

Zygomatic Implant Treatment: A New Minimally Invasive Technique with Piezoelectric Instrumentation

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Abstract

The zygomatic implants represent a valid alternative to regenerative surgery of severe maxillary atrophies. With a right clinical indication and a correct training for the operator it is possible to treat complex cases with immediate loading to reduce the patient's discomfort. Actually the classic technique with burs and intrasinus approach is very destructive way. The Minimally Invasive Technique developed by Author with ESACROM (Imola Italia), using piezoelectric dedicated inserts, helps the surgeon to realize an easy surgery, less demolishing, more predictable because the osteotomy preparation is always outside the sinus, totally using the piezoelectric instrumentation.

Keywords: Zygomatic implants, Edentulous, Atrophic, Piezoelectric surgery

Introduction

The Minimally Invasive Zygomatic Technique devised by the Author then makes use of two fundamental concepts: the completely extrasinus approach and the preparation of the osteotomy site for housing the zygomatic implant made entirely with dedicated piezoelectric instrumentation (Figure 1).



Figure 1: Kit of dedicated inserts (ESACROM, Imola Italia) for the complete preparation with zygomatic implants

It is important to underline that for extrasinus approach we mean a preparation such as to ensure that between the inserted zygomatic implant and the sinus membrane there can always be a minimal bone height. In fact, the author suggests the creation of an implant bed in which the implant is inserted for at least 180 degrees of its body [1].

To increase its accuracy, the author has devised a protocol through which he divides the preparation of the osteotomy site into three different steps, always controllable, rectifiable, especially in cases in which we realize that we need to improve the preparation axis.

For this concept the dedicated inserts are fundamental, together with an efficient and extremely controlled machine (ESACROM, Imola Italia) allow the realization before an implantation trip on the buccal wall of the maxillary bone then the crestal bone and finally the zygomatic bone (Figure 1a). It should be noted that the piezoelectric machine in question also differs from having in its software programs specially designed for surgery with zygomatic implants with extremely variable parameters, also depending on the inserts. This makes it widely performing and specific for this approach.



Figure 1a: Piezoelectric micromotor (ESACROM, Imola Italia)

The technique consists in drawing a bed of a few millimeters along the chosen axis (axis along which the implant will meet the zygomatic bone) on the external wall of the maxillary sinus without ever invading it. The aim is to transform an implant technique mainly used to solve extreme clinical cases in a much more precise technique, easily performed by many and with less operator risks [2].

Clearly, it is mandatory to underline the need for adequate training on the part of the operator who wants to approach this technique which, despite the simplicity, is always an important surgical procedure.

Materials and Methods

The surgical protocol begins with the incision of soft tissues at full thickness, the raising of a muco-periosteum flap that allows a wide vision of the pear-shaped opening, of the emergence of the infraorbital nerve and subsequently of the surface of the zygomatic bone body up to the infraorbital crest where a retractor must be affixed to keep the operandi area clearly visible.

Once the important anatomical structures are displayed, the preparation is divided into three basic steps:

1. Preparation of the maxillary bone
2. Preparation of the crestal bone
3. Preparation of the zygomatic bone

This subdivision is, in my opinion, extremely important as completing a three-step preparation is certainly more precise than at once starting from a point and arriving immediately at the end without calculating any errors that, if evaluated moment by moment, are reversible and easily rectified, otherwise everything becomes more complicated.

Maxillary Preparation

The technique involves a preparation that immerses the implant section within the maxillary sinus buccal wall in order to achieve osseointegration on a large, less invasive implant surface [3].

The dedicated ES020XLT insert (Figure 1b,) by Dr. Tedesco Andrea (Figure 2) is used to draw a bed on the surface of the lateral wall of the maxillary sinus. This would be the chosen axis along which the zygomatic implant will be directed towards the malar bone (Figures 3, 4 and 5).



Figure 1b: Insert ES020XLT designed by Dr. Tedesco



Figure 2: Note the concavity of the insert which, depending on the angle, can be used in several positions



Figure 3: The reduced length and the appropriate shape make the preparation extremely precise

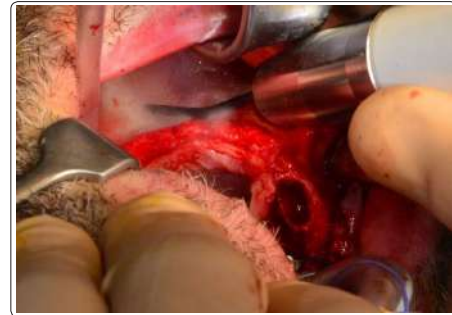


Figure 4: The nebulizing action of the piezoelectric makes the operating field extremely visible



Figure 5: The insert has been designed to be gently manipulated without any kind of force by the operator

After each step it is always good to evaluate the length of the preparation with a probe.

With the inserts then ES007T and ES010T it is possible to enlarge the diameter of the route and deepen the preparation inwards (Figures 6 and 7).



Figure 6: With the insert ES007T it is possible to smooth the corners of the preparation



Figure 7: If necessary, it is possible to go further into the bone plane with the ES010T insert

Crestal Preparation

It represents the entry point of the implant, which will communicate with the implant bed previously made. Preparation at the crestal bone/palatine bone level begins with the ES052XGT pointed insert (Figures 8-11).



Figure 8: With the pointed instrument ES052XGT the crestal/palatine preparation is started, that is the entrance of the zygomatic implant



Figure 9



Figure 10



Figures 9, 10 and 11: The insert, like the others of the rest, is equipped with depth notches that help the surgeon in the choice of the depth

It is very easy to find the road previously created as this instrument works very well both at tip and in rotation.

Remaining with the slightly palatine preparation allows us to maintain that bone peak useful for the implant mucosal seal, essential for not having troublesome mucositis problems over time that do not guarantee, among other things, the well-being of the new patient's prosthesis.

Should it be necessary to enlarge this hole, it is possible to do it with the ES015T insert (Figures 12 and 13).



Figures 12



Figures 12 and 13: With the ES015T ball insert, the margins can be further corrected to increase accuracy

Zygomatic Preparation

At this point we are practically already at the last step: we proceed then with the preparation of the zygomatic zone.

By always resting the ES052XGT tip insert on the bone plane, the preparation will end piercing the buccal cortical cortex, trying to follow the previous maxillary preparation.

The insert practically lets itself be guided by the groove.

By placing the body of the instrument on the bone plane it is gently slid towards the zygomatic bone trying to maintain a central preparation point to the body of the malar bone itself without inclining the instrument or down (it would risk entering the breast) or towards the 'tall, which is much more difficult because basically the opposite is always the case (Figures 14 and 15).



Figure 14



Figure 18

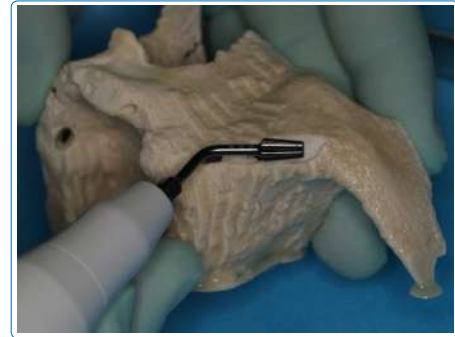


Figure 19



Figures 17-20: Countersink insert ES0SV1T

Figures 14 and 15: With the same pointed insert you work on the cortical of the cheekbone trying to continue the previous preparation

Then the implant length is confirmed by measuring the depth with a specific millimeter probe which, even if already established by the initial Tc, is however reconfirmed in this phase (Figure 16) [4].

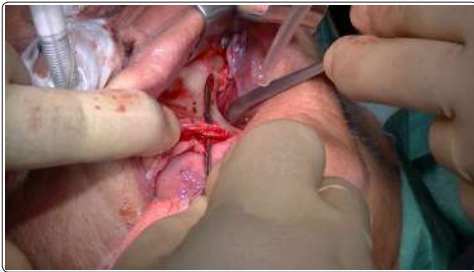


Figure 16: Measurement of the depth of the preparation completed

To complete the whole, before inserting the implant, it is necessary to countersink, to adjust the diameter of the preparation according to the chosen implant diameter. In other words, this new technique has a universal surgical protocol that can adapt to every implant type.

The first surgical phase is the same for everyone; with this last step, it is decided how much to enlarge the holes.

The ES0SV1T insert, of truncated-conical shape, is available in various increasing diameters (Figures 17-20).



Figure 17

Once the preparation has been completed, it is possible to note how precise it can be, especially within the limits of the areas previously described (Figure 21).



Figure 21: Preparation of the completed osteotomic site

The prepared osteotomic canal is completely surrounded by bone, at the crestal, zygomatic level and especially towards the maxillary sinus.

At this point it is possible to insert the implant (Zygan, Southern Implants) which, as seen from the images, goes to engage the zygomatic bone assuming an extrasinus position, maintaining a bone level around the implant neck and above all a correct prosthetic position (Figures 22-28) [5].

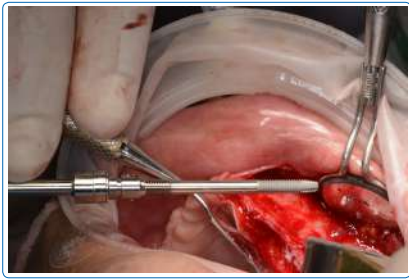


Figure 22: Selected zygomatic implant (ZYGAN Southern Implants)

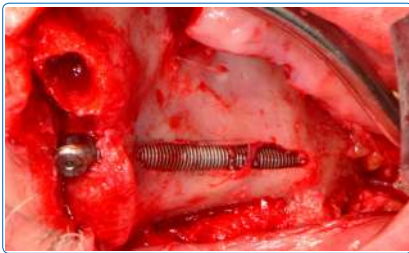


Figure 23: Implant inserted: note the extrasinus position with the maintenance of the crestal bone peak



Figure 24: End of intervention



Figure 25: Immediate loading prosthesis

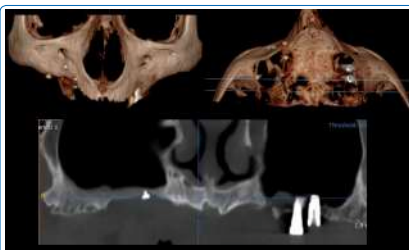


Figure 26: Images of the initial Tc



Figure 27: Before and after immediate loading

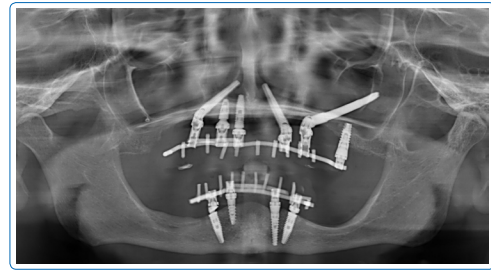


Figure 28: Control OPT

Results

No zygomatic implants was lost during the observation period. The survival rate for the zygomatic implants was 100% over an average of 24 months observation period. Two conventional implants were lost and there were no significant complications.

Discussion

The zygomatic implants are a valid alternative to grafting procedure for the rehabilitation of the atrophic maxilla, in many cases using a immediate function protocols. The zygomatic implants were placed outside the sinus and anchored in the maxillary alveolar process and in the zygomatic cortical bone.

Conclusion

There are many advantages about this new technique:

- Extrasinusal approach: no sinus complications
- Piezoelectric instrumentation (ESACROM, Imola Italy)
- Dedicated inserts
- No instruments vibration: No dangerous
- The surgery follows 3 steps: more accuracy
- Greater visibility
- Less time
- Less post-operative discomfort

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