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Treatment of peri-implant soft tissue deficiency around a narrow diameter implant with subepithelial connective tissue graft: A case report

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Treatment of Peri-implant Soft-tissue Deficiency around a Narrow Diameter Implant with Subepithelial Connective-tissue Graft

A Case Report

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ABSTRACT

Narrow diameter implants and mini-implants are preferred by dentists for restoration of missing teeth on narrow ridges. However, such implants are associated with long-term complications, including soft-tissue deficiencies. This case report describes a novel approach using a connective-tissue graft to resolve peri-implant mucositis. A 66-year-old male patient presented with inflammation and abscess in relation to a mini-implant at the upper left incisor on the facial aspect. Deficiencies of keratinized tissue and width of attached gingiva were observed. Surgical management was performed using subepithelial connective tissue. An 18-month follow-up showed increased width of attached gingiva at the surgical site.

Narrow-diameter implants with diameters of less than 3 mm have been a popular treatment modality.[1] Currently, strong, long-term data on survival of narrow diameter implants is lacking.[2] Connective-tissue grafts for esthetic improvement around both teeth and peri-implant tissue are widely known.[3-5] However, using this technique for the direct treatment of pathologic reaction around narrow-diameter implants has never been reported. The purpose of this case report is to show that the inflammation associated with a mini-implant can be effectively managed with an autogeneous connective-tissue graft without removing the implant.

Case Report

Clinical Presentation

A 66-year-old retired Caucasian male patient was referred to the Department of Periodontics, School of Dental Medicine, University at Buffalo, for evaluation of #7 implant. Patient was a nonsmoker, and his medical history was significant for Type II diabetes, hypertension, bilateral orthopedic knee joint replacement, kidney stone removal surgery and bowel section surgery, due to blockage in the colon. The patient's BMI was 29.8. The patient's list of medications is presented in Table 1.

The patient's previous history revealed that in 2015, #7 had a horizontal fracture and was extracted (Figures 1a, 1b). However, the patient decided to get a narrow diameter implant from a private practice; the implant was in service for three years. An X-ray revealed that there was slight bone loss extending to the first thread of the implant, along with poor crown gingival contour (Figures 1c, 1d). Periodontal examination revealed generalized

plaque deposition; most of the teeth exhibited 2 mm to 3 mm probing depth (PD), with mild bleeding on probing (BOP), with the exception of PD 4 mm and heavy BOP at mesial and distal of labial #7 implant.

Underneath the saddle type of the implant crown, heavy plaque accumulation was noted, along with redness, slight swelling and suppuration. Soft-tissue dehiscence and draining abscess in the mid-facial aspect were observed, creating an esthetic problem. The width of the keratinized tissue was observed to be 1 mm to 2 mm. However, the peri-implant inflammation extended to the mucogingival junction, indicating a lack of attached gingiva. This information was pertinent for a diagnosis of peri-implant mucositis and soft-tissue deficiency according to the 2018 classification by the American Academy of Periodontology.[6,7]

The patient was given the option of replacing the implant and restoration but he declined. Initial therapy included oral hygiene instruction and scaling and root planing. At re-evaluation after four weeks, suppuration and inflammation had resolved mildly, but persistent dehiscence was noticed. Hence, surgical treatment using subepithelial connective-tissue (CT) grafting was considered.

Case Management

Local anesthesia was administered using infiltration (Figure 2a). Sulcular incision below the crown margin was made from mesial of #6 to distal of #8, labial side only (Figure 2b). A full-thickness labial flap was reflected using a periosteal elevator (Figure 2c). Granulation tissue was removed using surgical curettes. An exposed implant thread was seen after thorough debridement and saline irrigation, and bone loss was rather horizontal, with no possibility for regenerative procedure (Figure 2d).

A 7 mm x 10 mm connective-tissue graft with thickness of 3 mm was harvested, using the patient's palate as a donor site (Figure 2e). The donor site was closed with resorbable sutures *(Vicryl, Ethicon Inc., Somerville, NJ)* and hemostasis was achieved. The graft was de-epithelialized and adipose tissue was removed. The graft was wrapped around a mini-implant and secured to the labial flap with suture *(Polypropylene Surgical Sutures, Unify, Denver, CO)* using two simple interrupted sutures (Figure 2f). The flap was coronally advanced using resorbable sutures *(Vicryl, Ethicon Inc., Somerville, NJ)* (Figure 2g). The patient was instructed to take a non-steroidal anti-inflammatory drug *(ibuprofen, USP, 600 mg, Dr. Reddy's Laboratories LA LLC, Shreveport, LA)* for three days. He was advised not to brush or floss at the surgical site for six weeks.

Clinical Outcomes

After one week, postoperative evaluation was performed. It was observed that the connective-tissue graft was exposed facially and appeared necrotic (Figure 3a). However, in three weeks, the pa-

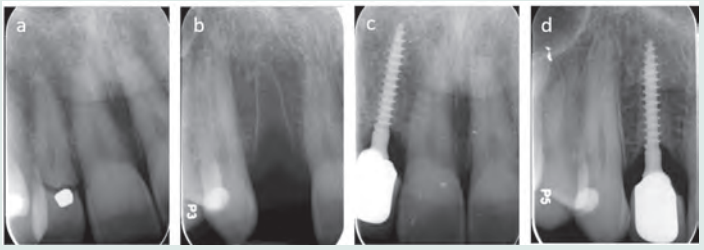

Figure 1. Preoperative radiographic analysis. 1a: Horizontal crown fracture of #7 was identified. 1b: Dental extraction was done. 1c & 1d: Three years later, patient appeared with narrow-diameter implant on previously extracted site.

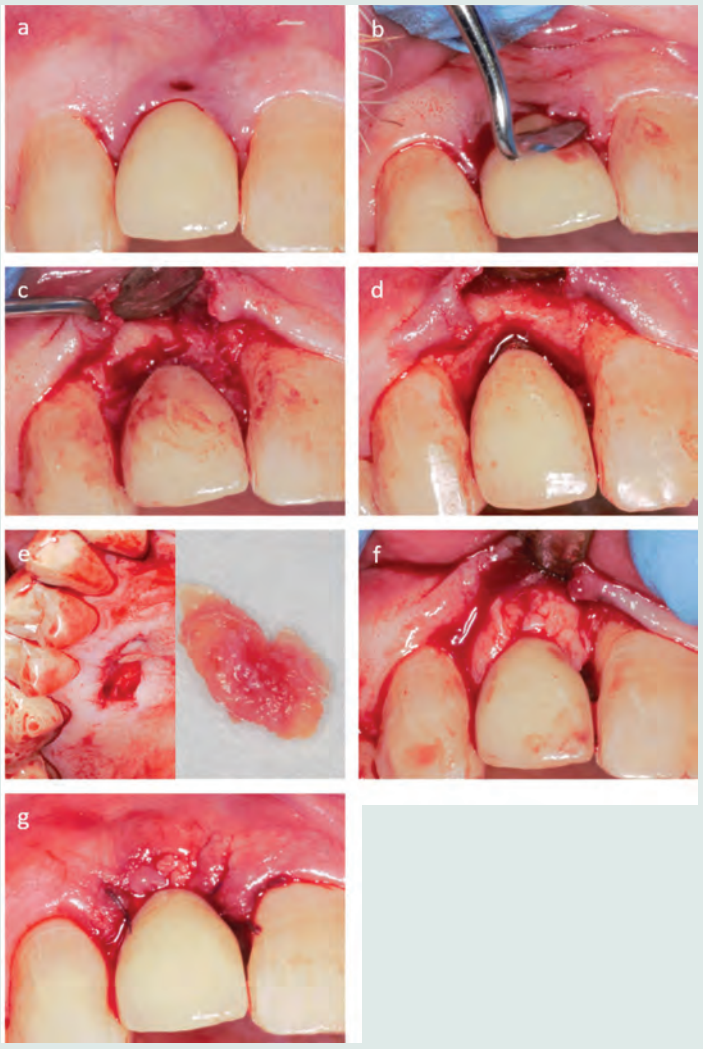

Figure 2. Surgical procedure. 2a: Patient appeared with fistula tract and inflammation around #7 peri-implant gingiva. 2b: Using #15c blade and Orban interdental knife, intrasulcular incision was done. 2c: Full thickness flap was reflected, exposing granulation tissue underneath implant crown. 2d: After curettage with Gracey curette, implant thread was exposed. 2e: Connective tissue from palate was harvested, 7 mm x 10 mm in size. 2f: Connective tissue covered entire implant to augment lost volume of tissue. 2g: After graft was secured to labial tissue with simple interrupted suture, coronal sling suture was done.

tient showed almost complete healing, with a slight defect in the mesial papilla of #7 (Figure 3b). Sutures were removed and oral hygiene instructions were reinforced.

At six weeks after surgery, slight inflammation was observed in the peri-implant tissue at the implant crown margin (Figure 3c). Following initial evaluation, the patient was placed on a supervised six-month recall schedule with a hygienist. At six months, complete healing was observed, with a slight defect on mesial papilla (Figure 3d). The patient was instructed to brush using a periodontal proxabrush.

After 11 months, gradual filling of the mesial defect of the papilla was observed at the site (Figure 3e). After 18 months, the regained volume of tissue on the labial side of #7 implant was almost close to the original dimension (Figures 3f, 3g). The tissue not only looked healthy, but the increase in keratinized tissue and width of the attached gingiva were obvious, indicating a successful outcome. In addition, the patient's palatal tissue also healed completely (Figure 3h). The patient was using floss and a small-size interproximal brush to clean underneath the implant crown, and reinforced oral hygiene instruction was given.

Figure 3. Postoperative wound healing. 3a: One week postop. 3b: Three weeks postop. 3c: Six weeks postop. 3d: Five months postop; defect on mesial papilla is seen. 3e: 11 months postop; gradual filling of mesial papilla. 3f & 3g: 17 months postop; mesial papilla defect was almost filled and palatal tissue looked healthy. 3h: Healing of palatal donor site after 3 weeks (left) and 17 months (right).

Discussion and Conclusions

There are many proposed factors for initiation of peri-implant mucositis and peri-implantitis, such as a patient's systemic condition and habits, including obesity, diabetes and smoking.[8-10] The effect of lack of keratinized gingiva around dental implants on peri-implant inflammation is a controversial topic.[11-13] Narrow-diameter implants can be exposed to more stress due to lower fracture resistance.[14] Another disadvantage could be the over-contouring of the implant crown, making the abrupt volume transition from alveolar crest to crown margin of the gingival area, which opposes the favorable biologic tissue contour. This may lead to plaque accumulation, resulting in abscess and chronic inflammation.

In this report, the patient had poor oral hygiene and plaque accumulation. The retention of plaque underneath the saddle-type crown, which was fabricated for esthetic purpose, eventually led to inflammation of the peri-implant tissues and abscess formation. There is strong evidence that poor plaque-control skills are related to initiation of peri-implant mucositis and peri-implantitis.[15]

TABLE 1.
Preexisting Medical Conditions of Patient and List of Medications

Drug Name	Dose	Medical Condition
Atenolol	50 mg	Hypertension
Atorvastatin	10 mg	Hypercholesterolemia
Glimepiride	1 mg	Diabetes Type II
Metformin	1000 mg	Diabetes Type II
Venlafaxine	150 mg	Depression
Omeprazole	20 mg	Gastritis
Ropinirole	0.25 mg	Parkinson's Disease
Quetiapine	25 mg	Mood Disorder
Valium	2 mg	Anxiety
Lamotrigine	200 mg	Epilepsy

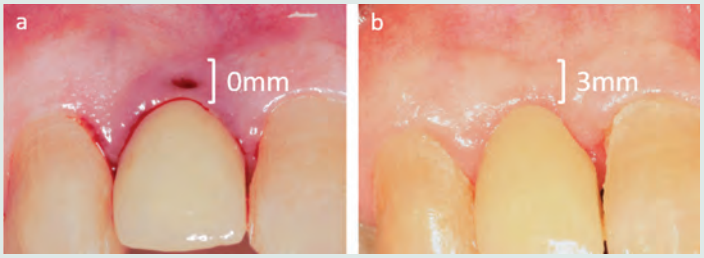

Figure 4. Preoperative and postoperative comparison of treatment site. 4a: baseline 4b: 17 months later, patient gained 3 mm of attached gingiva.

A connective-tissue graft around peri-implant lesions is a well-evidenced approach.[16-18] The placement of connective tissue around an implant is usually utilized for esthetic and functional purposes and is not considered a main intervention method to resolve inflammation. This case report shows that simultaneous resolution of inflammation, in association with the connective-tissue graft, allows treatment of peri-implant inflammation confined to narrow-diameter implant.

The authors declare they have no conflicts of interest and that no author received any monetary compensation for this manuscript. Queries about this article can be sent to Dr. Maddi at maddi@musc.edu.

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