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The use of a porcine-derived collagen matrix for vertical soft tissue augmentation. A case report

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SUMMARY

Soft tissue augmentation is a well-established procedure employed in a diverse range of applications such as soft tissue thickening, keratinized tissue augmentation, improvement of the esthetics of existing dental implants and teeth, and crestal bone preservation around implants.

This case report describes a technique for the augmentation of vertically thin soft tissue in the lower jaw posterior area. At the time of the implant placement, after measuring the soft tissue thickness, soft tissues were augmented with a porcine accellular dermal matrix (Mucoderm, Botiss Biomaterials, Germany). After 2 months, during the second stage surgery, the implant was exposed and the soft tissue thickness was measured.

Key words: porcine-derived collagen matrix, xenogenic membrane, tissue thickening.

INTRODUCTION

Mucosal thickness has been shown to be an important factor in the etiology of early crestal bone loss around dental implants (1-4). Clinical studies have demonstrated that a mucosal thickness of 2 mm or less can increase the risk of crestal bone loss within the first year after implantation. Thus, in the case of thin biotypes, it is recommended to perform a thickening of the soft tissues by applying a connective tissue graft (CTG) extracted from the palate. CTGs show an excellent outcome and have been considered the standard grafting material for a long time (5). However, harvesting the graft from the palate results in a longer healing time and increases patient's morbidity (6). In addition, patients may suffer pain and numbness for several weeks after the surgery. In some cases, anatomical issues may limit the quality/quantity of the harvested grafts (6, 7). These issues have induced researchers to explore alternative grafting techniques with allogenic or xenogeneic materials; several studies indicate the positive outcome ensured by these materials (4,8). The aim of this article is to present a concept of simultaneous implant placement and vertical soft tissue augmentation using a porcine-derived collagen matrix.

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CASE REPORT

Initial situation

A 44-year old patient with a missing tooth 4.6 came to the clinic and asked for a restoration with an implant-borne crown. She demonstrated good oral and systemic health; no significant health problems that might influence the treatment were noted. Intraorally, the tooth gap in region 4.6 was noted. The alveolar ridge was slightly flattened and a width of the fixed, keratinized mucosa of approximately 6 mm was observed. The treatment plan included the placement of an implant and, if necessary, the simultaneous thickening of the peri-implant mucosa.

Surgical procedure

One hour prior to the surgery, the patient received a prophylactic dose of 1 g amoxicillin (Ospamox; Biochemie, Kiel, Germany) and continued to take 0.5 g of antibiotics three times daily for 1 week after the intervention. Surgery was performed under local anesthesia of 4% articaine 4 ml solution with adrenaline (Ubistesin, 3M ESPE, Seefeld, Germany). An incision with scalpel No. 15 in the center of the edentulous ridge was performed, leaving a width of at least 2 mm of keratinized tissues buccally. Next, a full-thickness buccal flap was raised, and the vertical thickness of the soft tissues was measured with a

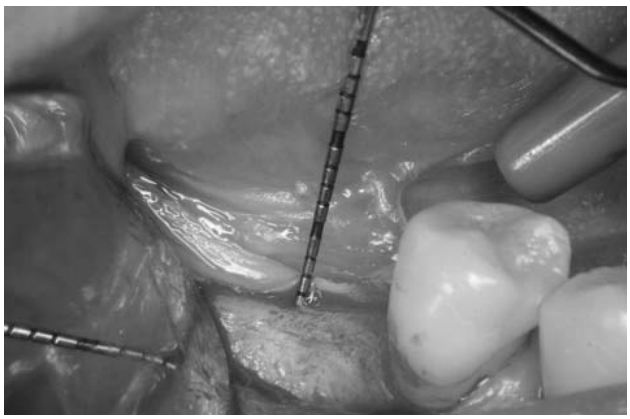

Fig 1. Measurement of vertical soft tissue thickenss

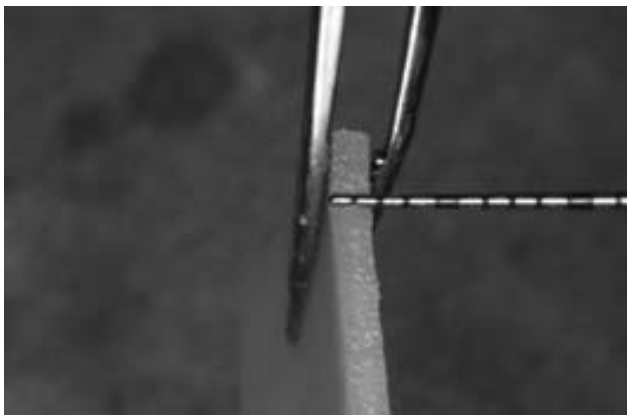

Fig 2. Mucoderm membrane

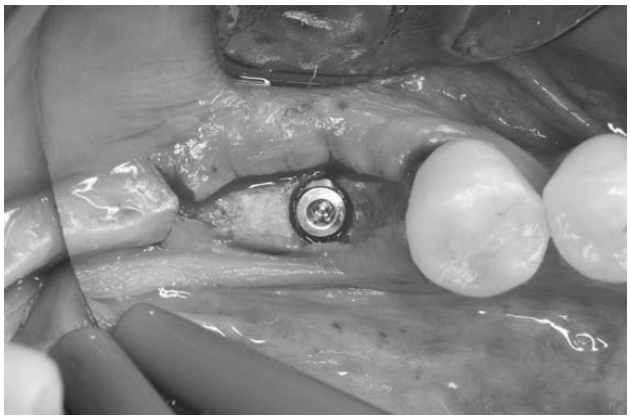

Fig 3. Before vertical soft tissue augmentation

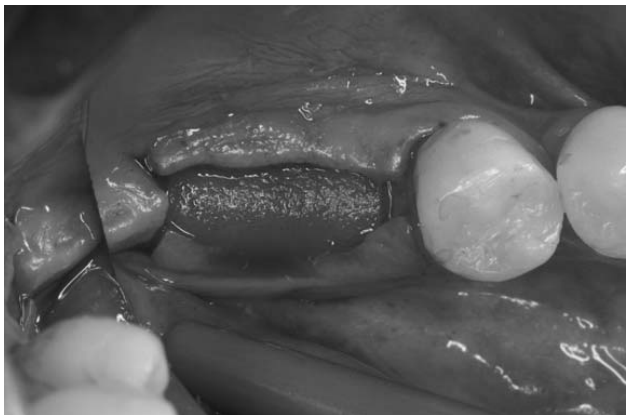

Fig 4. Mucoderm membrane positioned above the impalnt

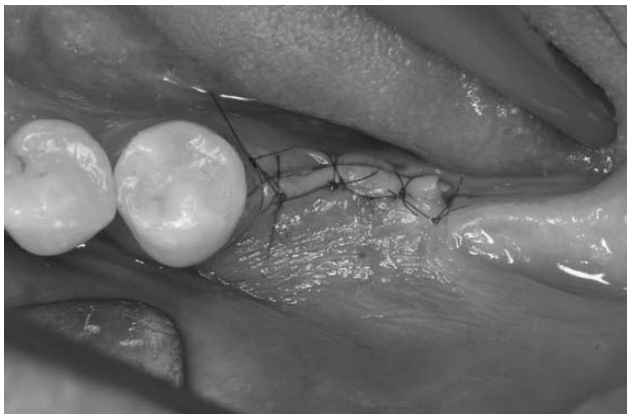

Fig 5. After suturing

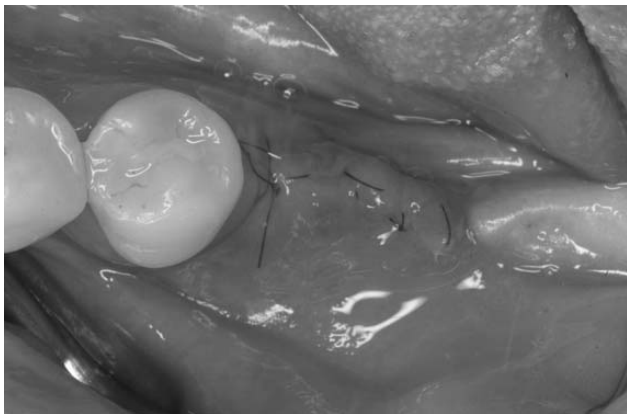

Fig 6. 1 week post surgery

1.0-mm marked periodontal probe (UNC; Hu-Friedy, Chicago, IL, USA The vertical soft tissue thickness was 2 mm; the soft tissues were considered to be thin (Fig. 1). Then, a full-thickness lingual flap was raised to completely expose the implantation site. A bone-level implant (Medentika, Hügelsheim, Germany) of 4.0 mm in diameter was placed equally with bone crest according to manufacturer's recommendations. A porcine-derived collagen matrix (mucoderm, Botiss Biomaterials, Germany) was used for vertical soft tissue augmentation.

The membrane was shaped to fit the implantation site and positioned over the alveolar ridge. (Fig. 2-4). Coronal periosteal-releasing incisions were made; flaps were approximated and sutured without tension with 6/0 sutures (Assucryl; Assut Medical Sarl, Lausanne, Switzerland). Primary wound closure was achieved (Fig. 5). The patient was instructed to rinse the operated site for 1 minute with 0.12% chlorhexidine digluconate solution (PerioAid; Dentaid, Barcelona, Spain) twice a day for 4 weeks. The patient was asked to refrain from chewing or brushing the surgical area for 4 weeks after surgery. The sutures were removed 10 days after surgery (Fig. 6). Examinations were made every 2 weeks for 2 months. After 2 months of

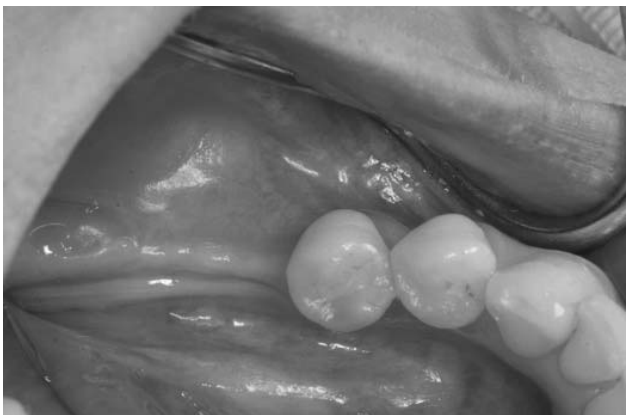

Fig 7. 2 months post surgery

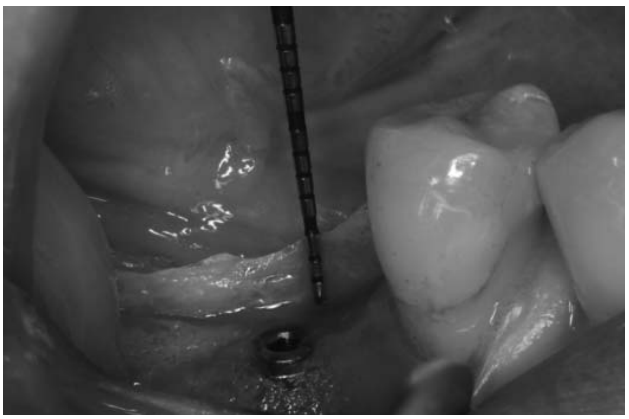

Fig 8. Measurement of soft tissue vertical thickness

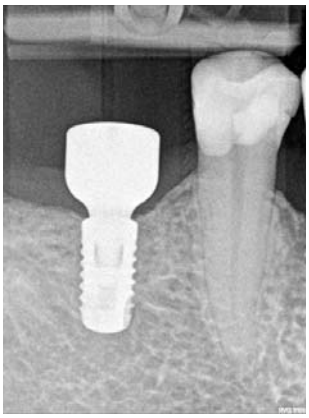

Fig 9. X-ray after placement of healing abutment

healing, a final clinical examination was (Fig. 7).. There were no signs of inflammation, and the operated site had a similar appearance to the healthy surrounding soft tissues; the patient was scheduled for a second stage surgery. After the infiltration of local anesthetic 4% articaine 4 ml solution with adrenaline (Ubistesin; 3M ESPE), an incision was made in the center of the bone crest. A full-thickness buccal flap was raised, and the thickness of augmented soft tissues over the center of the implant was measured with a periodontal probe (Fig. 8). Then lingual flap was raised to completely expose the implant, and cover screw was removed. The healing abutment screw was covered with 0.12% chlorhexidine digluconate gel (Perio-Aid Gel; Dentaid) and connected to the implant (Fig. 9). The excess of gel was carefully washed off with sterile solution. Flaps were approximated and sutured with single interrupted 6/0 sutures without tension (Assucryl; Assut Medical Sarl). The patient was advised to minimize trauma to the site. The sutures were removed 7 days after surgery.

DISCUSSION

The results of this case report demonstrated that thin soft tissues can be successfully augmented vertically with a porcine collagen membrane. The simultaneous use of xenograft and implant placement in a two-stage procedure resulted in an increase in peri-implant soft tissue height, measured during the connection of the healing abutment. This procedure ensured an increase in the soft tissue thickness from 1.5 mm to 3.0 mm. In a previous study (9), Wiesner et al. have used connective tissue grafts from palate for augmentation, reporting an increase in the soft tissue thickness of 1.2 mm. Puisys et al. (4) have investigated a vertical soft tissue augmentation with an accellular dermal matrix of human origin, observing an increase in the vertical thickness of 2.21 mm. It is typically recommended to place connective tissue grafts on top of the periosteum, to ensure a sufficient blood supply. To achieve this, the harvesting is usually carried out in a separate procedure. In this case report, the porcine collagen matrix was placed directly onto the bone at the time of implant placement. Therefore, implant placement and thickening of the soft tissue could be performed simultaneously and without the need for preparation of a split-thickness flap. Moreover, application of the porcine collagen matrix renders unnecessary the tissue harvesting from the palate. Thus, the surgical procedure will be less invasive and for the patient less painful and with a lower risk for complications. Mucoderm® matrix is produced from porcine dermis in a multi-stage wet-chemical process. Preclinical as well as first clinical studies already indicated that the matrix could be a valid alternative for autologous connective tissue transplants or free gingival grafts (10-12).

Thus, the results described in this case report clearly show that the use of a porcine derived collagen membrane can simplify and render less invasive the soft tissue thickening procedure.

CONCLUSION

This case report shows that a porcine-derived collagen matrix can be successfully used for vertical soft tissue augmentation. Well-designed clinical trials with an adequate number of patients are necessary to prove the efficacy of this material.

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