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Aesthetics with Single Implants in the Anterior Sector: What Experts Claim

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ABSTRACT

The objective of this article is to review the keys for the correct placement of implants in the anterior sector of the maxilla in order to achieve long-term implant success and, since it is an anterior sector, correct aesthetics.

There should be a distance of at least 1.5 mm between the tooth and the implant, and ideally, the minimum vestibular thickness of bone of the implant should be 2 mm. Between implants the mesio-distal distance should be 3 mm and regarding the apico-coronal we should have at least 3 mm from the margin of the implant to the future restoration.

The case must be planned carefully, and we have to decide: when to place the implant, the provisional restoration, the type of implant, requirement of a graft, etc.

Keywords: Aesthetic, critical contour, dental implants, emergence profile, subcritical contour, implant abutment, three-dimensional position.

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I. Introduction

The treatment with single implants in the anterior sector is a great challenge. Patients demand more aesthetics and there are many factors that influence the aesthetics of implants in this area of the maxilla.

To achieve successful aesthetics using implants in the anterior sector, the implant must be placed in the bone in an optimal three- dimensional position.

It is useful to use a surgical guide even in a single implant case. This guide can be an acrylic guide made by the laboratory, an essix-type guide made by the professional himself or even a silicone key which we will cut leaving only the vestibular sector. These last two guides can be obtained by taking an impression of the patient if they still have the corresponding tooth or with a wax-up.

II. Three-Dimensional Position

There should be at least 1.5 mm between the tooth and the implant, and ideally, the minimum volume of bone in the vestibular sector of the implant should be 2 mm. The bucco-cortical thickness is very important for aesthetics, as well as the thickness of the soft tissue [1]. Between two implants there should be a minimum mesio-distal distance of 3 mm. [2]. The vestibulo-lingual position should be slightly more towards lingual (at the level of the cingulum of the tooth), about 2 mm. Furthermore, placing a buccal anterior implant may produce many complications [2].

Regarding the apico-coronal position, the implant should be placed 3 mm from the margin of the future restoration. The biological width should be about 3 mm [3].

If we plan to place an immediate provisional, the provisional crown that the laboratory has made for us can be used as a surgical guide and to calculate the apico-coronal position at which we will place the implant. This single provisional crown rests on the adjacent teeth and when the provisional is finished these abutments are easily cut [4].

An average of 4.5 mm is required from the point of contact of the adjacent teeth to the peak of the bone between the tooth and the implant in order to predictably obtain a papilla [5], [6].

III. Periodontal Biotype

When planning the case, the periodontal biotype must be considered. Thick biotype is the most favourable. In which, the bony and gingival architecture is flat. Although there is a large amount of attached gum, the cortical bone is thick, the dental crowns have a squared shape, the contact points are located apically and there is less probability of recession.

Regarding the fine biotype, there is a large discrepancy

between the buccal and interproximal gingival margins. In these patients, dehiscence, fenestrations, and recessions can occur after surgery. Moreover, the crowns are more elongated, and the contact point is located towards incisal [4], [7].

IV. Timing For The Implant Placement

The implant can be placed immediately after extraction, delayed or early, at 6 or 8 weeks, or when more than 12 weeks have passed.

Patients with a thin biotype are not candidates for immediate implants (thin scalloped periodontium and triangular tooth). The best cases for immediate implantation are cases with extruded teeth, flat periodontium, thick biotype, and square shaped tooth [3], [4].

To decide if a patient can have an immediate implant placed, the bone and gum tissue should be assessed. Reference [3] classified these alveoli into three types and gave some indications regarding the surgical technique required to achieve success:

Type I: intact buccal cortical with thick gingival biotype. Immediate flapless implant. The result will be optimal.

Type II. Intact buccal cortical with fine gingival biotype. Immediate implant without a flap but with connective tissue graft. The result will be efficient.

Type III. Deficient buccal cortical but the implant can be placed. Membrane-guided bone regeneration with a connective tissue graft. Acceptable results. In these cases, an alveolar augmentation technique can also be performed, and the implant placed in a second phase, especially in thin biotypes, the result would be more predictable.

According to [2] and [5], in addition to evaluating the alveolus, the interproximal height of the bone in the adjacent tooth should be evaluated, since this determines the prognosis. From the peak of the interproximal bone of the adjacent tooth to the tip of the papilla or the desired point of contact, there must be 4.5 mm so that a complete papilla can be visualized. If the distance exceeds 4.5 mm, it is better not to place the implant immediately.

In immediate implants, palatal placement results in bone apposition between the implant surface and the vestibular table, and this bone is maintained over time [8].

V. Timing for the Provisional Restoration

We must decide the type of immediate provisional restoration, fixed or removable.

The advantage of an immediate fixed provisional is that the gingiva can be shaped. The gingival contour can be restored by means of these temporary resin crowns, to which composite is added and sometimes even several provisional ones are made. If we decide to make it removable, we must try to reshape the gums with it or at least prevent harming the future gingival contour due to inadequate pressure.

The critical and subcritical contours are very important, [9] gave a detailed description regarding this subject.

The critical contour is the area of the abutment and crown immediately apical to the gingival margin, usually 1 mm wide. The zenith and the height of the gingival margin are in this zone, which will determine the height of the final restoration. It is very important for the support of the gingival margin and its scalloping. The interproximal critical contour influences the triangular or square shape of the crown.

The subcritical contour is located between the implant abutment and the critical contour. It will not affect the level of the buccal gingival margin or the shape of the crown. If the implant is placed very superficially, this area does not exist. It can be designed in a convex, flat or concave shape. With the modification of this contour, the peri-implant tissues are modified.

The vestibular subcritical area with exaggerated convexities should not be over contoured as there may be gingival recession.

In the initial healing phase, the concave subcritical contour results in more tissue volume. Once the gum is healed, it can be given convexity. Increasing the interproximal convexity, will increase the height of the papilla as long as there is 2-3 mm of interproximal space.

A concave subcritical contour reduces gingival recession however physiological convexity does not produce recession.

These authors indicate that each provisional must be customized according to the gingival biotype.

Once good aesthetic results have been achieved, the provisional is replicated into the final restoration, taking the final impression with an individualized impression abutment following the Hinds technique in order to copy the emergence profile [10].

Although, by scanning the provisional an exact replica of the critical and subcritical contours will be achieved [11].

VI. Design of the Implant And Abutment

Internal connection implants lose less bone. Connection is a very important factor in marginal bone loss [12].

It is better if the abutment is machined and not casted, as the marginal fit is much better. And preferably originals or digital production [13].

The greater the height of the abutment, the less marginal bone loss and more biological width is respected [14]. In addition, the residues of cement can be removed more efficiently [15], [16].

The final abutment can be placed to maintain the epithelial seal. It is the concept of "one abutment one time", although the clinical relevance to avoid marginal bone loss does not seem very significant [17].

Platform switching preserves the crestal bone, especially between two adjacent implants [9], [18], [19].

VII. Volume of Soft Tissues Around the Implant

There are many factors that can influence the final appearance of the soft tissues, especially the position, the type and diameter of the implant, avoid large diameter implants [20]. Also the moment of placement of the implant and as we have mentioned, of the provisional [21] as well as the contour given to the restoration [9].

Sometimes it is necessary to consider hard and soft tissue

augmentation procedures to achieve more volume. Connective tissue grafts can maintain the buccal gingival tissue around the implant without recession over time [22]. According to some authors, the bone level is also better maintained: the gingival thickness influences the marginal bone stability around the implants [1].

VIII. Conclusion

Placing an implant in the anterior sector is a challenge from a surgical and prosthetic point of view. It is necessary to have clear knowledge of several concepts regarding how to place the implant three-dimensionally in the correct position and how to make the prosthesis.

According to the findings in this review, the most important factors are the interproximal height of the bone, the buccal cortical, the type of defect (ideal, labial defect or interproximal and vertical defect), the thickness of the gingiva and achieving gingival harmony through provisional restorations.

If the case is not planned and executed correctly, aesthetic failures can occur and would consequently harm our patients. This can also lead to legal consequences.

Aesthetic failures are caused by errors in diagnosis, planning and execution:

- Inadequate position of the implant, for instance in a buccal position.
- Inadequate emergence profile due to inadequate implant placement.
- Soft tissues which are too thin.
- Insufficient vestibular bone thickness.
- Inadequate provisional design.
- Over contoured components.
- Not enough interproximal bone height
- Lack of gingival harmony. White aesthetic, pink aesthetic and transition zone.

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Conflict of Interest

Authors declare that they do not have any conflict of interest.

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