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 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 us to discuss the question of whether biology or implant design is more important. Well, we need to understand how 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. Which one would you like your patient 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 something, because crestal bone resorption will otherwise result. This is especially important for short implants, which are increasingly being used today. An implant of 8 mm in length would be considered short, and we have sufficient data to determine that implants of 6 mm in length will no longer ones do in the posterior of both jaws. However, the outcome of such an 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, considering the prosthetic superstructure and implant-crown ratio. Some implant manufacturers have launched implants of 4 mm in length, making soft-tissue thickness even more important for users of these products.

So what should the approach be? There are two options: some of them already researched clinically and some based on clinical experience without any objective evidence. An initial thought may be to place the implant deeper sub-crestally (Fig. 4). Firstly, there must be adequate distance from the alveolar nerve to position the implant sub-crestally in a safe manner. It is advised that the implant stop at least 1 mm from the nerve.

Extensive sub-crestal positioning of the implant, of course, does not prevent crestal bone loss, as the microgap at the implant-abutment interface will form an inflammatory infiltrate, which will cause bone resorption anyway; however, it is likely that the implant will not have soft tissue recession or rough surface exposure, which usually follow bone resorption. It is well known that the exposure of the rough implant surface enhances plaque accumulation and can be developed peri-implantitis. In other words, the future of such an implant would only depend on the scrupulous cleaning abilities of the patient, which is usually not the case.

Another option might be reconstructing 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 clinical evidence that this procedure increases soft-tissue thickness and reduces crestal bone remodelling.

Consequently, we might think in another direction and consider a third option, vertical reconstruction of the soft-tissue thickness, 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, allogeneic or xenogeneic 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, allogeneic 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 research, 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 (Figs. 6a & b). This research proves that the lack of soft-tissue thickness is required for biological width formation without crestal bone loss can be compensated for by the use of an acellular dermal matrix material at the time of implant placement.

In conclusion, it must be emphasized 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.