MANAGEMENT OF THE PATIENT CANDIDATE TO PROSTHETIC IMPLANT SOLUTION

Norina Forna, Iulian Costin Lupu
Faculty of Dental Medicine, University of Medicine and Pharmacy "Grigore T. Popa" - Iași, Romania

***Corresponding author:** *Iulin Costin Lupu, Assistant Professor, PhD*
Faculty of Dental Medicine
University of Medicine and Pharmacy "Grigore T. Popa" - Iasi, Romania
16, Universitatii Street, 700115

ABSTRACT

The success of any therapeutic solutions is based on psychological training and motivation of the patient. Nowadays, the dentist who uses a prosthetic implant solution has at hand a series of laboratory tests using various radiological software that provides more accurate images. This software that is used at digital radiographs, CT, also allows simulations of the number, the implant positioning, etc. and helps the clinician to explain to the patient the therapeutic solution, the complexity of the dental work, and the need for continuous supervision after the surgery itself.

Key words: Patient candidate to prosthetic implant solution, motivation, digital x-rays, computer software, medical supervision

In recent years due to easy access to information, the awareness of solving the needs to restore the aesthetic masticatory, phonetic function of edentulous patients has increased. This has resulted in more widespread use as a therapeutic solution in oral rehabilitation of prosthetic implant works, accompanied by a strict management. This includes both the therapeutic, as well as the psychological aspect of motivating the patient, beginning from the acceptance of the solution and ending with continuous medical supervision.

Thus we initially have an interception and motivation of the patient considering a prosthetic implant, which aims to raise awareness about the advantages, limitations and continuous need for patient supervision, followed by a diagnostic stage, then by the dentist's explanation about the methods of applying the therapeutic implant and the stages preceding the surgical procedure.

Modern technology today has offered a wide selection of modern diagnostic tools besides the classical ones that help the doctor make the right decision regarding the necessary therapeutic dental work.

Besides the clinical exam and the standard analyses required for the patient, the doctor has available a set of modern complementary radiological examinations, such as digital radiography and CT. The introduction of more powerful computer techniques and specialized software for data evaluation related to bone tissue, dental status, anatomical landmarks, helps the physician take correct therapeutic decisions and can persuade the patient to accept some surgical dental works preliminary to the implant.

Also in the stage before the implant one can use evaluation software based on analysis of digital radiographs with radiological

markers and especially the x-ray computerized design: the 3d navigation. Thus, a new working method was introduced, called the backwards technique that begins with the virtual design of the final denture, continuing with the actual positioning of the implants. The backwards technique consists of two stages: the virtual stage, when the implants are computer programmed and positioned using specialized software, and the second stage, when the actual implant guide that will be used in the moment of implantation is designed.

Before the implanting itself several steps must be taken. The first step is preliminary fingerprinting of dental arch or arches that are to be implanted and then realization of a radiological guide in the dental laboratory. This guide will show the aligned teeth in an ideal position and will establish some baseline markers, with the role of reference points for measuring the position of implants in bone. The next step is the scanning, when the patient will take the CT with the radiologic guide positioned in the mouth. The third stage of the operation is the introduction in the software of data collected by the CT. This translation allows three-dimensional virtual surgical placement of implants. The program provides details on anatomy, bone quality, implant features, potential need of bone addition and of maximizing the implant surface for each particular case, thus ensuring a high level of predictability. Using computer tomography provides additional information compared to the other high precision X-rays. It is used preoperatively to accurately locate vital structures such as the mandibular canal, the mental foramen and maxillary sinus.

Such software allows computer aided design of implants, proir to the surgery itself. This software can be used to present to the patient different possibilities for implant, all on a computer screen. Once all options have been discussed by the doctor and patient, the same software can be used to produce high precision implant guides that allow the surgeon to accurately place the implant in the ideal space, increasing the success rate of the surgery. The interface of these programs allows a variety of operations both in 2D and in 3D mode. Imported data from CT reading (recorded on optical media) is translated into a number of sequences DICOM (Digital Imaging and Communications in Medicine) which the software turns both in two-dimensional classic orthopantomographical images, axial and transverse sections, and a 3D representation of the patient's exact bone structure.

After carefully examining the bone structure, the areas for the implantation will be measured and analysed, the position of the mandibular channels will be determined, also the gingival thickness of the edentulous ridge, etc. In cases with implants in the jaw, the addition of bone for a possible sinus lift can be simulated and calculated.

The next step is the drawing on the model of panoramic lines that follow the dental arch and facilitate outlining the cross sections. The same panoramic profile will be used to transfer data from the program on the implant positioning device and at the final check of the implant guide.

After finding the ideal position for the implants, they will be placed in the virtual model and arranged in three axes with the help of an easy positioning tool. This can be done both in two-dimensional and in full 3D, cross-section or axial, with the possibility of immediate removal of the implant in the correct position. This way we can ensure that the implant does not reach the roots of adjacent teeth, other implants or sensitive anatomical structures, like mandibular channels. A purpose-built menu warns the user when positioned implants are wrong.

It is very important to choose the type of implant based on patient's bone density, and

this is facilitated by software through a comprehensive list of types of implants. The strength and integrity of future denture depends largely on the success of osseous integration, thus the need for this menu. Another important operation for the success of the implant guide is establishing the thickness of the gum in the area where the implant will be positioned.

Completion of the virtual aspect of implantation is reflected by the meeting between doctor and patient and the presentation of the best treatment plan directly on software, in case of last moment changes. This stage is important for the patient because it predicts the operating and postoperative time, the costs involved and the final appearance of the work.

Once the doctor "gives green light" to the work of implantation, the next step of the intervention can be carried out, and this is the procedure of achieving the implant guide. It begins with three-dimensional data transfer related to implant position on a positioning device, obtaining plaster model simulation, the implementation of the prosthetic plan and building the surgical template. The guide will be used for precise positioning of surgical implants in the bone. This guide has to fit perfectly in the patient's mouth and it has to be easy to set in and remove.

The qualities of the new system stand out easily by reduced operating time for both patient and surgeon and also by the fact that the patient does not undergo a costly and cumbersome surgery that could not have the expected results. Using the simulator and the implantation guide allow the initiation of high-difficulty surgery even by less experienced implant surgeons.

The preimplantation treatment aims at achieving optimal local and regional conditions for insertion of the implants and prosthetic reconstruction on these. It also aims at draining local and regional outbreaks, as well as bone and gingival remodelling required by the need of assembling future implants. The aim is: to extract teeth and root debris remaining stranded or bone from the previous extraction; marginal periodontal disease treatment, sometimes even doing the extraction of teeth affected; surgical treatment of apical periodontitis and of periapical osteitis; the including teeth extraction with the required bone augmentation; hyperplastic or very thin gum lining surgery through surgical procedures of excision or addition; deficient bone ridge reconstruction (raising the sinus floor, bone transplant through: lyophilized homotransplant, single autotransplant, pedunculated autotransplant; guided bone regeneration with absorbable or not absorbable membrane dental implant prosthetic solution. Note that all these surgical techniques can be performed before or during the operation when fitting the implants. Odontal treatment requires drainage and filling of all carious processes, simple and complicated.

Remaining teeth with obvious horizontal and vertical migration will be repositioned in terms of coronary by devitalization and prosthetic or orthodontic reconstruction. Through odontal treatment and correction of the migration of remaining teeth there will be an occlusal rebalancing. Finally after healing of bone and gum and all preimplantation interventions, implant installation will be carried out.

The next step in the management of the patient candidate to the prosthetic implant is the surgical stage of the actual application of the implants.

Overprosthesis of implants can be done immediately or after a period of time of 4-6 months.

It is considered that the medical supervision of implants carriers must begin with the day after implant insertion and continue during the life of the implants. The

next step is the application of the healing caps that allows the gum tissue to take their final position around the implants. This will be followed by the application of the dental prosthesis.

Medical supervision of patients during primary gum tissue integration of the implant is the first definitive step in continual supervision. Checking tissue integration is performed using clinical and radiological examination, and through periotest. Clinical and radiological tests are intended to motivate the patient to follow the doctor's instructions about hygiene and regular presentation at check-ups and making additional radiological examinations. Digital radiography, easily accessible due to the increasing number of laboratories with equipment associated with specialized software, can easily quantify the quality of bone peri-implantar support and can also achieve an easier follow-up of implant osseointegration. This X-ray examination is repeated three months after the first radiograph performed at a week or two after the intervention for the application of implants.

Medical supervision of patients in the first year of prosthetic loading of implants is performed watching carefully the strength of bone integration and maintaining within normal limits of epitelio-connective integration. In this respect, the periodontal indexes at the natural pillar teeth and those of the peri-implantar ring will be followed. These indices are very much influenced by the presence or absence of plaque and tartar. After the first year from the installation of prosthetic abutments and prosthetic loading of the implant, the patient is usually called for checkup every six months, the medical supervision consisting of a clinical and a radiological examination. Their aims are:

A. Criteria for peri-implantar diagnosing

- While an implant failure can be determined by clinical signs as pain, mobility or infection and also radiographic, success criteria are more difficult to establish precisely, because most histological research have been performed on animals and implants that have suffered setbacks.
- Early identification of failure signs of an implant is of great importance because early bone resorption could be stopped and regenerated by surgical procedures.

B. Establishing the peri-implantar bone

- It is known that after installing the implant and the prosthetic abutment, vertical peri-implantar bone resorption occurs. Therefore, it is better to fit the implant into the bone 1 mm below the surface of the cortical bone, the healing cap placed on the implant being at the same level as the cortical. For screw implants, the distance between coils can help determine the exact bone resorption, knowing the distance from the apex to the last coil of the implant. It is recorded in literature that a vertical peri-implantar bone resorption of 0.3 m per year should be regarded as pathological.

C. Tracking the epitelio-connective insertion of the implant

- In a normal development the depth of the peri-implant groove can remain unchanged about 10 years and over. The depth of periimplantar pouches can be determined by a classical and electronic sample in four areas: mesio-vestibular, disto-vestibular, mesio-oral, disto-oral.

D. Relationship between the level of the epitelio connective insertion and the level of peri-implantar cortical bone

- There is a close relationship between the peri-implantar epitelio connective level and the resorption state of the underlying bone. It is known that there is a fibrous connective cuff of 1.2 to 2 mm from the

bottom of the periimplantar bag and upper surface of the cortical bone that is actually the size of the epitelio-connective integration ring of the implant.

E. Determining the features of implant amortization

- Endosseous integrated implants show the peri-implantar presence of a layer of proteoglycans of 20-30 to which the bone tissue accedes and overlaps. This type of peri-implantar attachment is also known as osteo accepted implant.

The patient must be motivated to apply the correct hygienic measures; this can be achieved by using practical and video demonstration. This will allow to prologue "the life" of the implants. The general state of health must be maintained also.

REFERENCES

1. Misch C.E. *Contemporary Implant Dentistry*. 3rd Edition. Mosby Elsevier 2008.
2. Misch C.E. Dental Implant Prosthetics Edition. Mosby Elsevier 2004