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Head LINES

Minimally invasive surgery and immediate prosthesis loading.

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Introduction

Since the beginning of dental implantology, the surgical principles have undergone an evolution that continues today. Originally, an osseous healing phase (during which the implant was submerged and completely covered with soft tissue) was considered a prerequisite, thus bringing about the development of the two-stage protocol.

Later it was shown that the survival of the implant was not in jeopardy if exposed during this osseous healing phase, leading to the development of the single stage protocol.

In both cases, to achieve osseointegration, a period free from any occlusal loads on the implants during healing was considered necessary. In this conventional implant surgery it was considered important to expose completely the alveolar process and the osseous base, in order for the surgeon to visualize the bone topography.

The protocols for immediate loading were developed after it became evident that in some circumstances the implants could receive loads during the osseous healing phase. Extensive clinical research demonstrated that immediate loading of implants with provisional fixed prostheses could be successful.

As diagnostic methods have evolved, implant guided surgery can now be defined as the placement of the fixture in the exact location specified during planning, through the use of devices (navigation systems, surgical templates…) that guide the drilling sequence to create the implant osteotomy as well as guiding the implant placement.

The next evolutionary step should then be “surgery with no surgery”. Minimally invasive implant surgery could be defined as surgery in which (based on case-specific knowledge of the anatomical structures and the optimal position for the prospective prosthesis) the implants are placed without exposing or at most minimally exposing the alveolar bone.

The purpose of this article is to describe the use of surgical guides through a case report. This case also illustrates the prosthodontic techniques required to adapt an immediate prosthesis, previously created on a stereolithographic model of the mandible. The same surgical template used in the guided surgery is also used to place the analogues in the stereolithographic model, duplicating the future position of the implants in the patient's mouth.

Materials and Methods

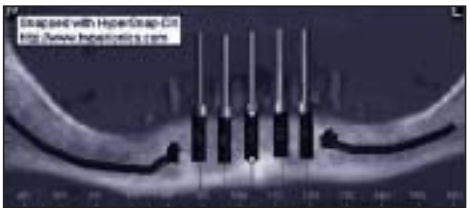
Case description

The patient, 67 years of age, completely edentulous and with a severe atrophy of the mandibular alveolar process, was wearing a mandibular complete denture not well adjusted. The patient requested treatment with implants.

Minimally invasive surgery and immediate prosthesis

After the data collection and the clinical examination, a new set of complete dentures was constructed, taking into consideration such parameters as aesthetics, phonetics, occlusion and function. This new prosthesis was used as a reference in the radiographic exploration, with a CT scan reformatted for the SimPlant program.

The placement of 5 implants evenly in the interforaminal area to construct a fixed complete denture was decided as the choice of treatment.

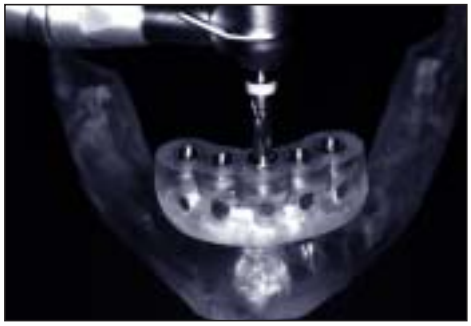


Preparation

Due to the mandibular atrophy and the lack of attached gingiva, the use of a bone-supported surgical template (SurgiGuide) to create the osteotomies and to place the implants was the most appropriate option.

The surgical template or SurgiGuide was manufactured by Materialise based on the computer planning made in the SimPlant program. Depth control was added by adapting the height of the tubes in the template (SAFE™ system). The position was judged to be correct when the stop in the implant mount reached the top of the template.

The surgical template was placed over the stereolithographic model of the patient's mandible, and “surgery” was performed on the model.

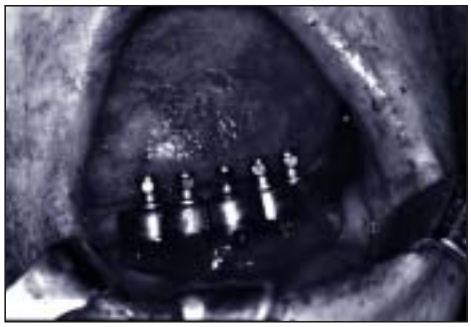


A conventional complete denture was manufactured and (after all the parameters were satisfactory) the denture base was fitted to the stereolithographic model.

After the model was articulated, transmucosal abutments were placed on the implants. The mandibular immediate fixed detachable provisional was fitted over titanium copings for the conical abutments. The mandibular provisional was not attached to the titanium copings, instead a small chimney was left so that it could be moved up or down over the copings screwed onto the conical abutments. This is done because according to our previous experience, there are always small variations in the vertical position of the implants.

Implant surgery

The implant surgery began after a small incision was made to accommodate the surgical template on the alveolar bone. Once the template was stable on the bone, drilling was performed and the implants were placed through the template to their final position. After the SurgiGuide was removed, the transmucosal conical abutments were placed on the implants and torqued appropriately.



The surgical phase finished after the tissue was sutured to approximate the flaps with limited attached gingiva to the conical abutments.

On the top part of the conical abutment, the titanium copings were screwed in place and the provisional immediate prosthesis was positioned. At this point the occlusion was checked. The titanium copings protruded from the prosthesis’s chimneys enough to fix them with autopolymerizing resin. When the resin

loading.

had polymerized, the prosthesis was removed and finished. The prosthesis was then again inserted in the mouth, the occlusion was rechecked and the patient was sent home.

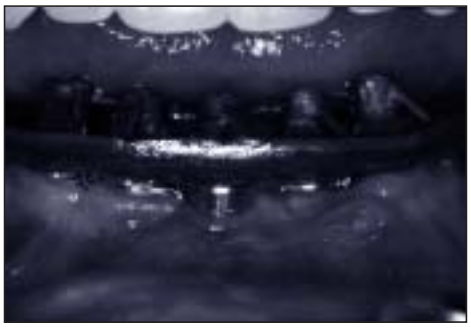
Seven days later the prosthesis was unscrewed and taken out of the mouth, without removing the conical abutments, to remove the sutures. The prosthesis was placed back again and checked for loose components.

The final prosthesis

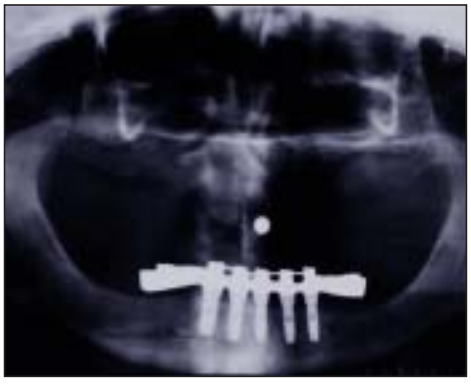
After the appropriate healing time, the construction of the final prosthesis was started. The prosthesis was constructed directly on the conical abutments, an easy procedure in which the prosthesis is finished after one impression and one trying.

With these few steps the prosthesis can be finished and delivered, because what we have in the casts is the result of work done three months earlier when the provisional was made to fit the stereolitographic model and then adjusted in the mouth after surgery.

A trying of the metal structure was done to confirm the existence of passive fit. With a good laboratory and pick-up impressions, misfits are very rare.



Once the metal structure was checked in the mouth, it was returned to the cast to set the teeth and to finish the prosthesis. At the delivery time, occlusion and radiographic fit of the conical abutment, and bone levels at the insertion time were checked and recorded.



Conclusion

The position of the incisal edge and the position of the implants in the atrophic mandible shows that the use of an immediate prosthesis created on a stereolithographic model of the mandible was the first choice for this case.

To achieve a successful result the reestablishment of the occlusal plane, the position of the maxillary incisal edges, the vertical dimension, and the smile line are critical factors to consider.