

Autologous concepts in dentistry:

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Transplantation on a new level

The history of tooth transplantation goes way back in time. Thus, even the ancient Egyptians recognized the potential of "tooth transplantation," at which time subjects were forced to give their teeth to their pharaoh. This allogeneic approach is today a problem not only for ethical, but also for hygienic reasons (danger of prion transmission).



Back to modern times, in 1956 ML Hale described for the first time the procedure of autologous tooth transplantation. Transplantation involves teeth that are fully erupted. Transplantation is technique sensitive and requires a high level of skill by the performing surgeon. An intact cementum is essential for the tooth to be able to fuse into the alveolar bone postoperatively. That is what we refer to as ankylosis. The procedure can be drastically simplified by breaking down the extracted tooth into dentin particulate graft using the Smart Grinder procedure. This allows the clinician to achieve a predictable transplantation result in order to maintain the extraction site from continued resorption, but instead of using the entire tooth, actually using tooth particulate.

From a pathological point of view, tooth replacements using the re-implanted tooth or alternatively the tooth-dentin graft will lead to ankylosis in the surrounding bone compartment. This is due to the absent of the periodontal ligament. This in turn, will allow osteoclasts to gain access to the root / graft surface and initiate the mechanism of ankylosis. Tooth-dentin graft can be more

effectively produced with the Smart Grinder system of KometaBio as an effective treatment modality in everyday practice.

Thus, it is possible to generate from an extracted tooth in a time window of only 7 to 8 minutes an autogenous, bacteria-free particulate autograft. This can be used immediately for the preservation of the extraction socket or for the augmentation of other bone defects. In principle, all extracted tooth fragments (root and crown) can be processed by the Smart Grinder protocol after they have been mechanically cleaned using a high-speed carbide to remove all impurities such as fillings, cementum, caries and calculus. Currently, however, the use of root canal treated teeth is not yet approved by the manufacturer.

Sufficient drying of the tooth fragments has proven to be particularly important in order to maximize graft output. Grinding and sorting the tooth takes less than a minute. In this case, the tooth is pulverized in just 3 seconds. Particulate is then sorted by size using a vibration feature in about 10-20 seconds and particulate is then sifted into two separate compartments. The top compartment holds particulate size of 300 to 1200 microns and the lower compartment holds particulate size smaller than 300 microns. The contents of these compartments are transferred into a supplied glass mixing dish where the graft will soak for 5 minutes in the supplied “Dentin Cleanser”. This is a solution of sodium hydroxide and 20 percent alcohol. After soaking for 5 minutes, the liquid is removed by means of sterile gauze and the neutralizer solution will be applied in the same manner. This neutralizer is phosphate buffered saline that will soak the graft followed by dehydrating the graft once more with a sterile gauze and repeat this last neutralizing step once more. At this point the product is ready for use and can be used immediately. The time required is a total of a few minutes and always generates a larger volume than that of the underlying tooth. Similarly to the concept of auto-transplantation, which seeks to source possible teeth to be transplanted in the patient himself, it is now possible to use non-erupted teeth specifically for autologous augmentation. This novel concept is represented in the following case.

Case description

In February 2019, a 39-year-old patient presented with an unremarkable general medical history and asked to replace the endodontically treated teeth 16 and 26 (US: 3 and 14). As a follow up plan, the prosthetic rehabilitation of the upper and lower jaw will be considered. The clinical history showed that tooth 26 (US: 14) already has a hemi-section of the two vestibular roots. The large bone defect led to a significant undercut in the area of the former vestibular roots and the area periodically inflamed, according to the patient account. The tooth 16 (US: 3) showed apical inflammation on the distobuccal root. The rejection of an apicoectomy was justified due to the negative experience with this treatment option on the opposite side.

Operational procedure

60 ml of the patient's blood were removed by means of a butterfly system and worked up according to the Ghanaati protocol for PRF (Mectron Germany GmbH). After palatal and buccal infiltration anesthesia, the minimally invasive extraction of teeth 16 and 26 (US: 3 and 14) was performed using the X-Desmo tools according to Dr. med. Hildebrand (Helmut Zepf GmbH). Attention was paid to the preservation of the buccal lamella in the region of the tooth 16 (US: 3), since the buccal

bone has considerable implications on the success of the implant procedure. Extraction of the individual roots using a Lindemann cutter has proven to be particularly efficient here.

This was followed by the extension of the sulcular section in area 27 and a crestal extension in area 28. Next, tooth 28 (US: 16) was removed without vertical relief. The extraction socket was filled with PRF and the extracted tooth was processed using the Smart Grinder. The extraction sockets were cleaned with a sharp spoon. Augmentation was performed in area 26 (US: 14) by means of autologous tooth particulate and PRF and preparation of the implant site in region 16 (US: 3) to about 1 mm in front of the paranasal sinus. The floor of the paranasal sinus was elevated by means of the osteotome. At 45 Nm, a 4.0 × 10 mm MegaGen implant was inserted. The ICQ Osstell measurement was 70. After augmentation to the osseous border of the extraction socket, flap formation and occlusion were performed with PRF and 4-0 monofilament suture.

After 10 days the patient reported back to our office. The sutures were removed and the OP situs was fully closed. No inflammation was visible. The patient mentioned that there was very little post-operative pain and little swelling. Continued follow up is planned.

Summary and discussion

The application of an autologous material in particulate form corresponds to the same range of applications of other particulated materials, so that it can be used in indications such as guided bone regeneration, sinus lift or the treatment of periodontal defects. The particles have a certain adhesiveness after processing, so that the product can be easily handled, sticks to the instruments and allows a sufficient site and material control during placement. In contrast to an autologous bone block, which requires a high degree of surgical experience, skill, and requires a secondary harvesting site, this procedure is easy to implement and leverages an already extracted tooth – hence no secondary site and no additional morbidity.

Offering the extraction of retained wisdom teeth as a potential source of autologous bone replacement material allows the patient to eliminate another potential problem area, as it were, in one procedure. At the same time, the procedure is of course limited to the use of patient's own tooth. Another added benefit is that each tooth can be used at a later time and not necessarily at the time of extraction. Furthermore, if the tooth has already been processed, but not all the dentin graft is utilized, the remaining particulate can be dried and given to the patient to keep. When used again in a subsequent session, the disinfection protocol must be repeated.

¹ Hale ML. Autogenous transplants. Oral Surg Oral Med Oral Pathol 1956; 9: 76-83



1. 1st initial x-ray image



2. Intraoral initial situation



3. Extraction of #26



4. Extraction of #26



5. Preparation of the extraction socket



6. Extraction #16 after separate root stock



7. Extraction socket #16



8. Osteotomy #28



9. Extraction #28



10. #28 after mechanical cleaning with high speed handpiece



11. Processing with Smart Dentin Grinder



12. Particulate material in Upper tray (300-1200 micron)



13. Purified dentin graft ready for processing (after cleansing process)



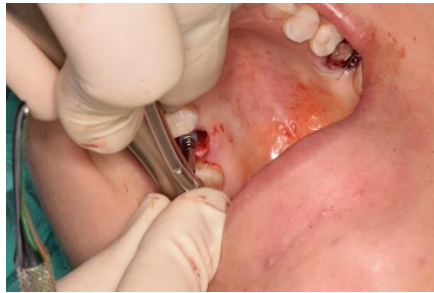
14. #26 with PRF and suturs



15. Implant bed before



16. Internal lift



17. Insertion of implant



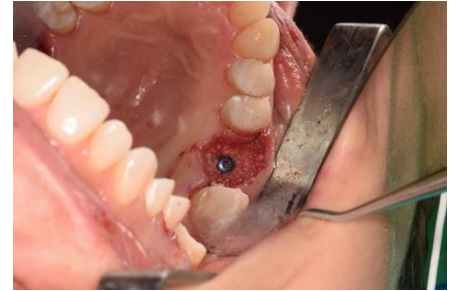
18. Infeed force 45 nm



19. Resonance measurement with Ostell (70 measurement)



20. Introduction of dentin graft



21. Padded defect #16



22. Cover with PRF



23. Suture for primary closure with 4 0 polyamides



24. Final radiograph #16

Contact



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