SHORT IMPLANTS. THERAPEUTIC ATTITUDE.

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Abstract: *The use of short implants has been proposed as a viable alternative in patients with resorbed posterior regions unwilling to undergo ridge augmentation procedures. Short implants are manufactured for use in atrophic regions of the jaws, so, using of shorter implants with osteotome technique minimizes the need of more extensive sinus floor elevation, thus reducing the duration and morbidity of the treatment.*

The placement of implants in the posterior areas of the dental arches remains complicated even in the present time due to difficult approach, the risk of sinus membrane perforation, mandibular nerve damage, and near tissue. Therefore, have tried countless techniques for tooth replacement in case of bone atrophy, including bone addition for bone ridge augmentation, reposition the mandibular nerve, sinus lifting, inducing osteogenesis. These techniques remain invasive to the patient. Placing the short dental implants (SDI) reduces the degree of invasiveness, working time is shorter, and the comfort and acceptance of SDI by the patient, have made them to be increasingly more often used by clinicians, thereby avoiding most of the times other invasive bone reconstruction techniques in order to insert some long implants. Issues such as reduced length of these implants, disputed them, contrary to their rate of success.

In the past, clinicians preferred to use the implants as long as possible, in any area of the dental arches, because the use of such implants and with larger diameter was coupled with high rates of success. But most of the time, using these implants needed additional interventions to improve the bone level. This is especially used in posterior areas of dental arches due to bone deficiencies. In addition, the upper jaw is subject to additional challenges in the insertion of implants, including hampered access, limited visibility, reduced space and the low quality of the bone. An alternative to offset the reduced bone height is using various surgical techniques that facilitate bone growth and which includes sinus lifting procedure, as well as lateral approach or one that uses the osteotome, described by Summers in 1944. Both approaches have some drawbacks, the first of the techniques presented an increased rate of morbidity especially when autologous bone grafts are harvested from extraorale areas. The second procedure involves perforations of the schneiderian membrane, which are difficult to detect during the intervention and can lead to occurrence of late complications. Although a definition of short dental implants was absent, the literature defines implants shorter than 10 mm as SDI.

There are items that can interfere with successful insertion of short implant, such as: reduced bone density of atrophic upper jaw, posterior location on the arch, increased height of coronary restorations.

Indications for placing short implants:

- Atrophic arches;
- Maxillary ridges affected by resorption in the posterior area of dental arches;
- The proximity to the maxillary sinus;
- The proximity of the mandibular canal or mental foramen.

Factors that we need to consider when we propose the insertion of SDI implants:

- Rough surfaces implants have a higher rate of success than those with smooth surface;
- An increasing number of spirals in the thread will lead to an increase in contact between bone and implant, maximizing the size of the contact surface, this providing a better osseointegration with highly successful results;
- The lateral forces applied on the prosthetic reconstruction on short implants must be limited.

Reconstitution of edentate terminal areas where the supply of bone height is low, can be done either by mobile prosthesis or implant-prosthesis. For the insertion of implants, the augmentation techniques are mandatory which do not always succeed or they have predictable indications.

In terminal mandibular edentulous, where the vestibular cortical is compact, integration of bone block or bone granulation is poor. The solution remains inserting implants under 9 mm in height, that are supported by the existing bone offer.

Characteristics of SDI implants:

- There are different types of short implants, coming from various systems placed in the circuit (e.g. Ankylos, Nobel Biocare, Straumann, Biocon, Implantium).
- The macrogeometry of short implants is provided with a design fitted with large sharp coil, large spaces between the threads, where bone will grow (the so-called healing rooms of bone) similar to the implants used for immediate loading. This type of broad coils provides a convenient assignment of stress at the bone/implant interface. The macrogeometry of short implants involves a switch platform design, which provides the placement of the abutment inside the implant platform wide of cervical edges. The created space protects soft tissue from the accumulation of bacterial plaque, ensures thickness for soft and hard tissues, and therefore aesthetics, a biological

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width for cleaning the peri-implantar groove. Biomechanically, by directing the stress toward the middle of the implant in long bone, reduces the risk of peri-implantar alveolar cortical resorption. Conical internal connection through the phenomenon of conical self-gripping Morse type, ensures stability of the superstructures and removes micro-movements that generate peri-implantar bone resorption. Microspaces of the conical connection between abutment and implant interface do not exist, the risk of bacterial build-up is null. Mechanical stability is complemented by tightening the screw and hexagonal anti-rotational connection. Macro-geometry of implants with switch platform, with sealed implant-abutment interface and slopping shoulder reduce bone resorption and can be placed at subcrestal level. An implant will be inserted for each lost tooth, for molars an implant for each root and ensure compulsory biological space of 1,5 mm circumscribed bone for each implant and 2 mm between the implant and the tooth.

- Short implant diameter must be greater than 4 mm in order to expose a surface in contact with the bone as large as possible. Thus identifies three types of implants grouped according to ratio between diameter and height. Type I implants with a diameter of 4,2 mm with 6 mm in length and surface area of 110 mm², type II with 4.2 mm diameter by 7 mm length and surface area of 130 mm2 and implants of 4.5 mm with 6 mm in length and area of 210 mm2. The presence of a large area for implants with a diameter of more than 4 mm, designed with active coils, conical connection and splayed platform switch type, ensures a functional distribution of stress, reduces the concentration of forces at cortical level and stops peri-impalantar resorption (figures no, 1,2).
- Crowns with reduced surfaces by a third of a natural tooth's surface.

Patient selection, exclusion criteria:

- Patients with bruxism;
- expanded prosthetic space;
- poor hygiene;
- chronic smokers.

Advantages of inserting short dental implants:

- Decreased need for bone graft in height;
- Reduced time in completion of treatment;
- Lower cost of treatment;
- Reduced discomfort;
- Low-risk for surgical perforation of the sinus, paresthesia, heating of the bone and the destruction of adjacent tooth roots.(1,2)

The use of SDI was debated for more than two decades because of the alleged high failure rates relative to the long implants, which promise better results in the long run. However, recent clinical and biomechanical trials show that the prognosis of implants with reduced height is comparable to that of longer implants. Misch has published a literary review about failure rates associated with implants of less than 10 mm high, in the lateral areas of partially edentulous patients that were inserted between 1991 and 2003. It was reported that from 2837 short implants, the success rate was 85.3%. It has been suggested that the use of long implants, that provide greater surface distribution of occlusal stress, is not necessarily required or advantageous.(3)

Once it is determined a minimum height to provide stability for the implant, the diameter is more important than the initial height.

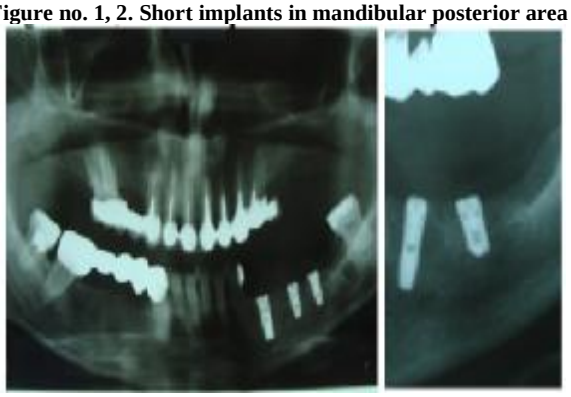
Short implants can substitute bone augmentation stage either with bone block, either with granular graft and titanium retainers, which is a surgical risk stage. According to R. A. Levine: "one of the risk factors pre-surgically assessed in obtaining a final aesthetic result is an inadequate three-dimensional bone volume."(4)

Bone deficiency is present even for the totally edentulous. There were authors who were preoccupied by the prosthesis on implants of such situations. Malo et al. have introduced the concept of therapeutic "all-on 4" involving immediate load of totally fixed prosthesis based on 4 implants in the jaw or mandible. But there is a possibility of inserting short implants in the interforaminal area from 4 to 6 implants with fixed loading and distal bracket. In an overview of the concept of "all-on 4" implant rehabilitation of an edentulous arch, Sascha A. Jovanovic claims that: "bone augmentation techniques, such as sinus augmentation with a lateral window approach (maxilla) and onlay grafts or rearrangement of the nerve (jaw) are traditional approaches, but assume extra cost and prolong the treatment."(5)

Patients who are recommended to SDI are patients with advanced bone resorption caused by early loss of teeth, lack of prosthesis in the edentulous gap or wearing inappropriate mobile prosthesis. referring to the physiological or pathological bone loss L. F Cooper claims that: "no longitudinal study has been identified to evaluate the rate of bone loss in the edentulous regions under the terms of not using a prosthesis. In this regard, bone resorption associated with wearing the prosthesis does not reflect a physiological reduction of bone, due to ageing or inactivity atrophy. Under a mobile prosthesis, bone loss is usually caused by compression forces inducing pressure necrosis. However, some patients that don't use prosthesis face severely atrophied ridges. This can be attributed to a history of inactivity atrophy, formerly of periodontitis, deficiencies during dental extraction, systemic problems etc."(6)

Using the SDI requires a correct analysis of the prosthetic structures, the biomechanical principles and a selection of the prosthetic structure type. Scott Ganz claims that the prosthesis on implants has become a predictable therapeutic alternative, even conventional and a continuous process of improvement in surgical and augmentation techniques and restorative technologies. Restorative phase of implant reconstruction has evolved significantly in terms of components, manufacturing processes, impression techniques, materials. Perhaps the most important technological methodology consists in using CAD-CAM technologies to manufacture abutments, bumpers, and individualized prostheses. Since most implants are not ideally placed and round implants do not actuality represent the real dental morphology, custom abutments are a must for the restorative phase. (7)

Figure no. 1, 2. Short implants in mandibular posterior area



CONCLUSIONS

In this article, there were presented various reviews regarding the use of SDI in implantology, observing clear their degree of predictability and safety.

SDI can be successfully inserted for patients with atrophy of the bone ridge, as long as the protocols are strictly followed. Likewise, their use eliminates the need for some procedures as sinus lifting and bone grafting.

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