The Effect of Different Soft-Tissue Management Techniques in Alveolar Ridge Preservation – a Randomized Controlled Clinical Trial

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Introduction

For alveolar ridge preservation various treatment protocols are described. While most studies focus on the effect of the bone graft material, the aim of this study was to determine whether covering the grafted socket with either a combined epithelialized-subepithelial connective tissue graft (CECG) or a porcine collagen matrix (CM) had an influence on the soft- and hard tissue.

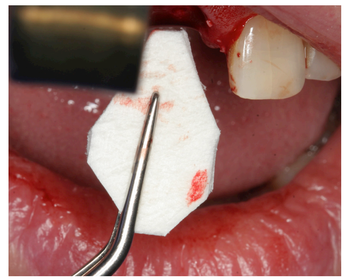
Material and Methods

A total of 20 maxillary extraction sockets were grafted with an anorganic xenogenic bone graft and then randomly assigned to either group A (CECG) (autologous combined connective tissue-mucosal graft from the palate) or group B (CM) (Bio-Oss® Collagen; Geistlich Pharma AG, Wolhusen, Switzerland). Subsequently, labial and palatal tunnels were dissected leaving the periosteum attached to the bone. Then the grafts were inserted.
Measurements of soft-tissue parameters were performed at tooth extraction (T0), implant insertion (T1) and second stage surgery (T2).
The primary outcome criterion in this study was the gingival thickness. Secondary outcome criteria were the width of the keratinized gingiva, the emergence profile and marginal bone level.

Randomization
Extraction Socket

Control Group

combined epithelialized–subepithelial connective tissue graft (CECG) from the palate



Test Group

xenogenic collagen matrix

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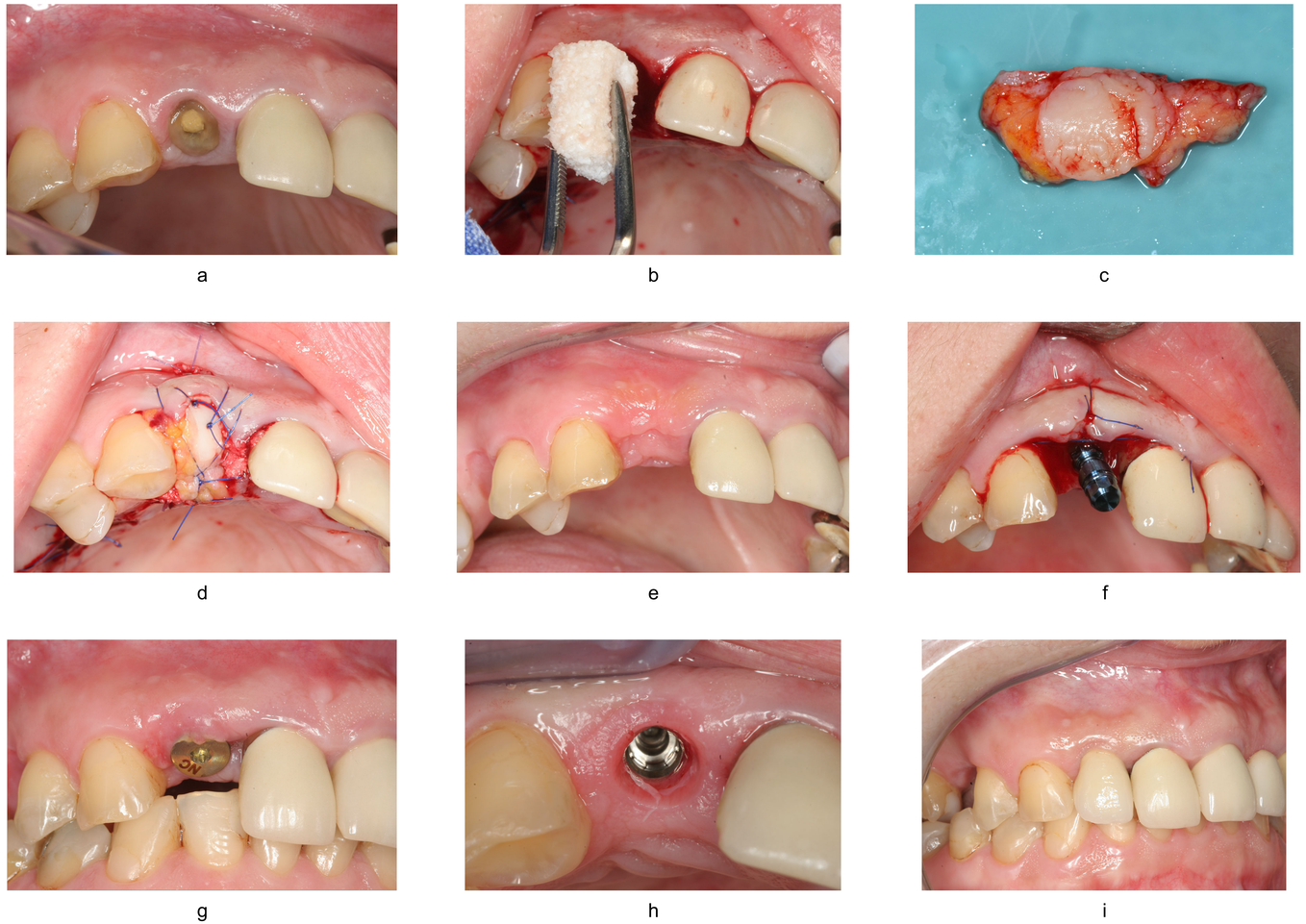

Figure 2: Surgical procedure CECG group (a) situation before extraction (b) grafting the extraction socket (c) combined epithelialized–subepithelial connective tissue graft (CECG) from the palate (d) post surgical situation (e) clinical situation after healing (f) clinical situation after implant placement (g) clinical situation after second stage surgery (h) emergence profile (i) final restoration

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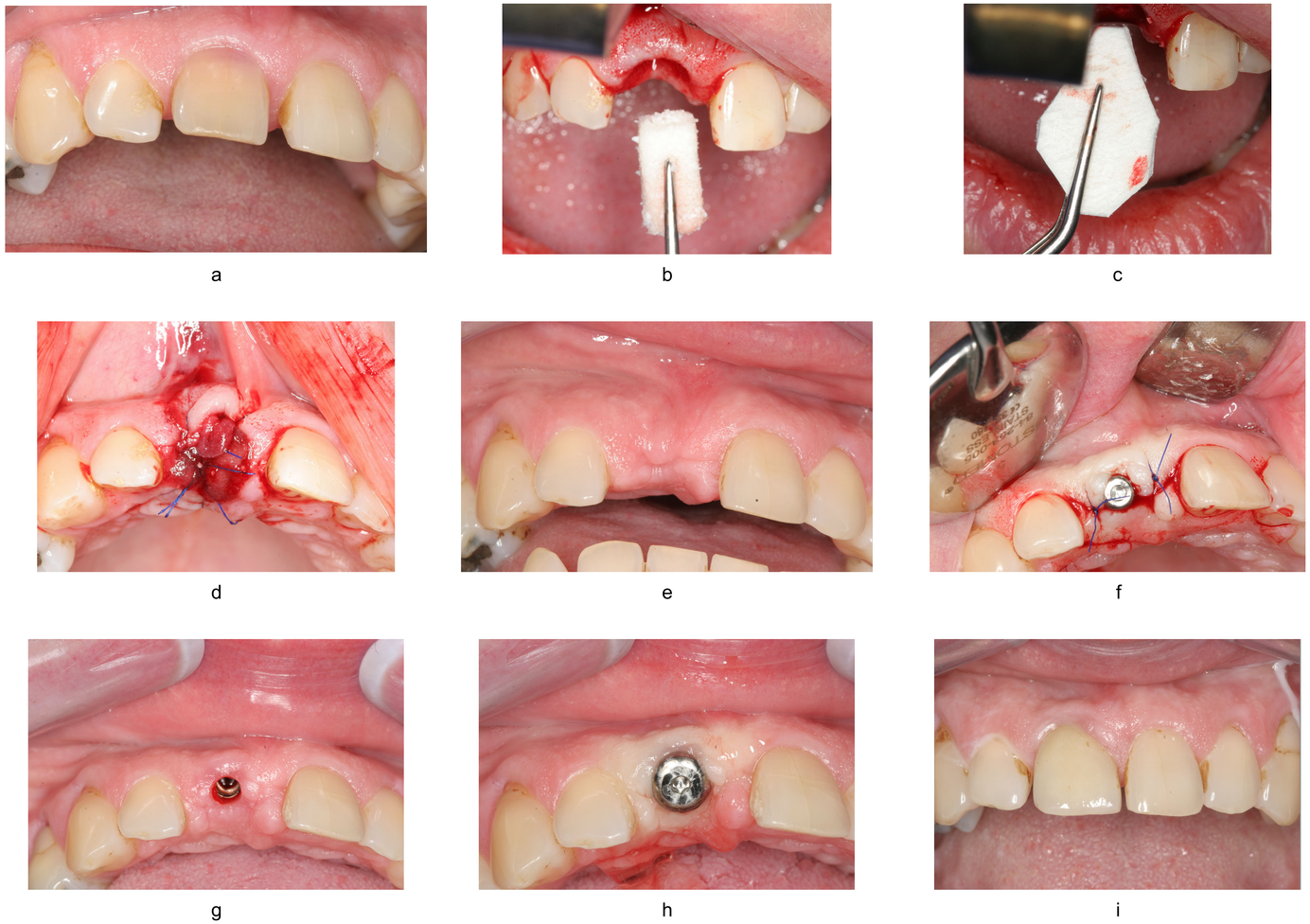

Figure 3: Surgical procedure CM group (a) Central incisor with internal resorption, situation before extraction (b) grafting the extraction socket (c) CM to cover the extraction socket (d) post surgical situation (e) clinical situation after healing (f) clinical situation after implant placement (g) emergence profile after healing (h) clinical situation with healing abutment (i) final restoration

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Results

A similar initial gingival thickness of 1.18 ± 0.56 mm (CECG) and 1.24 ± 0.50 mm (CM) could be measured at T0 (p = 0.791). At T1 a thickness of 1.29 ± 0.26 mm (CECG) compared to 1.58 ± 0.6 mm (CM), could be documented (p = 0.199). At T2, a reduction in gingival thickness to 1.2 ± 0.32 mm (CECG) was recorded, compared with 1.7 ± 1.06 mm (CM) without statistical significance (p = 0.214). This means an overall increase in gingival thickness from T0 to T2 of 0.02 ± 0.66 mm (CECG: p = 0.926) compared to 0.46 ± 0.89 mm (CM: p = 0.102).

Thickening of soft tissue in the sense of biotype switching from thin to thick biotype was observed in 8 patients (CECG = 4 patients, KM = 4 patients).

Keratinized soft-tissue was 3.91 ± 1.11 mm (CECG) and 4.76 ± 1.48 mm (CM) before extraction and 3.73 ± 0.90mm (CECG) and 4.13 mm ± 1.29 mm (CM) at implant follow-up.

Mean periimplant probing depths were 3.15 ± 1.39 mm (CECG) and 3.41 ± 0.99 mm (CM). The difference was not significant (p= 0.7858).

Conclusion

After ridge preservation with a standardized approach, comparable soft tissue parameters were observed in both groups, either with a collagen matrix or a combined autologous connective tissue graft. The use of CM to improve the soft tissue situation leads to a thickening of the soft tissue and similar results as with an autologous graft.

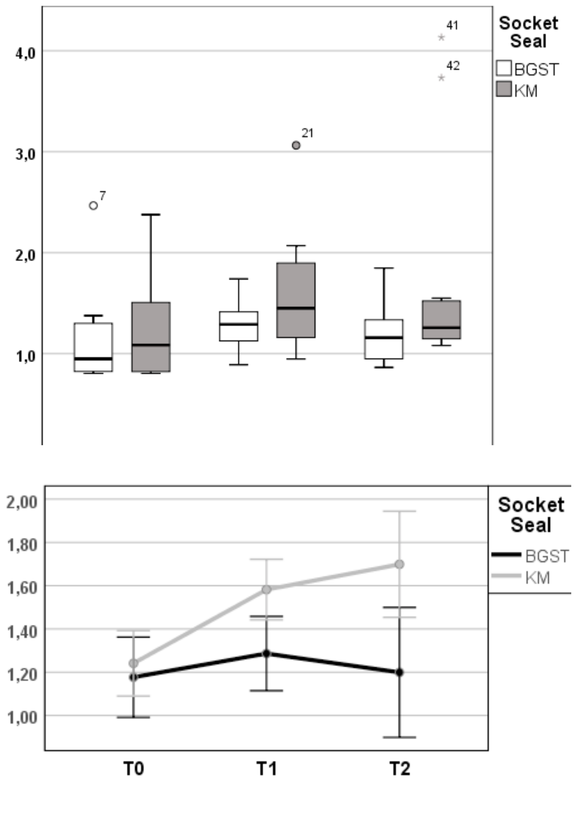

Figure 4: Change in gingival thickness
Comparison of both groups on the basis of the measured gingival thickness at the time points T0 (prior to tooth removal), T1 (prior to implant placement) and T2 (prior to second stage surgery).

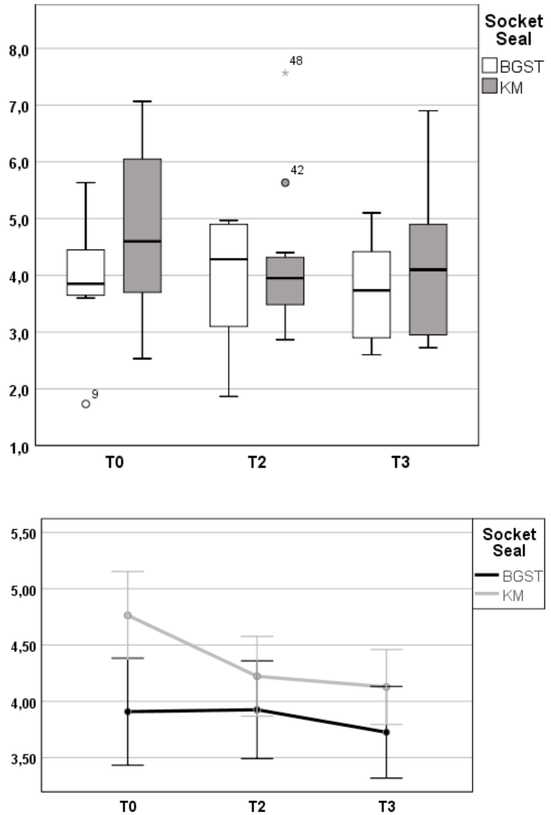

Figure 5: Change in keratinization
Comparison of both groups on the basis of the measured widths of the KG at the time points T0 (prior to tooth removal), T2 (after second stage surgery) and T3 (after prosthetic restoration).