

Ridge preservation/restoration using d-PTFE membranes

A protocol for using non-resorbable membranes immediately after extraction with creation of keratinised gingiva

Having attended several EAO congresses over the last 10 years, we noticed that very few to none of the presentations discussed the use of d-PTFE membranes immediately after an extraction. The role of this type of membrane in bone augmentations was only discussed during a couple of short oral presentations and in some posters. The goal of this article is to inform EAO members and other readers about the interesting indications for placing a d-PTFE membrane directly after extraction.

A variety of alveolar ridge preservation and augmentation techniques have been described in the scientific literature. Autologous bone or bone substitutes can be used to fill the alveolar process/dental alveolus. A resorbable membrane or collagen plug can be used as a cover. In addition, non-resorbable membranes have a role to play in the ridge preservation/restoration process.

The non-resorbable e-PTFE (Gore-Tex) membranes which were previously available were not suitable for this purpose. Instead, a d-PTFE (Teflon) membrane (Cytoplast) is required because unlike e-PTFE this remains in function if exposed to the oral cavity. This is because d-PTFE membranes are non-permeable to bacteria. A study by Hoffmann et al. (2008) reported minimal changes in the alveolar process when a d-PTFE membrane was placed following an extraction. An additional advantage is the increase in the width of the zone of keratinised gingiva when using this type of membrane (Barboza et al. 2014).

Application of d-PTFE membranes in practice

We have been applying d-PTFE membranes directly following extractions for a considerable period of time within our practice, and with good results. Their use means that after a healing period we can place implants surrounded by hard bone and keratinised tissues with sufficient dimensions in around 95% of all cases. The following case illustrates one example of the technique.

The case concerns a 50-year-old woman who had been referred for treatment of periodontitis. She underwent treatment in accordance with the Dutch periodontology protocol, resulting in a predominantly stable and healthy reduced periodontium. Endodontic retreatments were performed on teeth 36 and 37 (tooth 36 had had an apex resection in the past). However, in the 36 an endo-periodontal problem developed with a primary endodontic cause, indicating an extraction (Figures 1–2). The 36 was removed with some difficulty (it broke off) and it was observed that the vestibular wall was mostly lacking (Figure 3).

We decided to preserve/restore the alveolar ridge as much as possible by applying a titanium reinforced d-PTFE membrane with allogeneic bone graft material

as filler. The edges of the tissue were deliberately not primarily closed. The reasons for this were as follows:

- to preserve the position of the mucogingival junction
- because exposure of the d-PTFE membrane does not have a negative impact on regeneration, as long as the edges are not openly exposed
- because following removal of the membrane, the upper part of the osteoid matrix will reform into keratinised gingiva over time, with a fine, wide zone of keratinised tissue as a final result

The membrane was removed five weeks after it had been put into place (Figures 4–5). This can be fairly easily done by elevating it slightly and cutting off the connection between the outside of the membrane and the inside edges of the tissue, e.g. by means of a pocket probe without anaesthesia. After this the membrane can be removed with the help of a pair of tweezers (sometimes local anaesthesia is necessary). It is important to leave the tissue (bone matrix) untouched, because it is now no longer protected by the membrane. If required, a stitch can be put in to stabilise the edge of the tissue. Three months after the removal of the membrane, the tissues had healed nicely and there was a wide zone of keratinised tissue present (Figure 6).

After elevating a flap to enable the placement of the implant, the alveolar process could be seen to have visibly recovered and the preservation and augmentation of the shape had been realised (Figure 7). As a result, the placing of an implant in position 36 was straightforward (Figure 8). During drilling to create the implant bed, a very good degree of hardness of regenerative tissue was observed, comparable to the feeling of drilling into hard, natural bone. Some months later the crown was placed by the referring dentist (Figure 9).

Potential complication

A potential complication can occur when using this technique if the edge of the membrane is not fully covered by the soft tissues during the healing period. This will create a portal of entry for bacteria, which has a negative impact on the process of bone augmentation. In such a case, early removal of the membrane is required. The amount of regeneration will then depend on the length of time the membrane has remained in position, well covered by soft tissues.



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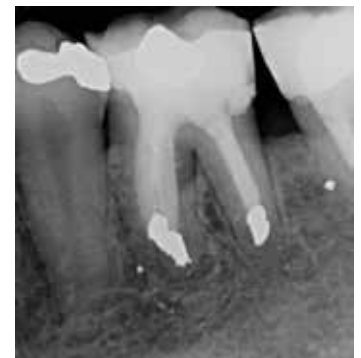


Figure 1. X-ray image of molar 36.

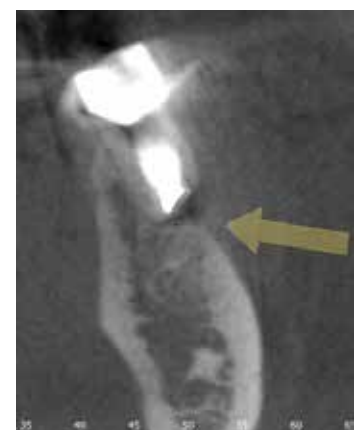


Figure 2. CBCT image of the 36. The arrow indicates the considerable amount of bone loss on the vestibular side.

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Figure 3. The area around the 36 immediately following its removal. A lot of bone loss is visible on the vestibular side.



Figure 4. The same area five weeks after the removal of the 36. The tissue looks healthy and the titanium reinforcement of the d-PTFE membrane is visible.



Figure 5. Clinical picture taken immediately after the removal of the membrane.



Figure 6. Three months after the removal of the membrane the area has healed nicely. Note in particular the wide zone of keratinised tissue.



Figure 7. The site of the 36 prior to the implant being placed. A comparison with Figure 3 illustrates the amount of alveolar ridge preservation and rebuilding achieved.



Figure 8. The implant following placement in position 36.



Figure 9. A screw-retained crown was attached a few months after implant placement.

Conclusion

Using a d-PTFE membrane directly following an extraction is a valuable technique because it has been clinically demonstrated to lead to good results. The placement of implants becomes easier and more predictable when this technique is used. It also considerably increases the likelihood that at the time of implant placement no additional bone augmentation procedure will be needed (including sinus lifts). The d-PTFE membrane will preserve/restore the shape of the alveolar ridge and increase the amount of keratinised gingiva, even in compromised situations. Likewise, the presence of a wide zone of keratinised tissue will increase the chance of stable peri-implant tissues. However, this technique requires further studies to investigate its limitations. Furthermore, its success is linked to the skill and knowledge of the practitioner and it should only be undertaken by well trained and suitably experienced surgeons.