Patient-centered implant treatment giving reliability through simplicity
(part 2 - when bone is not where we want it to be)

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When the bone does not coincide with ideal implant location
When the bone does not coincide with ideal implant location
When the bone does not coincide with ideal implant location.
A prospective study on angulated implants immediately loaded with a full ceramic crown

Hugo De Bruyn & Stefan Vandeweghe

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A 1-Year Prospective Study on Co-Axis® Implants Immediately Loaded with a Full Ceramic Crown

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ABSTRACT
Introduction: The Co-Axis® implant (Southern Implants®, Irene, South Africa) has a 12-degree angle in the implant neck to overcome angulation problems.

Aim: To examine bone loss, peri-implant health, and esthetic outcome after 1-year follow-up.

Materials and Methods: Fifteen single implants were placed in 14 patients in the premaxilla and immediately loaded with a screw-retained full ceramic crown. Periapical radiographs and standardized photographs were taken to determine bone loss and soft tissue changes. Plaque and bleeding levels were assessed. Patients’ satisfaction was measured using the Oral Health Impact Profile-14 questionnaire.

Results: After 1 year, all implants survived and mean bone loss was 1.20 mm, with no significant changes after 6 months. Plaque levels were low and no significant changes were observed. Bleeding levels decreased during the initial 3 months, but were constant thereafter. Before final torquing was performed after 6 months, four cases of screw loosening occurred. Also, one crown had a piece of porcelain chipped off. Patients reported an overall increase in well-being. A mean midfacial recession of 0.37 mm was observed. The mesial papilla showed a slight increase of 0.14 mm, while the distal papilla decreased 0.35 mm.

Conclusion: With 100% survival and stable bone levels after 6 months, the Co-Axis implant showed a good clinical outcome when immediately loaded. The use of a full ceramic crown as a first and final restoration resulted in a good aesthetic outcome with few changes in papilla fill, although midfacial soft tissue was stable only after 1 year.

KEY WORDS: co-axis, dental implant, immediate loading, implant angulation, prosthetic complication, single implants, soft tissue changes, southern implant

INTRODUCTION
The most important reason for tooth extraction is an endodontic complication, followed by tooth fracture, trauma, periodontitis, and caries. Single tooth replacement using implant therapy has proven to be predictable in short- and long-term studies with respect to implant survival. It is a challenge because the restorations do not rely on the surrounding dentition for support. In this way, it differs from other implant restorations like cross-arches and FPDs and may hold an increased risk. Additionally, the outcome of single implant crowns depends on the aesthetic demand of the patient and prosthetic features, such as tooth shape, color, transparency, symmetry with the neighboring teeth, and the emergency profile. The latter is predominantly depending on proper implant location whereby the availability of bone and restoratively guided surgical placement are decisive factors. Especially in the aesthetic zone of the maxilla, a correct three-dimensional implant position is essential to enhance the emergency profile determining the natural appearance.
Southern Implants Inc (Irene SA)
12-24-36 degrees angle
Introduction
Inclusion

- Patients > 18 years old
- Single implants with neighbouring teeth
- Anterior maxilla, 15-25
- Healed bone, at least 6 weeks post-extraction
- Adequate bone volume by clinical examination
- ASA I
**Exclusion**

- Heavy smokers (> 10 cig/day)
- Demanding esthetic cases
- Parafunctions
- Signs of infection
Materials and Methods

Angulated implants immediately loaded with a full ceramic crown

Protocol

- Flap surgery
- Drilling sequence
- Primary stability > 40 Ncm
- Impression
- Crown within 3 days
- Zirconia / Porcelain
- Recall sessions
- OHIP-14
- CBCT
Angulated implants immediately loaded with a full ceramic crown

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Patient distribution

- 14 patients
- Single in anterior maxilla (15-25 location)
- 6 male, 8 female
- Mean age 55 (31-80)
- 1 smoker (4 cig/day)
### Marginal bone loss

<table>
<thead>
<tr>
<th>Time</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 weeks</td>
<td>0.19 mm</td>
<td>0.129</td>
<td>0.00 - 0.55</td>
<td>0.001*</td>
</tr>
<tr>
<td>2 weeks</td>
<td>0.47 mm</td>
<td>0.193</td>
<td>0.10 - 0.95</td>
<td>0.001*</td>
</tr>
<tr>
<td>4 weeks</td>
<td>0.70 mm</td>
<td>0.239</td>
<td>0.30 - 1.30</td>
<td>0.001*</td>
</tr>
<tr>
<td>6 weeks</td>
<td>0.95 mm</td>
<td>0.239</td>
<td>0.60 - 1.50</td>
<td>0.001*</td>
</tr>
<tr>
<td>3 months</td>
<td>1.12 mm</td>
<td>0.205</td>
<td>0.90 - 1.70</td>
<td>0.001*</td>
</tr>
<tr>
<td>6 months</td>
<td>1.19 mm</td>
<td>0.224</td>
<td>1.00 - 1.80</td>
<td>0.008*</td>
</tr>
<tr>
<td>12 months</td>
<td>1.20 mm</td>
<td>0.215</td>
<td>1.00 - 1.80</td>
<td>0.052</td>
</tr>
</tbody>
</table>
Co-Axis clinical research

Marginal bone loss

![Graph showing bone loss over time for different implant numbers.](image)
- Ongoing mid-facial recession
- No significant changes in mesial papilla height
- Decrease in distal papilla height during first 3 months
- Ongoing mid-facial recession
- No significant changes in mesial papilla height
- Decrease in distal papilla height during first 3 months
Results

Implant bone loss

3D Cone Beam CT

✓ 1 week
✓ 6 months
Angulated implants immediately loaded with a full ceramic crown

Results

Implant bone loss

3D Cone Beam CT

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Buccal</td>
<td>1,29 mm</td>
</tr>
<tr>
<td>Bucco-Distal</td>
<td>1,18 mm</td>
</tr>
<tr>
<td>Distal</td>
<td>1,18 mm</td>
</tr>
<tr>
<td>Palato-Distal</td>
<td>1,11 mm</td>
</tr>
<tr>
<td>Palatal</td>
<td>1,18 mm</td>
</tr>
<tr>
<td>Palato-Mesial</td>
<td>1,16 mm</td>
</tr>
<tr>
<td>Mesial</td>
<td>1,16 mm</td>
</tr>
<tr>
<td>Bucco-Mesial</td>
<td>1,07 mm</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>1,19 mm</td>
</tr>
</tbody>
</table>
Q1: Have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures?
Q2: Have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures?
Q3: Have you had painful aching in your mouth?
Q4: Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?
Q5: Have you been self conscious because of your teeth, mouth or dentures?
Q6: Have you felt tense because of problems with your teeth, mouth or dentures?
Q7: Has your diet been unsatisfactory because of problems with your teeth, mouth or dentures?
Q8: Have you had to interrupt meals because of problems with your teeth, mouth or dentures?
Q9: Have you found it difficult to relax because of problems with your teeth, mouth or dentures?
Q10: Have you been a bit embarrassed because of problems with your teeth, mouth or dentures?
Q11: Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?
Q12: Have you had difficulty doing your usual jobs because of problems with your teeth, mouth or dentures?
Q13: Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?
Q14: Have you been totally unable to function because of problems with your teeth, mouth or dentures?
Co-Axis clinical research

Quality of Life

Before surgery

Q1: pronunciation
Q2: sense of taste
Q3: painful aching
Q4: uncomfortable to eat food
Q5: self consciousness
Q6: felt tense
Q7: diet unsatisfactory
Q8: interrupt meals
Q9: difficult to relax
Q10: been embarrassed
Q11: been irritable
Q12: difficulty doing job
Q13: life in general less satisfying
Q14: unable to function
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Q13: life in general less satisfying
Q14: unable to function
Results

Esthetics

Mean Pink Esthetic Score = 8.35 / 14
Mean White Esthetic Score = 6.35 / 10

Angulated implants immediately loaded with a full ceramic crown
Complications

- 4 cases of screw-loosening before final torquing at 6 months
- 1 case of porcelain chipping at 1 year control
Discussion

Single tooth replacement by immediate loading

*Siddique et al., J Oral Implantol 2008*
98.04 % success, mean bone loss 1.05 mm

*Hall et al., Clin Impl Dent Relat Res 2007*
No difference between immediate and delayed loading

*Glauser et al., J Prosthet Dent 2007*
97.5 % survival after 5 years, 1.54 mm bone loss

*Hahn, J Oral Implantol 2007*
97.9 % survival up to 3 years

*Degidi et al., J Oral Implantol 2006*
95.5 % survival after 5 years, all early failures
Angulated implants immediately loaded with a full ceramic crown

Discussion

Single tooth replacement by immediate loading

- Immediate loading has a comparable outcome as delayed loading if primary stability can be achieved (> 35 Ncm)
- Improved stability using tapered implants
- Functional loading = non-functional loading
- Tilted implants hold no increased risk
- Several studies also reported soft tissue recessions during the first year
- Provisional or final crown???

Hall et al. 2007; Ericsson et al. 2000; Lindeboom et al. 2006; Koutouzis et al. 2007; Nothdurft et al. 2010; Kan et al. 2003; Misch et al. 2008; De Rouck et al. 2008
Angulated implants immediately loaded with a full ceramic crown

Conclusion

+ 
- Predictable outcome regarding bone loss and survival
- Overcoming angulation problems
- High patient satisfaction
- Good esthetic results
- Shorten treatment time

- Technique sensitive procedure
- Esthetics: Provisional crown > Final crown
Immediate loading + Immediate placement

Materials and Methods

Case studies with single tooth implants under immediately full load (Nikolopoulos – Hattingh – Ghent)

Protocol

- Group 1 = Immediate placement / Flapless
- Group 2 = Delayed placement / Flap surgery
- Primary stability > 40 Ncm
- Impression
- Crown within 3 days
- Zirconia / Porcelain
- Recall sessions
Immediate loading + Immediate placement

Results

• 38 patients (5 smokers)
• 43 implants
  ▪ Immediate placement: 23 implants
  ▪ Delayed placement: 20 implants
  ▪ Maxilla: 30 implants
  ▪ Mandible: 13 implants
Immediate loading + Immediate placement

Results

Delayed + Immediate

Baseline | 20 months

(A) Delayed + Immediate

(B) Baseline

(C) 20 months

(D) Immediate + Immediate

(E) Baseline

(F) 20 months
Immediate loading + Immediate placement

Results

• Mean follow-up of 26 months (SD 11, range 8-44)
• Implant survival = 100 %
• Mean bone loss = 1.00 mm (SD 0.30, range 0.24 – 1.64)
• Bone loss: delayed placed implants > immediately placed implants
• 2 crowns experienced also porcelain chipping
Immediate loading + Immediate placement

• Reduced bone loss around immediately placed implants:
  ▪ No flap
  ▪ Deeper placement
  ▪ Healing potential?

• Immediate placement + immediate loading:
  ▪ Increased risk
  ▪ Improve esthetic outcome!
  ▪ Optimal soft tissue support

*De Rouck et al. 2009, Esposito et al. 2010, Raes et al. 2010, Atieh et al. 2010*
Case selection

- No infection
- Intact buccal bone plate
- Intact soft tissue profile
- Biotype => risk!
- Jumping distance > 1.5 mm: bone graft
**Immediate loading + Immediate placement**

**Conclusion**

**+**

- 100% survival and limited bone loss
- Less destructive
- Esthetics
- Decreased treatment time

**−**

- Technique sensitive procedure
- Only short time data available
CONCLUSIONS

**Immediate loading:**

- Primary stability: implant & surgery
- Careful patient selection: parafunctions!
- Careful prosthetics: occlusion and articulation
- For esthetical reasons: use a provisional
- Improve patient satisfaction, improve your practice

**Immediate placement + immediate loading:**

- Proper case selection: implant site
- Careful prosthetic procedure: no pressure
Co-Axis 24°
Factors for successful outcome in implant dentistry

- Implant
- Surgeon
- Dentist
- Dental technician
- Patient