Minimally invasive implant placement without the use of biomaterials using the bone expansion technique

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The success rate in implantology is close to 96 percent. Thanks to well-established implant placement protocols, with a few differences according to the implant system used, the predictability of the result under optimum tissue conditions is quite significant. It is very different when these conditions do not meet the recognized standards in terms of volume and quality for reproducibility in implantology. For example, thin ridges, which are frequent occurrences, will require a long and costly process for patients because they entail bone augmentation or possibly support tissue grafts.

Is there a minimally invasive alternative for these patients that allows them to be treated without these problems? One line of thinking is to stop the systematic practice of implantology as subtractive at the tissue level, but rather to transfer these surgical site, enables regeneration of the different tissues.

These principles are (Fig. 2):
- Primary closure of the surgical site to enable undisturbed and uninterupted healing. These are the most important goals of the surgical intervention. In other words, it is necessary to avoid a tension wound and ensure that the wound has been closed as perfectly as possible.
- Postoperative antibiotic treatment to prevent infection. This is very important to ensure proper wound healing.
- Proper protection of the surgical site. This can be achieved by using dressings or other types of wound coverage.

The general surgical principle of modern implantology, called osteotomy, as close as possible to the dimensions of the implant that will be placed. This principle is still widely prevalent.

However, soft-tissue management has evolved, and the trend the past few years has been to manage soft tissue from the first surgical step. With the arrival of self-tapping conical implants, a new technique was developed that enables lateral as well as vertical bone vertical bone condensing or expanding. In addition, in 1994, Summers, practicing his clinical cases, we will see it is possible to be minimally invasive, precise and also avoid the use of biomaterials simply by exploiting the biomechanical properties of bone tissue and its capacity to regenerate. Respecting guided regeneration principles, which means the implant is placed in a way that it stimulates new bone growth around it, is of paramount importance. This technique involves the use of bone expansion osteotomy, a method that allows for the creation of a bone defect in the jawbone and then filling the bone defect with a bone graft.

Case 1
The patient presented with a fracture of #16 (Fig. 3) and periapical cysts. With the patient's consent, the decision was made to perform an extraction of #16. The extraction was performed under local anesthesia, with the patient's teeth numbed. The extraction was performed using a chisel and a osteotome, and then a healing screw was placed in the bone defect.

The #16 was carefully extracted by radioccephalometric and panoramic radiographs to avoid bone fracture especially in the vestibule where the cortical bone is very thin. The lamina dura, which enables the attachment of collagen and Sharpey's fibres, presents a high potential for contamination. Consequently, a superficial debridement (vaporisation) of the entire lamina dura with an Erbium laser (2.940 nm) followed by decontamination with a diode laser (1.490 nm) was performed. This was a flapless surgery. The expansion osteotomy was performed through the inter-radicular septum. It was initiated with a very thin manual bone tap (pointed) and then an automatic mechanical osteotome (Figs. 4-5) (Osteo Safe®-Anthogyr) was used. The use of convex inserts in the beginning enables lateral expansion of the native or healed bone and then concave inserts during the breaking of the last sub-sinus millimeter. enables lateral bone recovery of this bone while protecting it apically.

During sinus progression PRF membranes (or native collagen membranes) are placed in the osteotomy opening to fill the intra-sinus space that is thereby gained (they also provide protection of the sinus membrane).

The Erbium laser is again passed through the osteotomy socket to vaporize the bone debris and sludge along the walls of this osteotomy. The implant is placed according to the manufacturer’s recommendation but with an even slightly higher torque if the titanium grade so allows. A healing screw that fits the diameter and height of the residual gap to be closed is carefully chosen (Fig. 6).

If the healing screw does not enable primary closure of soft tissue, PRF membranes are used to fill the gap. If this gap is too big, a mucoperiosteal detachment of 6-10 mm and then a horizontal incision of the peristium of 6-8 mm are made. This technique serves to pull the gum around the healing screw by maintaining it with two sutures. The control X-rays clearly showed good osseointegration of the implant, significant filling and regeneration in only three months, and then perfect filling and regeneration four months after surgery.

The bone remodeling around and above the implant neck also seemed...
The advantage of this technique was to maintain, if possible, the entire bony body by laterally pushing back the bone with minimal trauma while creating a precise osteotomy that breaks the last millimeter of the sinus floor while protecting the sinus membrane. The consequence is the notable increase in peri-implant bone density with a high elevation of BIC (Bone Implant Contact) and, therefore, bone stability.

The objective of this technique is to manage, if possible, the entire bony body by laterally pushing back the bone with minimal trauma while creating a precise osteotomy that breaks the last millimeter of the sinus floor while protecting the sinus membrane. The consequence is the notable increase in peri-implant bone density with a high elevation of BIC (Bone Implant Contact) and, therefore, bone stability.

The technique appears a new concept. On the other hand, using an automatic osteotome provides a better view of the site and makes it possible to practice flapless surgery, to position more precisely and obtain more homogenous progression, in comparison to using bone taps with a surgical mallet. From the patient’s perspective, surgical comfort is significant and very noticeable.

Vital importance is attributed to the closure of soft tissue during implant placement, either by carefully choosing the healing screw (the height and diameter) or the implant abutment, enabling slight compression of soft tissue and providing the implant/prosthetic connection system with a “barrier” that enables the regeneration of the two families of tissues.

These minimally invasive techniques still require many improvements and more widespread validation. However, for both technical and safety reasons, the practitioner should always suggest the least invasive technique that contributes to, guides and induces this tissue regeneration for which, most of the time, we have the matrix around these traumatized zones.

References


Editorial note: The full list of references available from the publisher.