Shorter Implant Applications for Alveolar Ridge Atrophy

Implants used to replace missing teeth are often an ideal anchoring element. However, bone defects or poor bone quality in the jawbone area are often accompanied by adverse effects, which only facilitate a dental implant with different surgical measures.

Often anatomical structures such as the maxillary sinus or the mandibular canal limit the option of simple implants. In such cases vertical or transversal bone augmentation can recreate optimal uptake conditions for missing alveolar ridge areas.

The transplantation of the body’s own bones is however stressful and risky for the patients. Aside from a longer operating time and morbidity at the transplant extraction site, surgical procedures also cause post-operative complications in the extraction site area [Giannoudis et al, 2005; Khan et al, 2005; Marx and Morales, 1988; Banwart et al, 1995; Tayapongsak et al, 1994; Summers and Eisenstein, 1989; Younger and Chapman, 1989; Cowley and Anderson, 1983].

As an alternative, xenogenic bone replacement materials are used, in addition to allogenic and alloplastic materials [Hoexter, 2002; Yildirim et al, 2000a; Hanisch et al, 1999; Hürzeler et al, 1997b, Hürzeler et al, 1997a], the mechanical, biological and immunological properties of which must be discussed.

Upon examination of these additional surgical measures it makes sense to take into account a rehabilitation which is good value and less invasive for patients.

Therefore the prosthetic treatment using shorter implants is an interesting alternative to the expensive, surgically reconstructive treatment.

The use of shortened implants was initially associated with low survival rates [(Pierrisnard, Renouard, et al. 2003 11 /id), (Baelum & Ellegaard 2004 12 /id), Bahat 1993, Bahat 2000, Henry 1993, Higuchi 1995 Jemt 1993]. In particular the high masticatory forces in the side teeth area limited the implant survival rate from a biomechanical perspective [(Rangert 1993 13/id)]. Consequently the insertion of shorter, unblocked implants in the side teeth area was discouraged.

For a long time the insertion of long enough implants, between 10 and 15mm in length, have been postulated for the long-term successful bone anchorage. However this implantation is only possible together with surgical, bone restructuring concomitant measures in many cases.

The progressive advancement of the implant design and the implant surfaces with simultaneous causal research for implant losses, perhaps give reason to rethink
If actual implant lengths play no definitive role in the long-term success, then special attention is to be given implant diameter and implant design.

The hypothesis of the lower survival rate in connection with the length of the implant.

Studies have revealed that implant losses cannot be directly attributed to the actual length of bone implant but rather to a combination of bone quality, site of insertion, parafunction, gender, length of implant, diameter and the loading period of the implants [Adell et al 1990, Bahat et al 2000]. Poor bone quality is given as the most significant cause for implant loss in most of the studies [Becker et al 1999, Davarpanah et al. 2001]. Many studies also indicate that implants only drop away after loading.

Analyses of transferring the force to the bones seem to be impartial to implant lengths [Pierrisnard et al. 2003]. Also experimental comparative studies with implants between 7-10 mm in length show no significant improvement to the osseointegration process with the insertion of longer implants [Bernard J et al 2003].

More recent experiments show that survival rates with short implants can reach up to 95% in the upper jawbone [Tawil et al. 2003, Renouard et al 2005] and between 88 and 100 % in the lower jawbone [Stellingsma et al 2004].

Therefore if actual implant lengths play no definitive role in the long-term success, then special attention is to be given to the two factors, implant diameter and implant design, as important parameters for primary and long-term stability.

Although Nibes, N and colleagues were able to demonstrate that 7mm long and 3.75mm wide implants report a failure rate of 9.7 %, while 4mm wide implants in turn record a failure rate of 7.5% and with the use of greater diameters the failure rate once again rises, the failure rate can hardly be held to one single factor, namely the diameter.

So complications can certainly be attributed to overheating during operative measures for the insertion of wider implants, since here it leads to further bone loss as a result of necrosis.

It seems that elaborate surgical and prosthetic planning and the use of modern operating technology have a significant impact on the success rate. Authors like Barhatsch et al. for example, illustrate this, by achieving a high success rate with short implants and being able to access detailed surgical and prosthetic planning which in turn results in similar success rates to that of an implantation with longer implants.

For the practitioner there are different implant systems which offer a selection of short implants. The GIP implant was thus developed by the Trinon company for atrophied but wide jawbones.

Taking into consideration the afore-mentioned criteria this type of implant is the ideal alternative to alveolar ridge augmentation or traction.

A GIP implant is possible from an alveolar ridge area of more than 4mm.

There are three lengths to choose from 4mm, 5mm, and 7mm with a diameter of 7mm. The tried and tested implant thread form and the outstanding primary stability relating to this, itself
The bone position is prepared by a punch with a trepan drill which is adjusted to the implant system and is 7mm in diameter and 7mm in length.

Flapless op using gingival punch (left and right)

Manual turning of the implant (left, center and right)
provides immediate restoration and if necessary immediate loading with the use of 4mm long implants. This new form of implant, the GIP Implant, may be inserted with the known surgical Q implant set.

Case Study
The 45 year old patient came to us on 21.4.2007 for the first time with problems with prosthetic lower jaw restoration and requested a tight tooth replacement. Upon extensive inspection and radiological mouth examination the following tooth status was diagnosed.

In the lower jaw the patient had an inadequate removable bridge in quadrant III, anchored with an attachment on tooth 34 and a ring telescope on tooth 37. Teeth 37 and 34/45 were crowned. In quadrant IV from the fifth there was a unilateral free-end situation. The porcelain firing on tooth 44 was chipped

Palpatorically the lower jaw was wide; however in radiological terms there were signs of highly resorbed alveolar ridges, Following an individual prophylaxis and mouth hygiene assessment we decided to insert a GIP implant in quadrant III in flapless surgery.

After removing the perforated gingiva the implant bed was prepared using another trepan drill of the same size and a 7mm long and 7mm wide GIP implant was manually inserted and the articulation movement examined.

The patient was discharged with immediate restoration. The laterotrusions – and balance contacts were freely smoothed. No complaints were raised after the operation. The patient was accepted in a review-and-recall system and was checked on a regular basis.

Every treating physician must know the fundamental principles for implant therapy. If he abides by these in a painstaking way the results are predictable.

Even though literature studies and independent results are encouraging for us, we need many more long-term studies in order to make a sure statement about the equal value the use of shorter implants carries.

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