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study

GBR in implants with dehiscences may not require addition of autogenous bone chips

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Background

The removal of single or multiple teeth will result in a series of alterations within the edentulous segment of the alveolar process. Moreover, neither implant placement in a fresh extraction socket nor alveolar-ridge preservation techniques may, in fact, prevent the physiologic modelling/remodelling that occurs in the ridge following tooth removal.

After four to eight weeks of spontaneous healing, small amounts of new bone (woven bone) in the socket and a complete soft-tissue coverage are formed, together with resolution of chronic infections and resorption of the bundle bone in the mid-facial aspect. In order to reduce the risk of post-operative complications, early implant placement – also called "Type 2 implant placement" – is recommended.

Bone regeneration procedures are required in most cases to improve bone volume and reduce the risk of mucosal recession. The guided bone regeneration (GBR) procedure results in a mean reduction of the vertical defect height from 5.1 to 0.9mm and a defect resolution of 81.3%. However, there is limited evidence about the use of either xenograft using deproteinised bovine bone mineral (DBBM) alone or combined with autogenous bone chips, or about the rate of graft resorption.

Aims

The aim of the present study was to evaluate clinically and radiologically the use of the DBBM versus DBBM combined with autogenous bone chips for the treatment of bony dehiscences at implant placement.

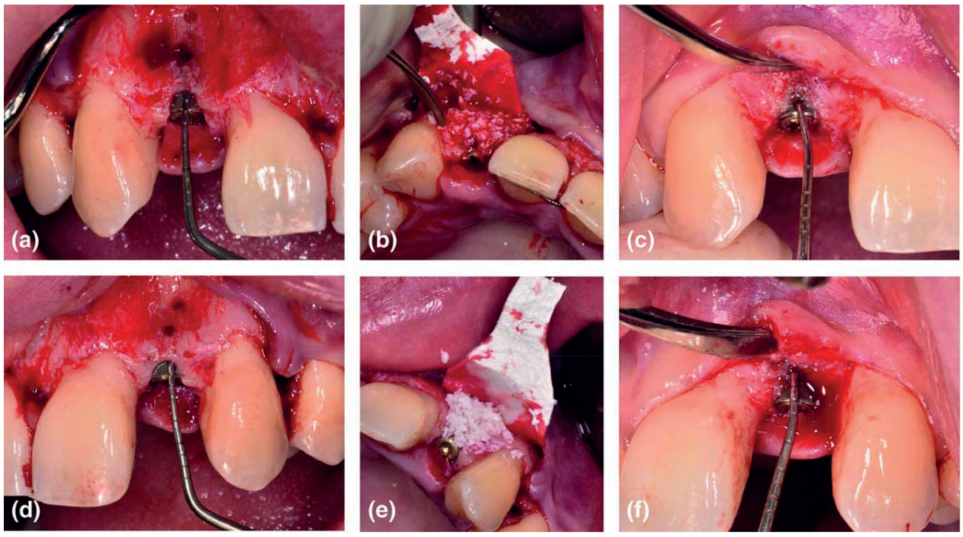
Materials & methods

- This was a randomised, controlled, clinical trial with a split-mouth design, including 14 patients (mean age 54.6 years) who underwent bilateral implant placement with simultaneous GBR to treat a bony dehiscence. Subjects were randomised into test and control groups.
- Inclusion criteria were the presence of a bilateral partially edentulous ridge of one tooth missing with at least one adjacent tooth present, existence of a pre-operative cone beam computed tomography (CBCT) scan, and tooth removal performed at least eight weeks before the GBR. Exclusion criteria were smoking, systemic diseases and medications that could influence the outcomes, jaws previously irradiated, and previous GBR in the same area.
- Bone-level implants were placed and dehiscences occurred. The test group received DBBM only and the control group received autogenous bone chips covered by DBBM. The same amount of graft material was placed in both sides. A resorbable collagen membrane was used in both groups following GBR principles. Four months later, healing abutments were connected and eight weeks after that the definitive prosthesis was installed.
- Vertical-defect height (VDH), horizontal-defect depth (HDD), and horizontal-defect width (HDW), at different levels on the implant shoulder, were measured after implant placement and abutment connection, using a periodontal probe. CBCT scans were taken after implant placement and four months later.
- The primary outcome was the change of the vertical-defect height after 16 weeks. Secondary outcomes were the change in horizontal-defect dimensions and changes in marginal bone level one year after functional loading.

Figure

Bovine-derived xenograft in combination with autogenous bone chips versus xenograft alone for the augmentation of bony dehiscences around oral implants: A randomised, controlled, split-mouth clinical trial.

(a) Defect measurements before GBR procedure (control site), (b) GBR augmentation procedure with autogenous bone chips and DBBM (control site) and a resorbable collagen membrane, (c) Defect measurements at re entry and abutment connection (control site), (d) Defect measurements before GBR procedure (test site), (e) GBR augmentation procedure with DBBM (test site) and a resorbable collagen membrane, (f) Defect measurements at re entry and abutment connection (test site).



Results

- Fourteen patients, 28 implants, mostly restored with single screw-retained crowns (61%) on premolars (57%).
- The implant survival rate after one year was 96.4%.

Primary outcomes:

- Clinically, at four months the change in vertical-defect height was 2.07mm (46.7%) in the test group and 2.28mm (50.9%) in the control group, without significant difference.
- Vertical defects were totally resolved in 14% of the test and 21% of the control sites.
- Radiographically, the mean bone level at loading and one-year post-loading were 0.01mm (test SD 0.56) and 0.16mm (control SD 0.31), not being significantly different.

Secondary and tertiary outcomes:

- The horizontal-defect width at the implant shoulder changed on average 1.85mm (40.5%) in the test group compared with 1.75mm (40.9%) in the control group, without a significant difference.
- Changes in augmentation thickness were not statistically different between the groups: 68.9% (0.45mm) for the test and 55.5% (0.64mm) for the control.

Limitations

- The sample (14 patients) was relatively small.
- The time for performing the second-stage surgery – four months – may have been too short.
- There was an unequal distribution of implants placed in maxilla and mandible (20 compared with eight).
- Wide timing range of implant placement after tooth extraction (five to 47 months).
- All implants were installed in a submerged way, placing them 1mm subcrestally.
- No data regarding the characteristics of the soft tissue (keratinisation, thickness, and attachment).

Conclusions & impact

- **The usage of DBBM coupled with autologous bone chips was not associated with any advantage in comparison with xenograft alone in terms of vertical and horizontal bone gain – its application thus seems to be worthless.**
- **Residual bone dehiscence should be expected after the healing period, regardless of the graft material that is employed.**
- **Autologous bone in combination with DBBM to treat bone dehiscences at the time of implant placement seems not to be cost-effective as it does not provide any benefit in terms of dimensional changes of the alveolar ridge. Suboptimal resolution of the bone dehiscence seems to be a frequent occurrence.**

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