Background information

Problem and method of resolution: soft tissue defect after extraction

Ronald Jung, Christoph Hämmerle:
«It is quite challenging to replace a single tooth with an implant in an esthetically-critical region. To achieve optimal esthetic results, any bone or soft tissue defect is unacceptable. Even though one has a maximum of bone contour available with immediate implantation, the primary wound closure is nevertheless encumbered by the soft tissue defect over the socket. With early implantation, however, the implant is first inserted a few weeks after the extraction. It is during this time that the spontaneous healing of the soft tissue wound occurs. The duration of the healing time influences the degree of thickness formed by the mucosa in the center of the socket. The biological processes that lead to bone resorption and to a partial or complete loss of bone lamellae commence immediately after tooth extraction. This again exerts a negative influence on the hard and soft tissue contour. It is our assessment that one usually cannot prevent the bone loss that occurs after extraction using Bio-Oss® Collagen and soft tissue grafts; nevertheless, Bio-Oss® Collagen does support the graft and the buccal soft tissue and this helps counteract the loss of soft tissue contour over the resorbing bone lamella. For its part, the graft closes and protects the fresh extraction wound and leaves a soft tissue arrangement of optimal thickness and structure for the impending implantation.»

2. Aims of the therapy

> At the time of the implant insertion 6 weeks after extraction, there should be an optimal soft tissue situation with respect to appearance and thickness.
> To promote healing, the blood coagulum should be stabilized.
> The buccal and crestal contours of the soft tissue should be supported and maintained after extraction.

3. Methods

> Creating a soft tissue arrangement that is optimal in contour, thickness, structure and color over the extraction sockets using a punched free gingival graft and Bio-Oss® Collagen
> Primary wound closure achieved with a punched, palatal graft
> Stabilization of the blood coagulum and support of the buccal wall using Bio-Oss® Collagen.

4. Surgical procedure

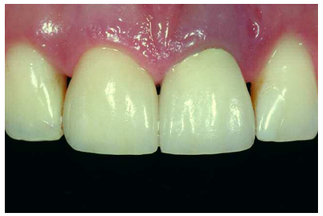

Fig 1 Status after front tooth trauma with a root fracture at 21 and periodontal bone loss interdentally and buccally at 21

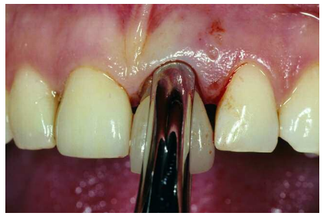

Fig 2 Gentle extraction of tooth 21. Granulation tissue carefully debrided. Inspection and palpation of the socket show a lacking buccal bone lamella.

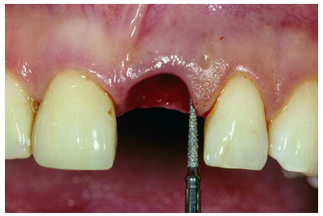

Fig 3 De-epithelialization of the wound margin using a coarse diamond drill

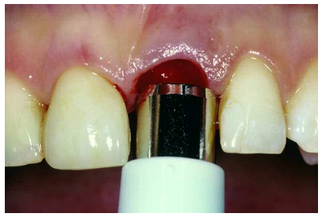

Fig 4 Selection of the punch with suitable diameter

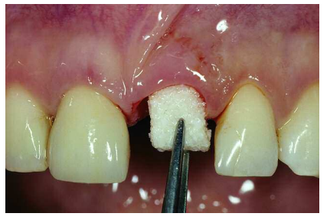

Fig 5 Application of an amount of Bio-Oss® Collagen that corresponds to the tooth root.

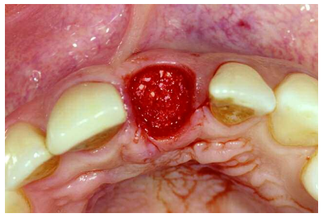

Fig 6 Independent of whether the buccal bone wall is present or not, Bio-Oss® Collagen is applied with light stuffing motions until it reaches the height of the rim of the palatine bone.

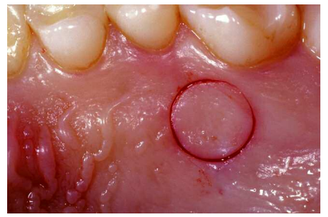

Fig 7 The graft is removed using a scalpel or a sharp tissue elevator. Bleeding is stopped using compression with sterile gauze, and the wound is covered with a tissue adhesive.

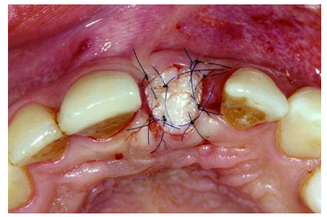

Fig 8 Using 6 – 8 single button sutures, the graft over the Bio-Oss® Collagen is carefully fixed to the marginal gingiva of the extracted tooth. Follow-up treatment: Antibiotics for 4 days (Clamoxyl, 750 mg, 3x/day), analgesics (Ponstan 500 mg) as needed; tooth cleaning: 2x daily 0.2 % chlorohexidine rinse for 1 week. No tooth brushing or other mechanical trauma in the operative area.

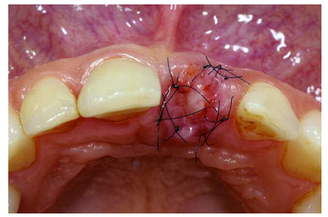

Fig 9 During suture removal after 7 - 10 days, one sees an integrated graft, partially covered with fibrin.

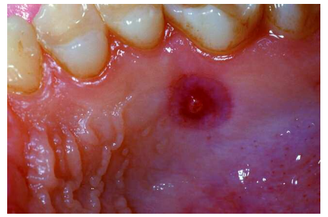

Fig 10 After 7-10 days, unremarkable wound situation seen in the gum region.

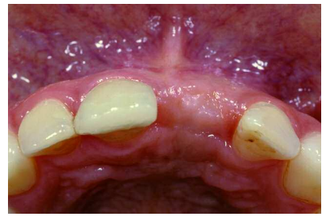

Fig 11 Clinical situation after 6 weeks. The graft is, biologically and color-wise, very well integrated and shows a mature mucosa in the area where the implant will later be inserted. In spite of the lacking buccal bone lamella, the crestal contour is well preserved.

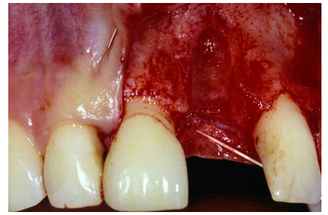

Fig 12 During implantation after 6 weeks, as expected, no significant amount of bone regeneration has occurred. Non-integrated Bio-Oss® particles that were used to support the soft tissue are removed. One sees an alveolar defect with a lacking buccal bone lamella.

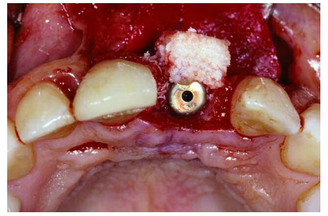

Fig 13 After implant insertion in the prosthetically-correct position, Bio-Oss® is placed into the buccal defect.

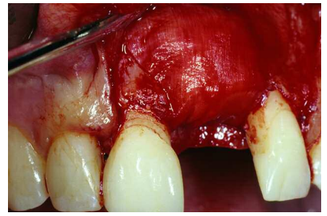

Fig 14 The Bio-Oss® is covered with a Bio-Gide® membrane, and apically fixed using 2 Resor-Pins®.

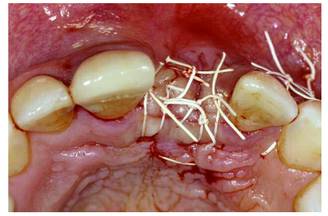

Fig 15 Thanks to the good mucosa quality and the maintained contour, a relief incision is made in the periost, and a tension-free wound closure is achieved, without strongly changing the gingival architecture.

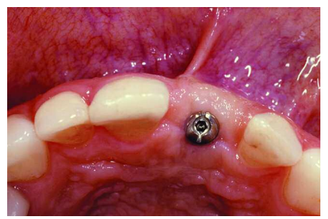

Fig 16 After the implant healing phase, a minimally-invasive abutment connection of implant 21 is made

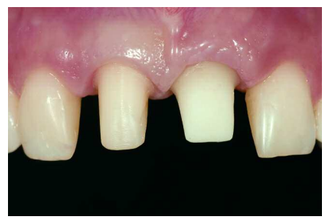

Fig 17 Status of the final prosthetic construction of tooth 11 and of the zirconium oxide abutment at 21

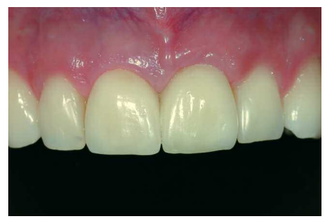

Fig 18 Prosthetic construction with 2 full ceramic crowns.

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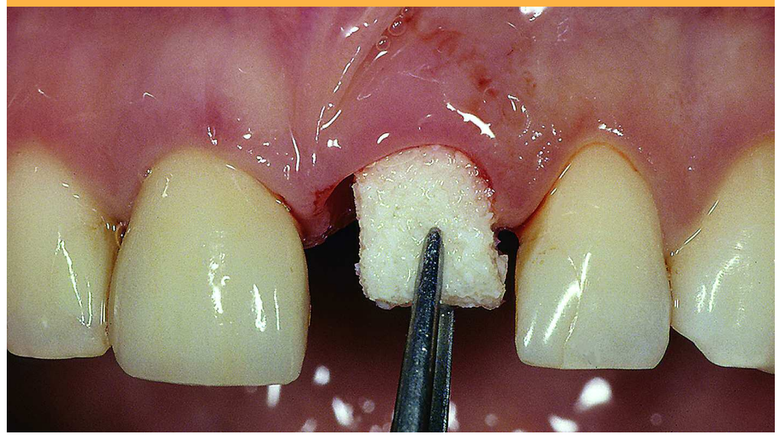
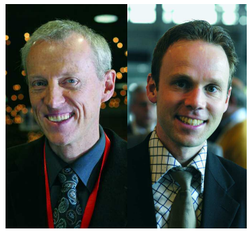
Indication Sheet E1

Extraction Sockets



Treatment concept by Dr. Ronald Jung and Prof. Dr. Christoph Hämmerle, University Zurich, CH



> Creating an optimal soft tissue structure using a gingival graft and Bio-Oss® Collagen
> After single tooth extraction, front tooth region
> For early implantation

1. Indication profile

Region	x Esthetic region ☐ Non-esthetic region Comment: Loss of single tooth in the front tooth region, maxilla and mandible
Bony situation around socket	x No bone defect present x Smaller-sized bone defect present Comment: Method can be used with a smaller sized bone defect. However, the method is not suitable for larger bone defects that require a two-stage procedure (first bone augmentation and then implantation).
Soft tissue situation	☐ Primary wound closure possible without problems x Primary wound closure poses problems from the esthetic aspect: Mobilization of a buccal flap would negatively influence the mucogingival border.
Bone augmentation indicated	☐ Yes, immediately x Yes, at the time of implantation Comment: a bone augmentation is usually necessary to optimize the hard and soft tissue contours. ☐ No
Implantation planned	x Yes: after about 6 weeks ☐ No

Limitations, open questions

> Using this method, an optimal soft tissue structure can be created during the 6-week time frame between extraction and implantation. However, this time duration is not sufficient for a bone regeneration to occur. Thus, in this indication, Bio-Oss® Collagen is not used to promote bone regeneration in the alveolus, but rather as a space maintainer to support the buccal and crestal soft tissue contours as well as for stabilizing the blood coagulum.
> It is not yet clear whether, or to what extent, the Bio-Oss® Collagen can also reduce or prevent the resorption of the buccal bone lamellae.
> Currently, this method is still classified as experimental. The aim of future development is to achieve comparably good clinical results without soft tissue grafting; this would simplify the surgical procedure and be less demanding time-wise.

Testing status / References

Clinical study on 20 patients: Jung R. E., Siegenthaler D.W., Hämmerle C.H.F. Postextraction Tissue Management: A soft tissue punch technique. Int. J. Periodontics Restorative Dent 2004, 24, 545 - 553

Landsberg C.H., Bichacho N. A modified surgical /prosthetic approach for optimal single implant supported crown. Part I – The socket seal surgery. Pract. Periodontics Aesthet. Dent 1994, 6, 11 – 17

Source of supply

> Punch: Stiefel Laboratium GmbH, Mühlheimer Straße 231, 63075 Offenbach am Main, Deutschland, www.stiefel-gmbh.de; Telefon: +49-(0)69 9840420, Fax: +49-(0)69 98404250
> Tissue adhesive: Histoacryl, Braun Aesculap AG & Co. KG, Am Aesculap-Platz, D-78532 Tuttlingen, Deutschland, www.bbraun.com. Tel. ++49/(0) 74 61/ 95-0 , Fax ++49/(0) 0 74 61) 95-26 00
> Suture materials: No. 6-0 Dafilon, Braun Aesculap AG & Co. KG, Am Aesculap-Platz, D-78532 Tuttlingen, Deutschland, www.bbraun.com. Tel. ++49/(0) 74 61/ 95-0 , Fax ++49/(0) 0 74 61) 95-26 00

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