Vertical reconstruction of soft peri-implant tissues

By Dr Tomas Linkevičius, Lithuania

Crestal bone stability around dental implants remains one of the most important features of successful implant treatment. Besides major clinical advantages for the patient, stable marginal bone provides the clinician with psychological comfort and satisfaction, because of the positive long-term outcome (Fig. 1). Therefore, we all need to be aware of possible causes of loss of crestal bone stability and exercise every method to prevent bone resorption.

For almost one decade, platform switching has been considered to be the most effective way to achieve this outcome. It is so effective that almost all implant companies have implemented platform switching as an essential feature of implant manufacture. It has generally been concluded that implant design is more important than the biology itself. However, recent clinical research conducted by our group has found that soft-tissue thickness is an important factor in preserving crestal bone stability around implants. It was determined that if vertical soft-tissue thickness is 2 mm or less, there will be crestal bone resorption of 15 mm in extent during formation of a biological seal between the soft tissue and the implant, abutment or restoration surfaces (Fig. 2).

Furthermore, it was clearly shown that even implants with platform switching could not maintain bone if at the time of implant placement vertical soft tissue was thin (Fig. 3). That returns us to the discussion of whether biology or implant design is more important. Well, we need to understand that vertical soft-tissue thickness is a prerequisite of the biological width around implants. Biological width around implants starts to form at the time of healing abutment connection and is complete after eight weeks. This biological seal is the only barrier protecting the osseointegrated implant from the contaminated intra-oral environment and hence most important. Thus, there is a direct connection between the peri-implant mucosa of an edentulous alveolar ridge and peri-implant soft tissue.

It seems that the soft-tissue thickness required to protect the underlying bone around implants is approximately 4 mm, which is longer than the biological width around teeth. There are two ways in which biological width around implants is formed with crestal bone: (a) with bone resorption. Which one would you like your mother to have? Or which one would you like your mother to have? That is the question we all as clinicians should answer sincerely.

So if we diagnose thin vertical tissue at the time of implant placement, what should we do? There are no current guidelines to follow; however, we need to do some-thing, because crestal bone resorption will otherwise result. This is especially important for short implants, which are increasing being used. Today, an implant of 8 mm in length is no longer considered short, and we have sufficient data to determine that implants of 6 mm in length work as well as longer ones do in the posterior of both jaws. However, imagine the outcome if a 6 mm implant is placed in the posterior mandible, where thin vertical soft tissue is frequently present. We would have approximately 2 mm of bone resorption, due to biological width formation, leaving only two-thirds of the implant surface to become osseointegrated. Such a circumstance poses a risk of implant failure, which in my opinion is the most logical approach. Increasing soft-tissue thickness vertically compensates for the lack of vertical tissue. Already in a 2009 paper, we suggested that clinicians "consider the thickening of thin mucosa before implant placement", therefore, this concept is not entirely new. The idea is to place some sort of autogenous, allogenic or xenogenic material over the implant to increase soft-tissue thickness after healing.

A connective tissue graft is considered the gold standard for soft-tissue augmentation around implants. However, this technique has some serious disadvantages, such as donor site morbidity and the difficulty of the harvesting procedure. Therefore, allogenic substitutes might be considered a viable option to replace autogenous grafts in vertical soft-tissue reconstruction. The use of an acellular dermal matrix is thus far the only approach backed by solid clinical approach, including a controlled clinical prospective study. In this study, implants were placed in three groups of patients with (a) thin vertical tissue, (b) thick vertical tissue or (c) thin vertical tissue augmented with an acellular dermal matrix material (AlloDerm, BioHorizons). Radiographic assessment showed a reduction of crestal bone loss from 1.74 mm in the thin-tissue group to 0.32 mm in the augmented group. In addition, soft-tissue thickness increased by 2.33 mm, from 1.50 mm to 3.83 mm, after augmentation with the allograft. Another option might be recontouring of the bone during basic implant bed preparation, especially if a narrow ridge is present. Careful reduction and smoothing of the narrow ridge will not only provide a flat bone surface and a sufficiently wide area of bone for implant positioning, but will increase soft-tissue thickness as well (Fig. 5). While the concept of bone removal to preserve the bone might be acceptable to some clinicians, there is no strong clinical evidence that this procedure increases soft-tissue thickness and reduces crestal bone remodelling.

In conclusion, it must be emphasised that diagnosis of thin vertical soft tissue is very important in implant treatment. Only by acknowledging that tissue thickness is an important factor can we follow protocols that allow us to reconstruct vertical peri-implant tissue and reduce crestal bone loss.

Editorial note: A list of references is available from the publisher.