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# Effects of immediate implant placement and provisionalisation on aesthetic outcomes

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## Background

Immediate implant placement has been shown to be a successful treatment modality, with similar survival rates when compared to the conventional approach. Although the effects of immediate implant placement on alveolar-bone preservation have been established, its impact on facial mucosa is still controversial.

Some studies have reported an increased risk of facial-mucosa recession, while others have suggested the opposite. Furthermore, several local risk factors – such as buccal implant positioning, thin-tissue phenotype, and buccal-plate thickness – can increase the risk of recessions.

Several solutions have been proposed in order to decrease the risk of and/or avoid mucosal recession development, including flapless surgery and using connective-tissue grafts at the facial aspect of the implant. Some studies have shown that immediate provisionalisation – apart from the obvious advantage of an immediate fixed solution for the patient – might also preserve papilla height and the mid-facial mucosal levels, leading to improved aesthetic outcomes compared to delayed restorations.
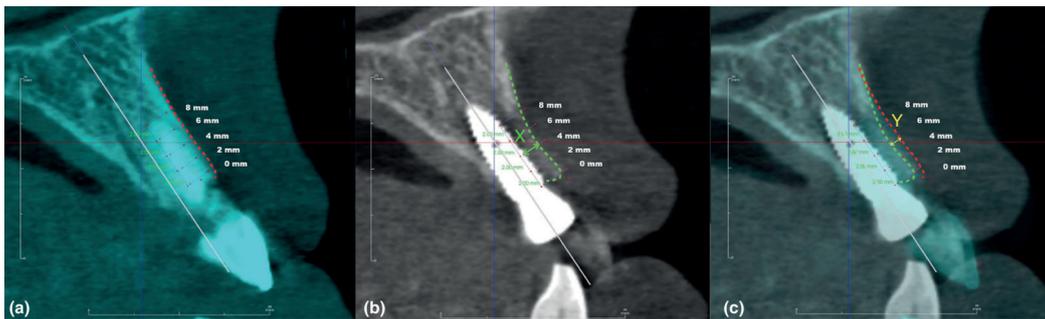
## Aims

The primary objective of this study was to compare mid-facial mucosal-level changes around immediately placed implants with and without immediate provisionalisation. Secondary objectives were assessment of interproximal papilla levels, implant aesthetic scores, marginal-bone levels, and crestal-bone changes.

## Materials & methods

- 40 patients, in need of a single tooth replacement in the anterior or premolar region in the maxilla, were included.
- CBCT scans were performed before implant placement (T0) and on the day of definitive implant crown delivery (T1).
- After implant placement, patients were randomly allocated to receive either an immediate provisional crown (test group) or a healing abutment (control group).
- Test implants were restored with temporary abutments and screw-retained, non-occluding provisional crowns, with flat or concave emergence profiles. Control implants received an abutment similar to the size of the socket.
- Primary and secondary outcomes were recorded by a single examiner at: T0, two weeks and one month post-operation, visit for delivery of permanent crown (T1), and final visit at 12 months (T2).
- Mucosal-level changes were estimated by drawing an imaginary line connecting the free gingival margins of immediately adjacent teeth on custom-made reference stents using a periodontal probe. Any discrepancy between these two methods was verified with standardised photos and study models.
- Papilla height and pink/white aesthetic scores (PES, WES) were also calculated at T1 and T2.
- Peri-apical digital radiographs, using parallel technique and customised stents, were taken at T0, T1, and T2. A built-in analysis software was used to measure mesial and distal marginal-bone loss using the implant platform as a reference point.
- Vertical and horizontal changes in alveolar bone-crest and bone-thickness reduction were measured by CBCT superimposition in the imaging software.

**Figure** Illustration of the measurement between two timepoints: baseline and four months after implant placement. Buccal bone thickness reduction at four months post-implant (T1) at different measurement levels (2mm interval) above the implant platform in CBCT superimposed analysis.
(a) Pre-extraction, the red dotted line represents the most outer surface of the buccal bone plate of residual root. (b) Post-implant placement at T1, the green dotted line represents the most outer surface of the buccal bone plate of implant; post-implant buccal bone thickness was measured (green arrow: X). (c) Superimposition of two images (T0 and T1) showed the amount of resorption (yellow arrow: Y); implant to pre-extraction outer surface of bone plate was calculated as X + Y, and the resorption percentage was calculated as Y/X + Y.

## Results

- Implant survival at T2: 100% in the control group; 90% in the test group.
- Mean mid-facial mucosa recession: no statistically significant difference between test group (0.1mm ± 0.9mm) vs. control group (0.1mm ± 0.7mm) at timepoint T2.
- Mesial papilla height and distal papilla height: no significant differences between the groups.
- Plaque index, gingival index, and PES/WES at T2: no significant differences between the groups.
- Mean marginal bone level loss: no statistically significant difference between test group vs. control group at T1 (0.7mm ± 0.6mm vs. 0.6mm ± 0.6mm, respectively) or at T2 (0.8mm ± 0.7mm vs. 0.8mm ± 0.6mm, respectively).

- Vertical crestal-bone loss at the buccal aspect of the implant was significantly more pronounced in the control group (0.7mm ± 0.6mm) vs. the test group (0.3mm ± 0.4mm).
- Horizontal resorption of the buccal bone plate at the implant platform: no statistically significant difference between test group (23.9%) vs. control group (22.4%) at timepoint T2.
- Peri-implant bone thickness/reduction of bone thickness at different levels above the implant platform: no statistically significant differences between the groups.
- The horizontal and vertical crestal-bone changes and the bone-thickness reduction at the platform above did not have an impact on the mid-facial mucosal recession over time.

## Limitations

- Inability to mask the examiners.
- Relatively limited sample size (two failed implants in the test group).
- Slightly different (0.7mm) apico-coronal position of the implants between the groups.

## Conclusions & impact

- **This study showed that, in the short term, successful aesthetic and functional outcomes can be achieved with or without immediate provisionalisation. Immediate provisionalisation did not seem to increase the aesthetic outcome and may be related to a higher risk of implant failure.**

- **Both groups displayed minimal changes on marginal-bone levels, papilla height, and bone remodelling.**

- **Immediate implant placement can maintain the soft-tissue levels. A delayed restoration does not create more mid-facial recession compared to immediate provisionalisation and aesthetic outcomes can be achieved with both approaches.**