Immediate Implant Placement

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

Region

Bony situation

- aesthetic region
  - no bone defect
  - small bone defect
  - medium bone defect
  - large bone defect
- non-aesthetic region
  - no bone defect
  - small bone defect

Bone augmentation indicated

- yes, immediately at time of implantation
- no

Implant insertion

- single tooth replacement (case I)
- multiple teeth replacement (case II)

Soft tissue situation

- thick biotype (case I)
- thin biotype (case II)

- interdental papillae intact
- papillae compromised or missing

- primary wound closure is possible
- primary wound closure problematic

- prosthetic treatment

Primary treatment

- yes, immediately at time of implantation
- no

- thick biotype post-op (depending on the size of defect)

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2. Aims of the therapy

- Geistlich Bio-Oss® and Geistlich Bio-Gide®

3. Surgical procedure

Case I: Closed (submerged) healing

- Aims of the therapy

- Patient selection

- Exclusion criteria for closed healing

- Exclusion criteria for open healing

- Procedure

- Postoperative care

Case II: Open (transmucosal) healing

- Aims of the therapy

- Patient selection

- Exclusion criteria for closed healing

- Exclusion criteria for open healing

- Procedure

- Postoperative care

- Case I: Closed (submerged) healing

- Case II: Open (transmucosal) healing

- Background information

- 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 I or II defects connected with a granuloma in the socket. The open technique was initially used as an option for soft tissue management due to bone augmentation of the defects. In such situations, it was necessary to perform the augmentation procedure in the buccal defect region, in effect closing the buccal defect region.

- The open procedure was also shown to provide aesthetic results, despite the endodontic infection and the buccal bone defect present. Most clinicians remove the endodontically involved tooth and wait for healing for several weeks or months, then bury the augmented bone and screws in the buccal space. This more demanding technique gives sufficient access to the buccal bone defect region, and the patient benefits from a less invasive and less demanding technique.

- The technique presented in case II 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 I or II defects connected with a granuloma in the socket. The open technique was initially used as an option for soft tissue management due to bone augmentation of the defects. In such situations, it was necessary to perform the augmentation procedure in the buccal defect region, in effect closing the buccal defect region.

- The open procedure was also shown to provide aesthetic results, despite the endodontic infection and the buccal bone defect present. Most clinicians remove the endodontically involved tooth and wait for healing for several weeks or months, then bury the augmented bone and screws in the buccal space. This more demanding technique gives sufficient access to the buccal bone defect region, and the patient benefits from a less invasive and less demanding technique.
2. Aims of the therapy

Compensation of facial 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:
- Avoid teeth with bad prognosis (fracture or endodontic problems) and no periodontal problems.
- Anterior teeth with bad prognosis (fracture or endodontic problems) and no periodontal problems.

Exclusion criteria for closed healing:
- Periodontal risk
  - Vertical bone loss
  - Vertical bone loss more than 6 in mm
  - Implant body not within bone envelope
  - No initial implant stability achievable

Exclusion criteria for open healing:
- Periodontal risk
  - Vertical bone loss
  - Vertical bone loss more than 6 in mm
  - Implant body not within bone envelope
  - No initial implant stability achievable

Case I: Closed (submerged healing)

The exact time for placing implants depends on the structural changes of hard and soft tissue after extraction. Following tooth extraction, morphologic processes of the osteoma lytic wall take place. The studies of Augat et al. have shown that the hard tissue is involved mainly. This results in loss of buccal bone volume. Subsequently, the tooth socket losing its volume and shape. Initially, the residual ridges will show sinus formation and bone loss. These conditions are vital for successful immediate implant placement. The surgical procedure is performed with the patient under local anesthesia. The adjacent marginal and papillary gingiva is elevated with a crestal incision to expose the bony walls of the defect and to perform a narrow osteotomy. The bony walls of the defect are relieved with a trephine drill. For undisturbed bone regeneration the augmented bone envelope is prepared, which represents the bony wall of the socket. The gap distance to the buccal bone plate is determined coronally by a split-flap technique so as to prevent tissue collapse and to preserve the coronal bone height. Through a mucoperiosteal flap, composed of the marginal gingiva and the attached papillae, the implant can be inserted using a restoration guide. After flap elevation, a clear fracture of the bony walls is visible. The bony envelope is augmented to at least 1.5 mm with Bio-Oss® particles. The gap distance to the buccal bone plate is preserved using a provisional tissue graft. After healing the implant is placed. Finally, missing soft tissues are augmented so as to obtain adequate support of the mucosal surface for maximum soft tissue support. The gingiva shows a natural appearance, is nicely scalloped and displays no scar tissues. The mucosa on the facial side is surgically adapted to the natural gingival for maximum soft tissue support. The patient presents with a thick, medium height and correctly placed incisal edge of the tooth. The tooth 11 with poor prognosis due to vertical root fracture. The tooth extraction is accompanied by extensive bone loss and gingival recession. A scientific follow-up on a composite of the aesthetic outcome in patients with a high smile line. These unsavory effects can be avoided by an open approach via the vestibule. Frequently present apical perforation and granulomatous tissue can be removed with good visibility to clean the implant surface before the socket. This more demanding technique goes parallel access to the bony defect for proper bone regeneration and soft tissue augmentation. Note the thin scalloped gingival morphology. Tooth 11 with poor prognosis due to vertical root fracture. The tooth extraction is accompanied by extensive bone loss and gingival recession.

Case II: Open (transmucosal healing)

The exact time for placing implants depends on the structural changes of hard and soft tissue after extraction. Following tooth extraction, morphologic processes of the osteoma lytic wall take place. The studies of Augat et al. have shown that the hard tissue is involved mainly. This results in loss of buccal bone volume. Subsequently, the tooth socket losing its volume and shape. Initially, the residual ridges will show sinus formation and bone loss. These conditions are vital for successful immediate implant placement. The surgical procedure is performed with the patient under local anesthesia. The adjacent marginal and papillary gingiva is elevated with a crestal incision to expose the bony walls of the defect and to perform a narrow osteotomy. The bony walls of the defect are relieved with a trephine drill. For undisturbed bone regeneration the augmented bone envelope is prepared, which represents the bony wall of the socket. The gap distance to the buccal bone plate is determined coronally by a split-flap technique so as to prevent tissue collapse and to preserve the coronal bone height. Through a mucoperiosteal flap, composed of the marginal gingiva and the attached papillae, the implant can be inserted using a restoration guide. After flap elevation, a clear fracture of the bony walls is visible. The bony envelope is augmented to at least 1.5 mm with Bio-Oss® particles. The gap distance to the buccal bone plate is preserved using a provisional tissue graft. After healing the implant is placed. Finally, missing soft tissues are augmented so as to obtain adequate support of the mucosal surface for maximum soft tissue support. The gingiva shows a natural appearance, is nicely scalloped and displays no scar tissues. The mucosa on the facial side is surgically adapted to the natural gingival for maximum soft tissue support. The patient presents with a thick, medium height and correctly placed incisal edge of the tooth. The tooth 11 with poor prognosis due to vertical root fracture. The tooth extraction is accompanied by extensive bone loss and gingival recession. A scientific follow-up on a composite of the aesthetic outcome in patients with a high smile line. These unsavory effects can be avoided by an open approach via the vestibule. Frequently present apical perforation and granulomatous tissue can be removed with good visibility to clean the implant surface before the socket. This more demanding technique goes parallel access to the bony defect for proper bone regeneration and soft tissue augmentation. Note the thin scalloped gingival morphology. Tooth 11 with poor prognosis due to vertical root fracture. The tooth extraction is accompanied by extensive bone loss and gingival recession.
2. Aims of the therapy

Compensation of facial bone wall • socket after tooth extraction or 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 papilla.

3. Surgical procedure

Patient selection

- Alveolar bone with good prognosis (structure or edentulous problems) and no periodontal problems
- Appropriate shape of the bone wall for immediate implant placement

Exclusion criteria for closed healing

- Insufficient bone height
- Insufficient bone width
- Insufficient bone density

Exclusion criteria for open healing

- Poor bone density
- Narrow bone width

Case I: Closed (submerged) healing

- The patient shows a nice smile 12 months after implant placement. Note the nicely preserved gingiva and papillae.
- Carefully extraction of both central incisors.
- Heavily infected root is covered with black granulomatous tissue. Note the total absence of tissue loss and gingival recession.
- The flap is deflected downwards and the buccal bone plate is at least 2 mm.
- Two Camlog Screw Line implants are placed adjacent to each other.
- Healing abutments are removed 2 months after implant placement. Note the nicely preserved gingiva and papillae.
- The patient shows a nice smile 12 months after implant placement.
- The vertical bone defect affects 2/3 of the buccal bone.
- The patient presents with a thick, medium colored root.
- After extraction a healthy bone plug is visible.
- The vertical bone defect affects 2/3 of the buccal bone. The regenerated hard tissue will provide the necessary stability for a stable soft tissue architecture.
- The bone defect is connected with a granuloma in the socket.
- The patient presents with a thick, medium colored root.
- The vertical bone defect affects 2/3 of the buccal bone. The regenerated hard tissue will provide the necessary stability for a stable soft tissue architecture.
- The bone defect is connected with a granuloma in the socket.

Case II: Open (transmucosal) healing

- The patient shows a nice smile 12 months after implant placement. Note the nicely preserved gingiva and papillae.
- Carefully extraction of both central incisors.
- Heavily infected root is covered with black granulomatous tissue. Note the total absence of tissue loss and gingival recession.
- The flap is deflected downwards and the buccal bone plate is at least 2 mm.
- Two Camlog Screw Line implants are placed adjacent to each other.
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- The patient presents with a thick, medium colored root.
- After extraction a healthy bone plug is visible.
- The vertical bone defect affects 2/3 of the buccal bone. The regenerated hard tissue will provide the necessary stability for a stable soft tissue architecture.
- The bone defect is connected with a granuloma in the socket.

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 closed healing. A sound evaluation of the patient and the clinical situation is an important prerequisite for a proper selection and case management. The presented case is an extra good example of soft tissue management due to the regeneration of the gingiva. In such situations scars are likely to become noticeable and the regeneration may simply be delayed.

The open healing procedure in case II has also shown pleasing aesthetic results, despite the endodontic infections and the buccal bone defects. Most clinicians remove the endodontically involved tooth and wait for healing for several weeks or months. Then, bone is augmented and the endodontic treatment is performed. The exact time for placing implants depends on the structural changes of hard and soft tissue after extraction. Following tooth extraction, margin changes of the socket Osseointegration and soft tissue healing are of the utmost importance. The studies of Armitage et al. have shown that the buccal bone is remodelled slowly. This results in loss of buccal bone thickness. Therefore, the thickness of the epithelialized surface in the first months after extraction is the most critical for patient satisfaction.

The regeneration of bone in the vertical dimension is so important for the future esthetic outcome. The epithelial tissue that covers the implant neck must be prevented from forming keratinized epithelium. This tissue would protect the implant neck from any future bacterial contamination and would be histologically different from the surrounding keratinized epithelium. Therefore, it is often necessary to create a passive fit. Implant healing abutments 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 closed healing. A sound evaluation of the patient and the clinical situation is an important prerequisite for a proper selection and case management. The presented case is an extra good example of soft tissue management due to the regeneration of the gingiva. In such situations scars are likely to become noticeable and the regeneration may simply be delayed.

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Region

<table>
<thead>
<tr>
<th>Aesthetic region</th>
<th>Extractions region</th>
</tr>
</thead>
<tbody>
<tr>
<td>No bone defect.</td>
<td>Careful bone defect</td>
</tr>
<tr>
<td>Medium bone defect</td>
<td></td>
</tr>
<tr>
<td>Large bone defect</td>
<td></td>
</tr>
</tbody>
</table>

Soft tissue situation

<table>
<thead>
<tr>
<th>Single tooth replacement (case I)</th>
<th>Multiple teeth replacement (case II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft tissue procedure for both situations.</td>
<td>Soft tissue procedure for both situations.</td>
</tr>
<tr>
<td>Gingival papilla maintenance is required.</td>
<td>Gingival papilla maintenance is required.</td>
</tr>
<tr>
<td>Primary papilla loss is possible.</td>
<td>Primary papilla loss is possible.</td>
</tr>
<tr>
<td>Soft tissue grafting is advantageous in thin bone grafts or cases with bone defects.</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Region</th>
<th>Bone situation</th>
<th>Soft tissue situation</th>
<th>Prosthetic treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aesthetic region</td>
<td>no bone defect</td>
<td>single tooth replacement (case I)</td>
<td>yes, immediately at time of implantation (case I)</td>
</tr>
<tr>
<td>Non-aesthetic region</td>
<td>medium bone defect</td>
<td>multiple teeth replacement (case II)</td>
<td>yes, immediately at time of implantation (case II)</td>
</tr>
<tr>
<td>Large bone defect</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bone augmentation

- yes, immediately at time of implantation (case I)
- no

Implant insertion

- case I: single tooth replacement
- case II: multiple teeth replacement

Soft tissue situations

- thick flap (case I)
- thin flap (case II)

Favorable treatment

- 3 to 6 months post-op (depending on the size of 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.

1. Indication profile

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Literature references


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