Minimally invasive tooth extraction

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Background
Remodelling of alveolar bone following extraction

2 weeks
4 weeks
8 weeks


Determinants of bone resorption/remodelling?

- Patient behavior
- Local morphological factors of the extraction site
- Surgical factors (reflection of a flap)
- Post extraction protocols

Resorption/remodelling:

- Hard tissue
- Soft tissue

Niklaus P. Lang
Terry L. T. Wong
May C. M. Wong
A systematic review of post-extractional alveolar hard and soft tissue dimensional changes in humans

Tan et al., Clin. Oral Impl. Res. 23(Suppl. 5), 2012, 1–21

Objectives:

To assess the dimensional change in alveolar bone and soft tissue in the post-extraction period.

Methods:

A systematic review of studies evaluating dimensional changes of alveolar bone and soft tissue after tooth extraction was performed. The following databases were searched: MEDLINE, EMBASE, and the Cochrane Library. Studies were included if they met the following criteria: human, post-extraction, non-natural, and follow-up period of 2 weeks to 6 months.

Results:

A total of 63 studies were included. The results showed that alveolar bone resorption occurs during the first 6 months after extraction, with a mean resorption of 0.80 mm. Soft tissue changes were also observed, with a mean resorption of 0.62 mm. The changes were generally more pronounced in the first 2 weeks after extraction.

Conclusion:

Alveolar bone and soft tissue undergo dimensional changes following tooth extraction, with alveolar bone resorbing more rapidly than soft tissue. These changes are important to consider in the planning of surgical procedures and the restoration of extracted teeth.

Keywords: tooth extraction, alveolar bone, soft tissue, dimensional changes, human, review.
Why minimally invasive?

- Minimise biological/surgical/technical complications
  - Biological
    - ‘normal’ postoperative morbidity
    - BRONJ/DNJ/ARION
    - OAC
  - Bone resorption/remodelling
  - Minimise PDL damage (intentional replantation)
- Technical/surgical
  - Minimise need for flap surgery
  - Patient satisfaction

Basic principle

Novel extraction systems

- Easy X Tract
- Apex-Control
- Benex
- ...

Benex
(Zepf/Meisinger)

Benex
(Zepf/Meisinger)
Prospective study

- Inclusion criteria
  - Extraction under LA +/− IVS
  - Decayed teeth/roots, not suitable for forceps extraction

- Exclusion criteria
  - Mobility > 1°
  - Upper molars
  - Third molars


Case Report Form (CRF)

Technical Details (n=121)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Success % (n)</th>
<th>Failure % (n)</th>
<th>Total % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxation of the root</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5 (5)</td>
<td>20 (4)</td>
<td>8 (9)</td>
</tr>
<tr>
<td>No</td>
<td>95 (95)</td>
<td>80 (16)</td>
<td>92 (111)</td>
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<tr>
<td>Axial alignment without tray</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>27 (27)</td>
<td>32 (6)</td>
<td>28 (33)</td>
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<tr>
<td>No</td>
<td>73 (73)</td>
<td>68 (13)</td>
<td>72 (86)</td>
</tr>
<tr>
<td>Tray used</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>75 (75)</td>
<td>68 (13)</td>
<td>74 (88)</td>
</tr>
<tr>
<td>No</td>
<td>25 (25)</td>
<td>32 (6)</td>
<td>26 (31)</td>
</tr>
<tr>
<td>Axial alignment with tray</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>99 (74)</td>
<td>100 (13)</td>
<td>99 (87)</td>
</tr>
<tr>
<td>No</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Screw characteristics</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Ø1.6, short</td>
<td>79 (79)</td>
<td>50 (10)</td>
<td>74 (89)</td>
</tr>
<tr>
<td>Ø1.8, short</td>
<td>6 (6)</td>
<td>15 (17)</td>
<td>21 (30)</td>
</tr>
<tr>
<td>Ø1.6, long</td>
<td>15 (15)</td>
<td>15 (15)</td>
<td>30 (40)</td>
</tr>
</tbody>
</table>

Success rate

- Total: 83 % (92 / 111)
- Multi-rooted teeth: 43 % (6 / 14 teeth)
- Single-rooted teeth: 89 % (86 / 97 teeth)


Learning curve

To be continued...

- 323 teeth in 223 patients
- All molars now excluded
Results by toothtype

Results

2 significant determinants of extraction failure:

- multi- vs. single rooted: RR 2.2 (95% CI: 1.3, 4.0), p=0.006
- RCT vs. no RCT: RR 2.1 (95% CI: 1.3, 3.6), p=0.003

Benex – clinical experience

- Factors for success
  - Screw positioning
  - Alignment of pullrope
  - Use of support tray

- Reasons for failure
  - Anatomical factors
    - undercuts
    - Root divergence
    - Root dimensions
    - Root curvature

Screw position

Alignment of pullrope
Support tray

Anatomical factors

undercuts

undercuts

undercuts

Luxation?
Upper premolars

Root divergence

Root dimensions & curvature

Technical complications

Tips & Tricks

1. Screw first

Tips & Tricks

1. Screw first
Tips & Tricks

2. Remove putty immediately

3. Use support tray (if in doubt – chicken out!)

4. Alignment of pullrope

5. A bit of patience...
Tips & Tricks

With intact crown screw fixation in coronal dentine
Tips & Tricks

With intact crown screw fixation in coronal dentine

Avoidance of flap surgery?

Guesstimated: 44%  Actual: 8%

Minimisation of surgical trauma?

(Bisphosphonate)
Spontaneous In Situ Gingival Augmentation

A technique to increase the quantity of gingival tissue around a tooth scheduled for extraction is described. When the tooth's periodontal ligament; the bone-subgingival area and soft tissue amounts of tissue are completely covered by the gingival tissue. Presented by Dr. John Langer, DMD.

Extrusion vs. Extraction...