacent to higid teeth, at least 1.0 mm between the implant and the abutment is necessary to restore 5.0 mm of proximal papillae.

Likewise, wrong implant positioning and inclination negatively affect the esthetics around an implant, leading to mucosal instability and gingival recession.[11]

Good reverse planning is essential to identify the correct three-dimensional positioning of the rehabilitation, for it will serve as orientation for implant placement, thus eliminating potential fixation mistakes in risk zones.[7]

Regardless of the treatment of choice, diagnostic wax-up is the pre-evaluation method that will decrease the chances of future mistakes.

Despite correct implant positioning, the challenge of single-tooth rehabilitation remains. The attempt to meet esthetic expectations and excellence goes beyond scientific knowledge, it requires critical sense in detailing the anatomical and biometric characteristics of a tooth.[4,5,6]

Esthetic smile rehabilitation must be planned on the basis of Restorative Dentistry, observing and imitating the

characteristics of adjacent teeth. References of dental size, width, light reflection area, surface texture and color are crucial to smile harmony.[14,15]

Another important development in prosthetic rehabilitation is the elimination of metallic infrastructures in prosthesis over implant. Among them, the use of high-density zirconia has become very popular due to its resistance to wear, great coloration, bending strength and tenacity against fracture.[16]

Zirconia is an oxide of light color used for several purposes, namely: Nuclear reactors, photography flash light, vacuum tubes, chemical industry where corrosive agents are applied, and glasses.[17] Additionally, it is an excellent material for single-tooth reconstruction of prosthesis over implants, as it meets requisites of tissue biocompatibility, resistance and esthetics.[18]

CLINICAL CASE

Female patient, 28 years old, sought dental treatment with history of trauma in a single anterior tooth (#11). The patient was dissatisfied with her composite resin restoration and its consequent unpleasant odor.

Radiographic analysis revealed oblique root fracture, in which case tooth extraction followed by implant placement were suggested (Fig 1).

A surgical guide was carried out before surgery, according to the position of the clinical crown that would be extracted. Surgery was performed with the bone preservation technique. After this procedure, a meticulous evaluation of bone and gingival quality and volume was carried out for posterior implant placement (10 mm high, 4.8-mm platform) (Straumamm – Switzerland) with a mesiodistal space

Figure 1: Initial clinical aspect.

greater than 1.0 mm. After surgery, a provisional pontic was placed and kept for 3 weeks, followed by the placement of a cemented provisional prosthesis over a zirconia post prepared for fixed prosthesis, which met the needs and criteria to correctly establish peri-implant tissues (Fig 2)

A copying of the same material was made and placed over the zirconia post to mimic and match the color of the dental substrate. This procedure was followed by stratification with fluorapatite-based ceramic, so as to ensure a natural incisal opalescence (Fig 3).

Stratification was carried out with fluorapatite feldspathic ceramic, characterized by great light refraction and esthetics. This procedure allowed clinical proof between sinterization procedures, which also allowed the desired optical results and coloration to be achieved (Fig 4).

After stratification, the element was cemented with dual cured resin cement (U200, 3M ESPE). Given that material in contact with other material did not require surface treatment, their intra-sulcular condition did not interfere in the cementation line (Figs 5 to 8).

Figure 2: Zirconia post clinical proof.

Figure 3: Zirconia copying proof.

Figure 4: Stratification of the feldspathic ceramic.

Figure 5: Final aspect.

Figure 6: Tooth in occlusion.

Figure 7: Final smile (frontal view).

Figure 8: Final smile (lateral view).

CONCLUSION

Single-tooth esthetic rehabilitation requires healthy adjacent teeth and good physiology of edentulous space. Prosthetic restorations rely on adequate ceramic material, satisfactory implant positioning and treatment planning, as well as on the dental surgeon's good performance, skills and accurate esthetic sense.

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