Ridge preservation following tooth extraction using a polylactide and polyglycolide sponge as space filler: a clinical and histological study in humans

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Abstract:
Background: The placement of different graft materials and/or the use of occlusive membranes to cover the extraction socket entrance are techniques aimed at preserving/reducing alveolar ridge resorption. The use of grafting materials in fresh extraction sockets has, however, been questioned because particles of the grafted material have been found in alveolar sockets 6–9 months following their insertion.
Aim: The aims of the study were to (i) evaluate whether alveolar ridge resorption following tooth extraction could be prevented or reduced by the application of a bioabsorbable polylactide-polyglycolide acid sponge used as a space filler, compared to natural healing by clot formation, and (ii) evaluate histologically the amount and quality of bone tissue formed in the sockets, 6 months after the use of the bioabsorbable material.
Material and methods: Thirty-six patients, undergoing periodontal therapy, participated in this study. All patients were scheduled for extraction of one or more compromised teeth. Following elevation of full-thickness flaps and extraction of teeth, measurements were taken to evaluate the distance between three landmarks (mesio-buccal, mid-buccal, disto-buccal) on individually prefabricated stents, and the alveolar crest. Twenty-six alveolar sockets (test) were filled with a bioabsorbable polylactide-polyglycolide acid sponge (Fisiograft®), while 13 sockets (controls) were allowed to heal without any filling material. The flaps were sutured with no attempt to achieve primary closure of the surgical wound. Re-entry for implant surgery was performed 6 months following the extractions. Thirteen biopsies (10 test and three control sites) were harvested from the sites scheduled for implant placement.
Results: The clinical measurements at 6 months revealed, in the mesial-buccal site, a loss of bone height of 0.2 mm (1.4 SD) in the test and 0.6 mm (1.1 SD) in the controls; in the mid-buccal portion a gain of 1.3 mm (1.9 SD) in the test and a loss of 0.8 mm (1.6 SD) in the controls; and in the distal portion a loss of 0.1 mm (1.1 SD) in the test and of 0.8 (1.5 SD) mm in the controls. The biopsies harvested from the test sites revealed that the new bone formed at 6 months was mineralized, mature and well structured. Particles of the grafted material could not be identified in any of the 10 test biopsies. The bone formed in the control sites was also mature and well structured.
Conclusion: The results of this study indicate that alveolar bone resorption following tooth extraction may be prevented or reduced by the use of a bioabsorbable synthetic sponge of polylactide-polyglycolide acid. The quality of bone formed seemed to be optimal for dental implant insertion.

Undisturbed extraction sockets heal uneventfully with bone tissue 1–2 months following extraction [Amler et al. 1960; Evian et al. 1982]. This healing process usually occurs with substantial reduction of the original height and width of the
alveolar bone, which in some cases may aesthetically compromise an implant, sup-
porting prosthetics [McCall & Rosenfeld 1991]. Several studies have proposed var-
ious ridge preservation techniques follow-
ing tooth extractions, including placement of different graft materials and/or use of occlusive membranes to cover the extrac-
tion socket entrance (for a review, see Adriaens 1999). The use of grafting materi-
als in fresh extraction sockets has been questioned because they seem to interfere with the normal healing process in the sockets in which oral implants have to be inserted [Pinholt et al. 1991; Becker et al. 1994; Becker et al. 1996; Buser et al. 1998]. Indeed, studies in humans using demineral-
ized freeze-dried bone allograft (DFDBA) [Brugnami et al. 1996; Becker et al. 1994],
deproteinized natural bovine bone mineral (Bio-Oss®) [Dies et al. 1996; Becker et al. 1996; Artzi et al. 2000; Carmagnola et al. 2001] or bioactive glass [Fromm et al. 2002] have shown the presence of particles of the grafted material in the alveolar sockets 6–9 months following their insertion. Furthermore, few studies have used quantitative methods to measure the efficacy of ridge preservation techniques following tooth extraction [Lekovic et al. 1997; 1998; Howell et al. 1997]. Lekovic et al. [1998] reported that healing of extraction sites seems to occur with different degrees of bone resorption, which can be partly pre-
vented by the use of resorbable membranes made of glycolide and lactide polymers. Polyactic acid and polyglycolic acid are considered to be suitable matrices for bone and soft connective tissue [Laurencin & Lane 1999]. Fisiograft® (Ghimas, Bologna, Italy) is a synthetic resorbable sponge formed by 50–50 lactide–glycolide polymer, and it has the fastest degradation rate of the D–L lactide/
glycolide materials, with the polymer degrad-
ing in about 50–60 days [Holland et al. 1986].

The aims of the present study were:

1. to evaluate if alveolar ridge resorption follow-
ing tooth extraction could be prevented or reduced by the appli-
cation of a bioabsorbable polylactide and polyglycolide sponge Fisiograft® (Ghi-
mas, Bologna, Italy) used as a space filler, compared to natural healing by clot formation;
2. to evaluate histologically the amount and quality of bone tissue formed in the sockets 6 months after insertion of the material.

Material and methods

Forty-five patients (31 females and 14 males), ranging in age from 35 to 64 years and undergoing treatment of periodontal disease, participated in this study. The study was approved by the Ethics Com-
mittee of our university. All patients were physically healthy, with no underlying systemic disease as determined by medical history screening and with at least one tooth to be extracted and subsequently replaced with an endosseous implant at a later stage. Before entering the study, the patients were informed of the nature of the investigation, and signed an informed con-
sent form. All patients received basic periodontal therapy and exhibited good oral hygiene. If an abscess was present, system-
tic antibiotic therapy was given 2 weeks before the extraction of the scheduled tooth.

The patients having one tooth scheduled for extraction were assigned to test and control groups at the time of their recruit-
ment in the study as follows: two patients to the test [T] group and one to the control [C] group. In five patients with two teeth scheduled for extraction, one site was assigned to T and the other to C. In one patient with five teeth for extraction, three sites served as T and the other two as C.

Baseline clinical examination

Following local anesthesia and elevation of full-thickness buccal and lingual flaps, the teeth were extracted. The sockets were then inserted.

Processing of specimens

The specimens were retrieved and stored immediately in 10% buffered formalin and processed to obtain thin ground sections with the Precise® Automated System [Assing, Rome, Italy]. The specimens were dehydrated in an ascending series of alcohol rinses and embedded in a glycolmethacry-
late resin [Technovit 7200 VLC, Kulzer, Wehrheim, Germany]. After polymerization, the specimens were sectioned long-
itudinally along the major axis with a high-
precision diamond disc at about 150μm and ground down to about 30μm. Three slides were obtained for each specimen. The slides were stained with basic fuchs in and toluidine blue. A double staining with von Kossa and basic fuchs in was carried out.
to evaluate the degree of bone mineralization, and one slide per specimen, after polishing, was immersed in AgNO₃ for 30 min and exposed to sunlight; the slides were then washed under tap water, dried and immersed in basic fuchsin for 5 min, and then washed and mounted. Histomorphometry to evaluate the percentage of bone was carried out using a light microscope (Laborlux S, Leitz, Wetzlar, Germany) connected to a high-resolution video camera (3CCD, JVC KY-F55B) and interfaced to a monitor and PC (Intel Pentium III 1200 MMX). This optical system was associated with a digitizing pad (Matrix Vision GmbH) and a histometry software package with image capturing capabilities (Image-Pro Plus 4.5, Media Cybernetics Inc., Immagini & Computer Snc, Milano, Italy).

**Subjects exited from the study**
During the study period, nine subjects dropped out from the study for reasons unrelated to the therapy. At the end of the study, data were available from 24 patients in the T group (26 T sites) and 12 C patients (13 C sites).

**Statistical analysis**
The measurements were expressed using mean values and standard deviations. The differences within the T and the C groups between the measurements recorded at baseline examination and 6 months later were analyzed using a paired t-test. A P-value < 0.05 was considered to be statistically significant.

**Results**

**Clinical findings**
The healing following tooth extractions occurred uneventfully in all the T and C sites. One week following the extractions, the clinical appearance of the soft tissues around the extraction sockets was similar in the T and C groups. After 2 weeks, the sockets in the T and C groups were covered by soft tissue (Fig. 1A–D). The measurements taken at the time of re-entry surgery revealed an overall lesser resorption of the alveolar crest in the T group compared to what was observed in the C group, with a mean gain of 0.2 mm (SD 1.5) in the T sockets and a mean loss of 0.7 mm (SD 1.2) in the C sites. The difference between the values recorded at the baseline examination and at 6 months was found to be statistically significant in the C group. The measurements showed that there was, in the mesio-buccal portion (M-B), a loss of 0.2 mm (SD 1.0) in the T group and a loss of 0.6 mm (SD 1.0) in the C group; in the mid-buccal portion (mid-B) a gain of 1.3 mm (SD 1.9) in the T sockets and a loss of 0.8 mm (SD 1.6) in the C sockets; and in the disto-buccal portion (D-B) a loss of 0.1 mm (SD 1.1) in T and a loss of 0.8 mm (SD 1.5) in C (Table 1). The difference between the values recorded at the baseline

Fig. 1. Clinical photographs from test and control sockets following the extractions: [A] application of the graft material in the test socket 12, 21, 23, while the control sockets 11 and 22 are left empty; [B] sutures are in place with no attempt to achieve primary closure of the surgical wound either in test or in control sockets; [C] 1 week following the extractions, the clinical appearance of the soft tissue around the test and control socket is similar; [D] 2 weeks following the extractions, both the test and control sockets are covered by soft tissue.
examination and 6 months later at the mid-
B portion of the T sockets was statistically
significant \((P < 0.05)\). Furthermore, six out
of 26 T sockets had lost \(Z 2\) mm bone
height in at least one of the three sites of the
buccal wall, and seven out of 13 in the C
sockets (Table 2).

Particles of the grafted material were not
identified in the T socket at the re-entry
surgery. The new bone that filled the
sockets was similar to the surrounding bone.
In three of the 26 T sockets and in two of
the 13 C sockets, the bone in the central
part, but not on the lateral sides, of the pre-
existing sockets exhibited a low density. It
was, however, possible to insert all im-
plants with good primary stability. In all
these cases, the avulsed teeth had pre-
viously suffered from repeated abscesses.

**Histological findings**

In the biopsies harvested from the T sites,
mature bone with signs of remodeling was
present (Fig. 2). In some areas, it was not
yet possible to observe mineralized bone.
The histomorphometric analysis revealed
that the percentage of the area occupied by
mineralized bone was \(Z 67\%\) in eight out
of 10 biopsies; 43\% and 38\% were the
percentages recorded in the remaining two
(Table 3). At higher magnification, it was
possible to observe, only in a few areas, a
few scattered osteoblasts. Particles of the
grafted material could not be identified.

These findings were consistent in all the 10
harvested biopsies.

At the C sites, the percentage of minerali-
dized bone did not exceed 56\% (Table 3); the
bone presented wide marrow spaces (Fig. 3).

**Discussion**

The results of this study indicate that loss
of alveolar bone height following tooth
extraction was lower in the sockets where
a bioabsorbable synthetic sponge made of
polylactide and polyglycolide acid was
inserted compared to what was observed
in the alveoli where natural healing by clot
formation was allowed. Six months follow-

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**Table 1. Difference between the measurements recorded at the baseline and at the 6-month examination of the distance between the socket bone crest level and the reference points on the acrylic stents**

<table>
<thead>
<tr>
<th></th>
<th>Test sockets (n = 26)</th>
<th>Control sockets (n = 13)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M-B</td>
<td>Mid-B</td>
</tr>
<tr>
<td>M-B</td>
<td>– 0.2 (1.0)</td>
<td>+1.3 (1.9)*</td>
</tr>
<tr>
<td>Mid-B</td>
<td>+0.2 (1.5)</td>
<td></td>
</tr>
<tr>
<td>All sites</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

M-B = mesial-buccal; Mid-B = mid-buccal; D-B = distal-buccal. The values are expressed in mm (SD).
+ = bone gain; – = bone loss.
*Statistical difference between the baseline and the 6-month values within the groups \(P < 0.01\).

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**Table 2. Changes in the position of the buccal bone crest with respect to the reference points on the acrylic stents for all the test (T) and control (C) sites: \(\geq 2\) mm is the threshold chosen to express bone level change**

<table>
<thead>
<tr>
<th>N</th>
<th>R</th>
<th>M-B</th>
<th>Mid-B</th>
<th>D-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>35</td>
<td>F</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T2</td>
<td>23</td>
<td>E</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T3*</td>
<td>46</td>
<td>F</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T4</td>
<td>14</td>
<td>E</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T5*</td>
<td>14</td>
<td>F</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T6</td>
<td>21</td>
<td>P</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T7</td>
<td>15</td>
<td>F</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T8</td>
<td>23</td>
<td>F</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T9</td>
<td>25</td>
<td>F</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>T10*</td>
<td>14</td>
<td>F</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T11</td>
<td>36</td>
<td>F</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T12*</td>
<td>16</td>
<td>F</td>
<td>/</td>
<td>–</td>
</tr>
<tr>
<td>T13*</td>
<td>21</td>
<td>F</td>
<td>/</td>
<td>–</td>
</tr>
<tr>
<td>T14</td>
<td>14</td>
<td>F</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>T15</td>
<td>46</td>
<td>C</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T16</td>
<td>35</td>
<td>F</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T17</td>
<td>24</td>
<td>F</td>
<td>/</td>
<td>+</td>
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<tr>
<td>T18</td>
<td>25</td>
<td>F</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>T19</td>
<td>36</td>
<td>C</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>T20</td>
<td>23</td>
<td>F</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>T21*</td>
<td>36</td>
<td>F</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>T22*</td>
<td>21</td>
<td>F</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>T23*</td>
<td>12</td>
<td>F</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>T24*</td>
<td>23</td>
<td>F</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T25*</td>
<td>46</td>
<td>C</td>
<td>/</td>
<td>+</td>
</tr>
<tr>
<td>T26</td>
<td>46</td>
<td>C</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

+ = bone gain; – = bone resorption; / = no change.
N = number of teeth; R = reason for extraction: F = fracture; P = periodontitis; C = caries; E = endodontic pathology.
M-B = mesial-buccal; Mid-B = mid-buccal, D-B = distal-buccal.
*Sites from which the biopsies were harvested.
ing tooth extractions, no particles of the grafted materials could be identified in the alveolar sockets, and the new bone formed was mature and well structured.

We noted that the grafted sockets had healed with less bone resorption than the control sockets, especially at the mid-buccal portion, where the buccal plate of the socket was often found to be partially or completely destroyed by tooth pathology. One possible explanation for this is that in the T sites, the sponge served as a supporting element to prevent the collapse of the surrounding soft tissues in the fresh extraction sockets once the teeth were avulsed. However, in the interpretation of these results, it should be taken into consideration that buccal bone walls are much thinner and less corticalized in the upper compared to the lower jaw, so that the sockets in the lower jaw may have a higher potential to regenerate the missing wall. In our experiment, 35% of the sockets in the test group were located in the lower jaw compared to only 23% in the control group. On the other hand, the fracture of teeth, which was often the cause of loss of the buccal wall, was present in 70% of the T sockets and in 30% of the C sockets (Table 2), and 79% of the teeth fractures in the T sockets had involved maxillary teeth.

Lekovic et al. (1998), in a clinical study involving 16 patients, also reported a lesser vertical bone resorption in the sockets covered by a resorbable membrane made of glycolide and lactide polymer compared to the negative control sockets in the same patients (0.4 mm in the test sites, compared to 1.5 mm in the control sites). However, the use of the membrane technique may present some clinical disadvantages such as (1) difficulty in obtaining the complete coverage of the membrane, which may eventually be exposed to the oral environment and consequently be colonized by bacteria [Selvig et al. 1990; Simion et al. 1994a; Nowzari et al. 1995], and (2) the risk of collapse of the membrane in the socket if the membrane is not supported by filling graft materials [Simion et al. 1994b; Buser et al. 1998]. In our study, both in the T and C groups, the primary closure of the wound healing was intentionally not achieved. Signs of infections were not recorded. This may be due to the good supragingival plaque control exhibited by the patients and also shows that glycolide and lactide polymer were well tolerated by the gingival tissue. This finding is in agreement with Lekovic et al. (1998). Most grafting materials have been used as filling materials in fresh extraction sockets to avoid collapse of the membrane. Studies in humans using DFDBA [Becker et al. 1994; Brugnami et al. 1996; Froum et al. 2002], deproteinized natural bovine bone mineral [Bio-Oss®] [Dies et al. 1996; Becker et al. 1998; Artzi et al. 2000; Carmagnola et al. 2001] or bioactive glass [Froum et al. 2002] showed the presence of particles of the grafted material in the

Table 3. Histomorphometric analysis: percentage of the area occupied by mineralized bone (B), and graft material (G) for 10 biopsies from the test sockets (T) and three biopsies from the control sockets (C)

<table>
<thead>
<tr>
<th>Site</th>
<th>% B</th>
<th>% G</th>
<th>Site</th>
<th>% B</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>67</td>
<td>0</td>
<td>C1</td>
<td>56</td>
</tr>
<tr>
<td>T2</td>
<td>78</td>
<td>0</td>
<td>C2</td>
<td>37</td>
</tr>
<tr>
<td>T3</td>
<td>38</td>
<td>0</td>
<td>C3</td>
<td>38</td>
</tr>
<tr>
<td>T4</td>
<td>71</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>T5</td>
<td>77</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>43</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T7</td>
<td>73</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T8</td>
<td>72</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T9</td>
<td>78</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T10</td>
<td>70</td>
<td>0</td>
<td></td>
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</tbody>
</table>

Fig. 2. Photomicrographs illustrating a biopsy harvested from a test socket, 6 months following the application of the graft material. The bone is mature and compact. Magnification × 10.
sockets 6–9 months following their insertion. On the contrary, in our study, particles of the grafted material could not be identified by the histological analysis of the biopsies harvested 6 months following the extractions. This may be related to the fact that Fisiograft®, formed by 50–50 lactide–glycolide polymer, has the fastest degradation rate of the D–L lactide/glycolide materials, with the polymer degrading in about 50–60 days [Holland et al. 1986]. The bone that filled the sockets was similar to the surrounding bone and it was not possible to identify the previous socket wall. The histological analysis indicated that the new bone formed in the T sites was mature with signs of remodeling. The bone in the apical portion of the biopsies (corresponding to a depth of about 3 mm from the bone crest) was dense, with few marrow spaces. In the coronal part of the biopsies, the bone was also well structured, with no signs of ingrowth of tissues other than bone; the sponge may be functioning as a barrier to the ingrowth of surrounding tissue that could have impeded the process of bone regeneration.

At the C sites, the percentage of mineralized bone did not exceed 56% (Table 3) and did not differ in the coronal compared to the apical portion of the biopsy. However, due to the small number of control biopsies, comparisons with the T sites cannot be made.

At the re-entry surgery, however, we noted that in three of the 26 T sites, and in two of the 13 C sites, the density of the bone in the central part of the sockets was reduced. In all these five cases, the teeth that were extracted presented a history of repeated abscesses has to be optimized. No adverse reactions that could be related to the use of this synthetic material were reported. The quality of the bone formed seemed to be good for dental implant anchorage. However, the treatment of alveolar sockets with a history of repeated abscesses has to be optimized.

**Conclusion**

The results of this study indicate that alveolar bone resorption following tooth extraction may be prevented or reduced by the use of bioabsorbable synthetic sponge of polylactide–polyglycolide acid inserted into the tooth socket. The use of this material in the form of a sponge seemed to be of clinical advantage in sockets where the buccal bone is completely or partially lost as a consequence of dental pathology. No adverse reactions that could be related to the use of this synthetic material were reported. The quality of the bone formed seemed to be good for dental implant anchorage. However, the treatment of alveolar sockets with a history of repeated abscesses has to be optimized.

**Résumé**

Le placement de différents matériaux de greffe associés ou non à l’utilisation de membranes occlusives pour recouvrir les alvéoles d’avulsion sont des techniques qui ont pour but de préserver ou de réduire la résorption du rebord alvéolaire. L’utilisation de matériaux de greffe dans les alvéoles fraîches d’avulsion a cependant été examinée parce que des particules du matériel de greffe ont été trouvées dans ces alvéoles six à neuf mois après leur placement. Les buts de cette étude ont été (1) d’évaluer si la résorption du rebord alvéolaire suivant l’avulsion dentaire pouvait être éviter ou réduit par l’application d’une éponge bioabsorbable en acide polyglycolide-polylactide utilisée comme mainteneur d’espace, comparée à une guérison naturelle avec formation d’un caillot, (2) d’évaluer histologiquement la quantité et la qualité du tissu osseux formé dans les alvéoles six mois après l’utilisation du matériel bioabsorbable. Trente-six patients qui suivaient un traitement parodontal ont participé à cette étude. Tous les patients ont été soumis à une avulsion de une ou plusieurs dents defectueuses. Après l’avulsion, le rebord alvéolaire a été évalué par la distance entre trois marques [méso-vestibulaire, médiane et disto-vestibulaire] sur des gouttières individuelles préfabriquées, et le rebord alvéolaire. Vingt-six alvéoles d’extraction (tests) ont été remplis avec l’éponge bioabsorbable [Fissograft®], tandis que treize autres (contrôles) ont été guéris sans ajout d’aucun matériel. Les alvéoles ont été suturés sans fermeture complète du site chirurgical. La réentrée pour la chirurgie implantaire a été effectuée six mois...

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*Fig. 3. Photomicrographs illustrating the biopsy harvested from a control socket, 6 months following the extractions. The bone has wide marrow spaces. Magnification × 20.*
Zusammenfassung

Erhaltung des Kieferkammes nach Zahnextraktion mittels eines Schwammes aus Polyactic- und Poliglycolid als Platzhalter: eine klinische Studie am Menschen


Ziel: Die Ziele der Studie waren: (i) evaluieren, ob die Resorption des Alveolarkammes nach Zahnextraktion durch die Applikation eines bioabsorbierbaren Schwammes aus Polyactic- und Poliglycolid als Platzhalter im Vergleich zur natürlichen Heilung durch Bildung eines Biokautums verhindert wird, (ii) histologisch 6 Monate nach dem Einsatz des bioabsorbierbaren synthetischen Schwammes aus Polyactic-Polyglycolid wird gefunden. Die Qualität des gebildeten Knochens schien für die Platzierung von dentalen Implantaten optimal zu sein.

Resultate: Die klinischen Messungen nach 6 Monaten zeigten einen Verlust an Knochenhöhe an der mesio-bukalen Seite von 0,2 mm (1,4 SD) bei den Test- und 0,6 mm (1,1 SD) bei den Kontrollstellen. Histologisch zeigte sich ein Abbau von knöcherner Substanz an der Teststelle (1,1 mm) und an der Kontrollstelle (1,6 mm) mit einer geringeren Resorptionsrate als die Kontrollgruppe.

Schlussfolgerung: Die Resultate dieser Studie deuten darauf hin, dass die Resorption des Alveolarkammes durch die Applikation eines bioabsorbierbaren Schwammes aus Polyactic-Polyglycolid verhindert werden kann. Die klinische Studie wurde erfolgreich durchgeführt.

Resumen

Antecedentes: La colocación de diferentes materiales de injerto y/o el uso de membranas oclusivas para cubrir la entrada del alvéolo de extracción, son técnicas que intentan preservar/reducir la reabsorción de la cresta alveolar. El uso de materiales de injerto en alveólos frescos de extracción ha sido sin embargo cuestionado, ya que se han encontrado partículas del material injertado en los alvéolos de 6–9 meses tras su inserción.

Intención: Las intenciones del estudio fueron [i] evaluar si se podía prevenir o reducir la reabsorción de la cresta alveolar tras la extracción dentaria mediante la aplicación de una esponja biópsisible de poliactácido–poliglicolíaco usada como relleno de espacio, en comparación con la cicatrización natural por formación de coágulo; [ii] evaluar histológicamente la cantidad y calidad del hueso formado en los alvéolos, 6 meses tras el uso del material biópsisible.

Material y métodos: En este estudio participaron treinta y seis pacientes sometidos a tratamiento periodontal. Todos los pacientes estaban programados para extracción de uno o más dientes comprobados. Tras la elevación de un colgajo de grosor completo y la extracción de los dientes, se tomaron medidas para evaluar la distancia entre 3 puntos de referencia [mesio-vestibular, medio-vestibular, dis- to-vestibular] en tallos fabricados individualmente y la cresta alveolar. Se rellenaron veintiséis alvéolos [prueba] con una esponja de ácido polialactico-poliglicolíaco (Fisiograft®), mientras que 13 alvéolos [control] fueron permitidos cicatrizar sin material de relleno. Se llevó a cabo la reentrada a los 6 meses tras las extracciones. Se tomaron 13 biopsias (10 en lugares de prueba y 3 de control) de los lugares previstos para colocación de implantes.

Resultados: Las mediciones clínicas a los 6 meses, revelaron en el lugar mesio-vestibular una pérdida de altura ósea de 0,2 mm (1,4 SD) en las pruebas y de 0,6 mm (1,1 SD) en los controles; en la porción medio-vestibular se registró una ganancia de 1,3 mm (1,5 SD) en las pruebas, y una pérdida de 0,8 mm (1,6 SD) en los controles, en la porción distal se encontraron unas pérdidas de 0,1 mm (1,1 SD) en las pruebas y de 0,5 mm (1,5 SD) en los controles. Las biopsias recogidas de los lugares de prueba, revelaron que el hueso neoformado a los 6 meses estaba mineralizado, maduro y bien estructurado. No se pudieron identificar partículas del material de injerto en ninguna de las 10 biopsias. El hueso formado en los lugares de control estaba también maduro y bien estructurado.

Conclusión: Los resultados de este estudio indican que la reabsorción del hueso alveolar tras la extrac- ción dentaria puede ser prevenida o reducida por el uso de una esponja sintética biópsisible de ácido polialactico-poliglicolíaco. La calidad del hueso formado parece ser óptima para la inserción de implantes dentales.