



Treatment concepts of Dr. Peter Randelzhofer and Dr. Gert de Lange, Amstelveen, Netherlands



- > Immediate implant placement after extraction in the aesthetic zone
- > Creating optimal soft and hard tissue structures around implants at time of implant placement
- > Closed (submerged) and open (transmucosal) healing approaches
- > Apical flap preparation and crestal flap preparation

1. Indication profile

Region	<input checked="" type="checkbox"/> aesthetic region	<input type="checkbox"/> non-aesthetic region
Bony situation	<input type="checkbox"/> no bone defect	<input type="checkbox"/> small bone defect
	<input checked="" type="checkbox"/> medium bone defect	<input type="checkbox"/> large bone defect
	Remark: Bone defects can be of different sizes as long as the implant is positioned within the bone envelope and interdental bone peaks are present. The same treatment concept applies if no bone defect is present.	
Bone augmentation indicated	<input checked="" type="checkbox"/> yes, immediately at time of implantation	<input type="checkbox"/> no
Implant insertion	<input checked="" type="checkbox"/> single tooth replacement (case I)	<input checked="" type="checkbox"/> multiple teeth replacement (case II)
	Remark: Procedure possible for both situations.	
Soft tissue situation	<input checked="" type="checkbox"/> thick biotype (case I)	<input checked="" type="checkbox"/> thin biotype (case II)
	<input checked="" type="checkbox"/> interdental papillae intact	<input type="checkbox"/> papillae compromised or missing
	<input checked="" type="checkbox"/> primary wound closure is possible	<input type="checkbox"/> primary wound closure problematic
	Remark: Procedure is suitable for more or less problematic soft tissue. Connective tissue grafting is of advantage in thin biotypes or in case of tissue defects. When choosing an apical approach (case II) the biotype plays a minor role.	
Prosthetic treatment	3 to 6 months post-op (depending on the size of defect)	

Background information

Dr. Peter Randelzhofer and Dr. Gert de Lange:

«The exact time for placing implants depends on the structural changes of hard and soft tissue after extraction. Following tooth extraction, resorption processes of the alveolar bony walls take place. The studies of Araujo et al. have shown that the bundle bone is involved mainly¹. This results in loss of buccal bone volume and height. Two thirds of the resorption occurs in the first 3 months post extraction^{2,3}, which results in a more complex clinical situation. The insertion of implants into fresh extraction sites fails to prevent this resorption⁴. According to our clinical experience, augmentation with Geistlich Bio-Oss[®] can be a successful therapy to compensate for the buccal resorption and to prevent premature resorption of the autogenous bone grafts^{5,6}.

Nevertheless, immediate implants have proven to be a predictable treatment option. Studies showed a success rate between 93–100%^{7,8,9,10,11,12}. The patient benefits from a less invasive and cost effective procedure resulting in reduced overall treatment time and higher patient comfort. However, immediate implantation requires primary stability and is often accompanied with «ad hoc» decision making. The possibility of placing immediate depends on the defect anatomy and therefore it is frequently possible to make a decision only at the time of extraction. Cases with thin gingival and high scalloped soft tissue architecture are suitable for the so called «open healing» procedure with a wide body healing abutment placed on top of the implant to support the marginal gingiva. A careful and conservative surgical approach is required to maintain thin papillae and marginal gingiva.

The technique presented in case I has shown aesthetically pleasing results in more than 100 cases treated and documented in our clinic. It features immediate implant placement in cases with class 2 (medium size) buccal bone defects with simultaneous ridge preservation technique followed by closed healing. A sound evaluation of the patient and the clinical situation is an important precondition for obtaining predictable results. The presented case displays an extra challenge in terms of soft tissue management due to the pigmentation of the gingiva. In such situations scars are likely to become visible and the pigmentation line may be distorted.

The open healing procedure in case II has also shown pleasing aesthetic results, despite the endodontic infections and the buccal bony defects present. Most clinicians remove the endodontically involved teeth first and wait for healing for several weeks or months. Then bone is augmented and after healing the implant is placed. Finally, missing soft tissues are augmented so as to obtain a proper marginal contour. This approach involves repeated surgery and a treatment time of 9 months or more. Lifting fragile papillae especially may result in attachment loss and soft tissue shrinkage which will severely effect the aesthetic outcome in patients with a high smile line. These unwanted effects can be avoided by an apical approach via the vestibulum, deflecting the flap downwards. Frequently present apical infections and granuloma tissue can be removed with good visibility to clean the implant receiving bony site. This more demanding technique gives sufficient access to the buccal bone defects for proper bone regeneration and/or soft tissue augmentation but does not affect gingival papillae. This method has been successfully used in more than 80 patients in our practice. A scientific evaluation study of efficacy and predictability is now in progress.»

2. Aims of the therapy

- › Compensation of buccal bone wall resorption after tooth extraction by bone augmentation with Geistlich Bio-Oss[®] and Geistlich Bio-Gide[®]
- › Immediate implant placement to reduce overall treatment time in the aesthetic area
- › Preservation of the papillae

3. Surgical procedure

Patient selection:

- › Anterior teeth with bad prognosis (fracture or endodontic problems) and no periodontal problems
- › Apical infections may be present but can be removed during surgery
- › Adequate level of marginal gingiva, interdental papillae and interdental bone peak must be present

Exclusion criteria for closed healing:

- › periodontal infections
- › vertical bone loss more than 3–4 mm
- › implant body is not within bone envelope
- › no initial implant stability achievable
- › critical gingival bio-types

Exclusion criteria for open healing:

- › periodontal infections
- › no vertical bone loss
- › implant body is not within bone envelope
- › no initial implant stability achievable

Case I: Closed (submerged) healing



Fig. 1 The patient presents with a thick, medium scalloped gingival morphology. Tooth 11 with poor prognosis due to vertical root fracture. The tooth had slightly extruded resulting in a vertical gain of soft tissue. The pigmented gingiva presents an extra challenge.

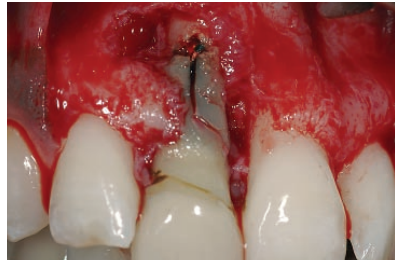


Fig. 2 After flap elevation, a clear fracture of the root is visible. The vertical bone defect affects $\frac{2}{3}$ of the buccal bone plate.

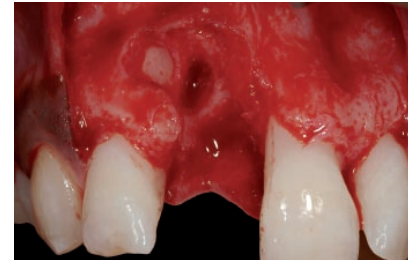


Fig. 3 An extensive bone deficit becomes visible after tooth extraction. It is accompanied by extensive attachment loss on tooth 21, which causes a high aesthetic risk due to possible papilla loss after surgery.



Fig. 4 After insertion the implant shows good primary stability. Due to the pronounced bone defect a closed healing approach is chosen.

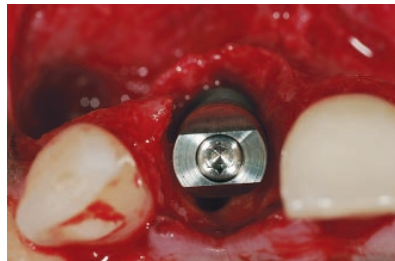


Fig. 5 The implant is located within the bordering side walls of the defect. The gap distance to the buccal bone plate is about 2 mm.

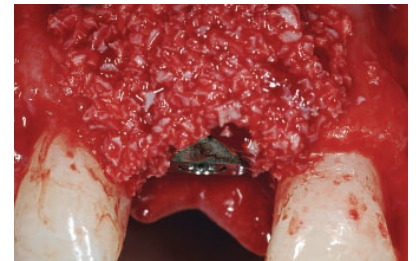


Fig. 6 Autologous bone chips are harvested with a trephine drill from the retromolar area and are placed onto the implant surface. Geistlich Bio-Oss® is mixed with blood and applied onto the bone chips to prevent primary resorption of the autologous bone. The regenerated hard tissue will provide the basis for a stable soft tissue architecture.

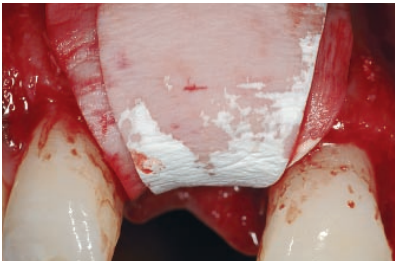


Fig. 7 The augmented area is covered with the Geistlich Bio-Gide® membrane. The membrane is placed in the double layer technique to provide stable protection for bone regeneration.

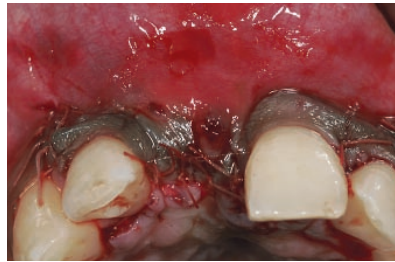


Fig. 8 For additional soft tissue augmentation a connective tissue graft from the palate is sutured to the flap. In order to guarantee a tension-free closure the flap is mobilized by a split flap technique. Primary wound closure is achieved with resorbable vicryl sutures 6.0/5.0. During a second stage surgery 4 month later the pigmented gingiva is repositioned coronally by a split-flap technique so as to restore its natural shape (not shown).

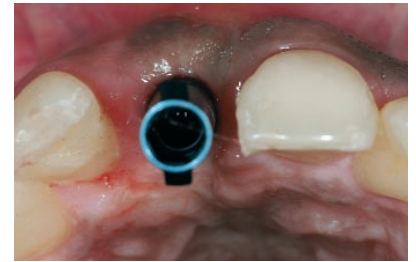


Fig. 9 Five months after implant placement: The distance from the implant to the buccal aspect of the alveolar ridge is still more than 2 mm which is important for a stable long term aesthetic result.

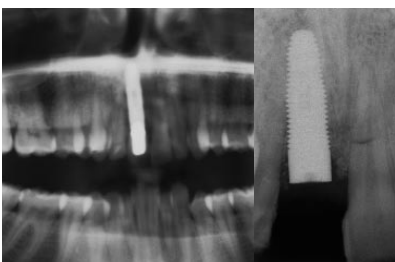


Fig. 10 The orthopantomogram 1 year after implant placement.



Fig. 11 Clinical situation 1 month after crown placement. The gingiva shows a natural appearance, is nicely scalloped and displays no scar tissues. The pigmented part could be maintained in shape and color.

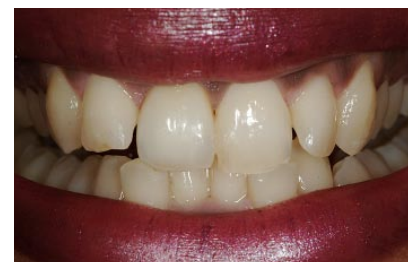


Fig. 12 Situation 1 year after implant placement shows good aesthetic results.

Case II: Open (transmucosal) healing



Fig. 1 Patient with a high smile line and thin biotype with two rather large incisors with fistulae and poor prognosis.



Fig. 2 Radiograph showing endodontic infections of both central incisors.

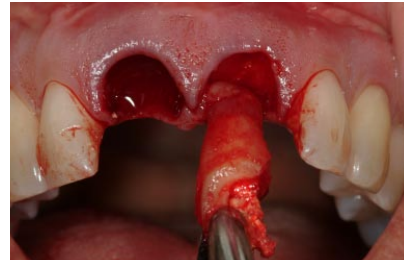


Fig. 3 Careful extraction of both central incisors preserving marginal gingiva and papillae.

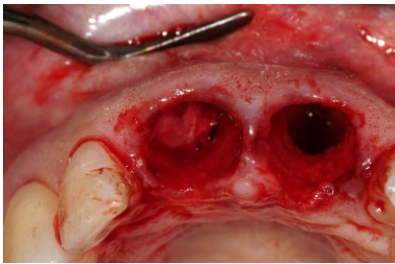


Fig. 4 Palpation of the buccal wall shows bone defects connected with a granuloma in the socket.

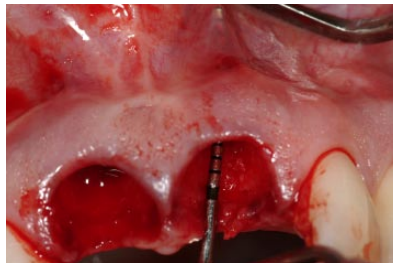


Fig. 5 Inspection of the left socket shows apically soft tissue and hard tissue defects. Note the thin central papilla.

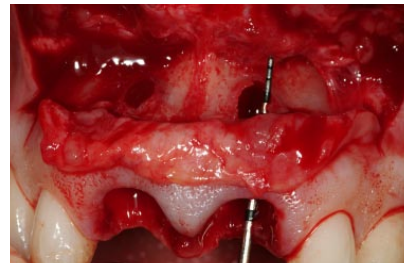


Fig. 6 After a vestibular half circle incision is made, the flap is deflected downwards and the buccal bone defects become visible for the right and left socket.



Fig. 7 After removal of granuloma tissue and endodontic material and thorough cleaning of the bone there are large remaining bony defects of the buccal wall of both sockets.

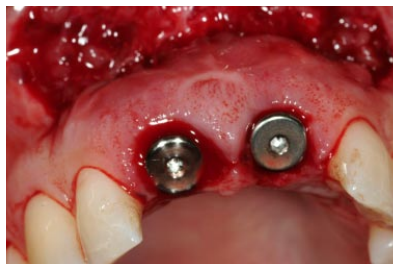


Fig. 8 Two Camlog Screw Line implants are placed with primary stability of 35 Ncm. Adequate support of the marginal soft tissues is obtained by immediately placing a wide body healing abutment intended to prevent tissue collapse and to preserve the contour of the gingival margin.



Fig. 9 The buccal bone plate is restored with autologous bone particles collected from lower retromolar site and covered with Geistlich Bio-Oss®. Geistlich Bio-Oss® particles are also used to fill the remaining buccal space between healing abutment and marginal gingiva for maximum soft tissue support.



Fig. 10 For undisturbed bone regeneration the augmented area is covered with Geistlich Bio-Gide®.



Fig. 11 One week after open healing the soft tissues have adapted well.



Fig. 12 Healing abutments are removed 2 months after implant placement. Note the nicely preserved marginal gingiva and papillae.



Fig. 13 Ceramic posts are placed.



Fig. 14 Final crowns, which are smaller in the cervical region, in place. Note the total absence of tissue loss and gingival recession.



Fig. 15 Patient presents with a nice smile 12 months after implant placement.

Literature references

- ¹ Araujo MG, Lindhe J: Dimensional ridge alterations following tooth extraction. An experimental study in the dog. *J Clin Periodontol* 2005;32:212–218.
- ² Schropp L, Wenzel A, Kostopoulos L. Impact of conventional tomography on prediction of the appropriate implant size. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2001;92:458–463.
- ³ Schropp L, Wenzel A, Kostopoulos L, Karring T. Bone healing and soft tissue contour changes following single-tooth extraction: a clinical and radiographic 12-month prospective study. *Int J Periodontics Restorative Dent*. 2003;23:313–323.
- ⁴ Araujo MG, Sukekava F, Wennström JL, Lindhe J. Ridge alterations following implant placement in fresh extraction sockets: an experimental study in the dog. *J Clin Periodontol* 2005;32:645–652.
- ⁵ Maiorana C, Beretta M, Salina S, Santoro F. Reduction of autogenous bone graft resorption by means of Bio-Oss coverage: A prospective study. *Int. J. Periodontics Restorative Dent*. 2005;25:19–25.
- ⁶ Schlegel KA, Fichtner G, Schultze-Mosgau S, Wiltfang J. Histologic findings in sinus augmentation with autogenous bone chips versus a bovine bone substitute. *Int J Oral Maxillofac Implants* 2003;18:53–58.
- ⁷ Becker W, Dahlin C, Becker BE, Lekholm U, van Steenberghe D, Higuchi K, Kultje C. The use of e-PTFE barrier membranes for bone promotion around titanium implants placed into extraction sockets: a prospective multicenter study. *Int J Oral Maxillofac Implants*. 1994;9:31–40.
- ⁸ Lang NP, Bragger U, Hammerle CH, Sutter F. Immediate transmucosal implants using the principle of guided tissue regeneration. I. Rationale, clinical procedures and 30-month results. *Clin Oral Implants Res*. 1994;5:154–63.
- ⁹ Bragger U, Hammerle CH, Lang NP. Immediate transmucosal implants using the principle of guided tissue regeneration (II). A cross-sectional study comparing the clinical outcome 1 year after immediate to standard implant placement. *Clin Oral Implants Res*. 1996;7:268–76.
- ¹⁰ Schwartz-Arad D, Chaushu G. The ways and wherefores of immediate placement of implants into fresh extraction sites: a literature review. *J Periodontol*. 1997 Oct;68(10):915–23.
- ¹¹ van Steenberghe D, Callens A, Geers L, Jacobs R. The clinical use of deproteinized bovine bone mineral on bone regeneration in conjunction with immediate implant installation. *Clin Oral Implants Res*. 2000;11:210–216.
- ¹² Hammerle CH, Lang NP. Single stage surgery combining transmucosal implant placement with guided bone regeneration and bioresorbable materials. *Clin Oral Implants Res*. 2001;12:9–18.

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