Reattachment of Connective Tissue Fibers to a Laser-Microgrooved Abutment Surface

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This report presents human evidence of reattachment of the connective tissue when a laser-microgrooved healing abutment was replaced with a laser-microgrooved cylindric definitive abutment. No additional bone loss was noted 15 weeks after placement of the laser-microgrooved cylindric definitive abutment. Dense connective tissue was in intimate contact with the laser-microgrooved surface to the point of the soft tissue separation, and clear evidence of the junctional epithelium ending at the coronal-most position of the laser-microgrooved zone was identified. (Int J Periodontics Restorative Dent 2012;32:e131–e134.)

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Soft tissue alteration as well as crestal bone resorption may occur at healing or definitive abutment connection for a two-stage dental implant system.[1–3] This has been challenged by the clinical observation of the bone-preserving effects of laser-microgrooved channel implants and abutments demonstrated in both preclinical and clinical studies.[4–8] A laser-created microchannel surface has the ability to reduce or eliminate crestal bone loss by promoting physical attachment of the connective tissue fiber and has the potential for significant esthetic and clinical benefits.

A recent study confirmed previous preclinical results of physical connective tissue attachment to the laser-microgrooved healing abutments, preventing the apical migration of the junctional epithelium and thus protecting the underlying crestal bone from premature resorption.[8] Therefore, the question can be raised of whether this physical soft tissue attachment can be reestablished when the laser-microgrooved healing abutment is replaced by the laser-microgrooved

Fig 1a (left) *Healing abutment with a 0.7-mm Laser-Lok microgrooved zone.*

Fig 1b (right) *Cylindric two-piece definitive abutment with a 0.7-mm Laser-Lok microgrooved zone.*

definitive abutment (Figs 1a and 1b).

This case report examined the feasibility of laser-microgrooved abutments in inducing reattachment of the peri-implant soft tissue after an abutment has been replaced.

Method and materials

A healthy male patient who previously participated in an implant retrieval study requiring removal of a single nonstrategic implant and the reconstruction of the biopsy site with bone graft[8] agreed to participate in this case. He signed an informed consent form based on the Helsinki Declaration of 1975, as revised in 2000. This patient received multiple dental implants and restorations at no cost.

This patient received multiple Resorbable Blast Textured Tapered Internal Implants with a 0.3-mm machined collar (BioHorizons) placed level to the osseous crest. Healing abutments with 0.7-mm laser-ablated microchannels at the implant-abutment junction were then connected to the implants (Fig 1a). At 10 weeks, three laser-microgrooved healing abutments were removed and replaced by laser-microgrooved cylindric definitive abutments (Figs 1b and 2). A healing period of an additional 15 weeks was allowed before a single soft tissue/definitive abutment assembly was removed using a gingivectomy procedure (Figs 3a and 3b). The specimen was placed immediately in fixative for histologic preparation and evaluation, and the patient received a conventional definitive abutment. Specimen preparation and anlaysis were reported previously.[8]

Results

Clinical and radiographic findings

The healing abutments demonstrated no signs of clinical inflammation at the 10-week postoperative visit. All implants were clinically stable, and radiographic examination suggested clinical integration at all sites. At that time, the healing abutments were replaced by definitive cylindric abutments with 0.7-mm laser-ablated microchannels. The soft tissue surrounding the laser-microgrooved cylindric definitive abutment was healthy at 15 weeks. Radiographic observations revealed the maintenance of the crestal bone level around all implants at all times (Figs 4 to 6).

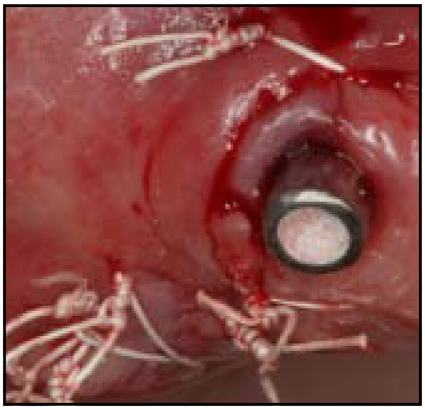
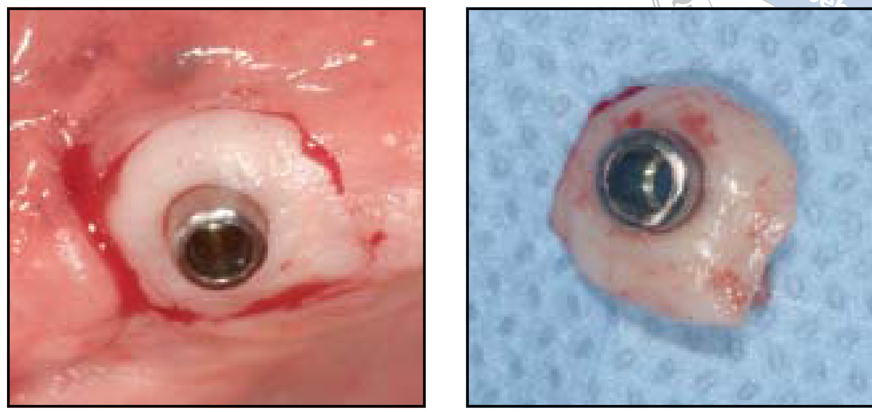
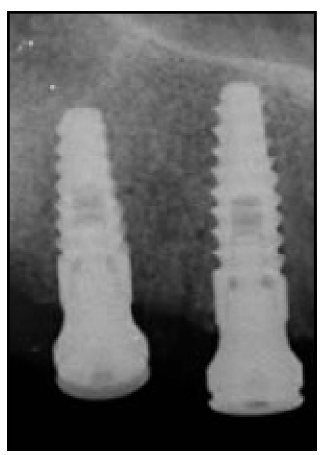
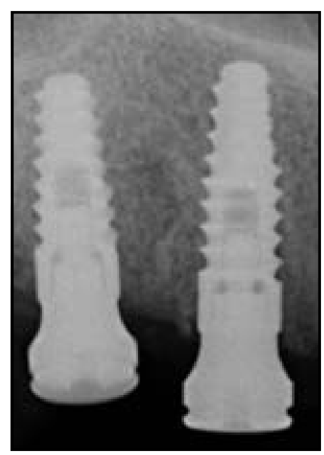


Fig 2 *Laser-microgrooved healing abutment replaced with a laser-microgrooved cylindric definitive abutment.*



Figs 3a (left) and 3b (right) *A gingivectomy procedure was performed to remove the peri-implant soft tissue cuff/abutment assembly.*





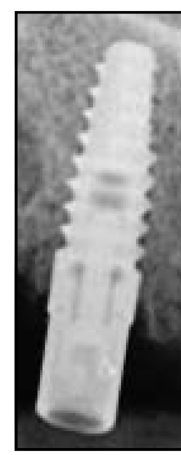


Fig 4 (left) *Radiograph taken the day of implant and healing abutment insertion.*

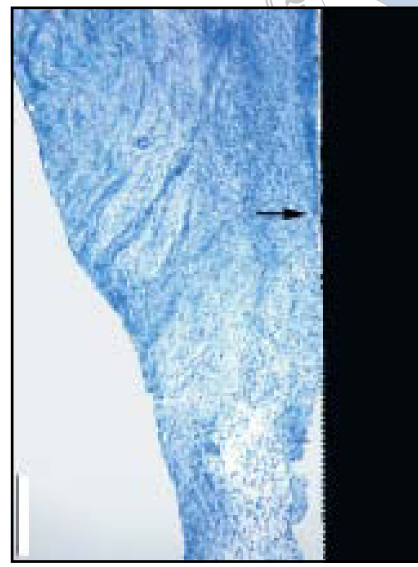
Fig 5 (center) *Ten weeks after implant/abutment placement.*

Fig 6 (right) *Fifteen weeks after the abutment-swapping procedure. Note the maintenance of the crestal bone level around the implant platform.*

Histologic findings

The retrieved specimen demonstrated normal peri-abutment soft tissues without evidence of inflammatory cell infiltrate (Fig 7a). Polarized light imagery of mesial and distal surfaces revealed dense connective tissue fibers attaching directly to the laser-microgrooved abutment surfaces (Fig 7b). It was difficult to perform histologic analysis because of the fragility of the small specimen, where some connective tissue had been displaced. However, dense connective tissue was in intimate contact with the laser-microgrooved surface to the point of the soft tissue separation, and clear evidence of the junctional epithelium ending at the coronal-most position of the laser-microgrooved zone was identified (Fig 7b).

Figs 7a (left) **and 7b** (right) *The retrieved specimen demonstrated normal peri-abutment soft tissues, without evidence of inflammatory cell infiltrate. Polarized light imagery of the mesial and distal surfaces revealed dense connective tissue fibers attaching directly to the laser-microgrooved abutment surfaces. Arrow = apical end of the junctional epithelium.*



Discussion

This report presents human evidence of reattachment of the connective tissue when a laser-microgrooved healing abutment has been replaced with a laser-microgrooved cylindric definitive abutment. No additional bone loss was noted 15 weeks after placement of the laser-microgrooved cylindric definitive abutment. This finding adds support to the use of a laser-microgrooved healing and/or definitive abutment when multiple-abutment engagement is required. Follow-up studies with more subject enrollment are required to confirm these findings.

Acknowledgment

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