Connective tissue graft to correct peri-implant soft tissue margin: A clinical report

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This clinical report describes the use of a subepithelial connective tissue graft to recontour a soft tissue margin discrepancy for a single-implant crown in the anterior maxilla. This procedure demonstrates that the use of soft tissue grafts to correct an esthetic deficiency may be a feasible approach to establish new and stable peri-implant soft tissue contours. The patient presented was followed for 18 months.

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Long-term success of dental implants in both edentulous and partially edentulous patients has been demonstrated in the literature.1 Esthetic restoration of missing anterior teeth with dental implants may be complicated. Excessive alveolar ridge loss after tooth extraction and difficulty with soft tissue manipulation may aggravate the problem.2 The increased esthetic and functional demands require peri-implant soft tissue contours that are in harmony with the adjacent dentition, including the presence of intact papillae3 and the appropriate location of the peri-implant mucosa margin on the labial aspect of an implant-supported restoration.

In spite of the surgical techniques that have been developed, the regeneration of the peri-implant soft tissue is difficult.4 The treatment plan often includes both hard and soft tissue ridge augmentation procedures. In situations in which soft tissue deficiencies are the result of severe implant misalignment, the treatment of choice may be the removal of the dental implant. However, this may not be accepted by the patient.

This clinical report describes the correction of an esthetic problem with a single-tooth implant-supported restoration using a subepithelial connective tissue graft combined with the re-establishment of a new abutment margin and crown emergence profile. An 18-month follow-up is included.

CLINICAL REPORT

A 37-year-old woman presented for a periodontal and prosthodontic evaluation of a single implant-supported crown in the location of the maxillary right central incisor. The patient related that the tooth had been restored 10 years ago. After the root fractured due to an inadequate post design, a dental implant combined with an autogenous bone graft was placed by an oral surgeon immediately after the extraction of the tooth.

At the initial clinical and radiographic examination, it was noted that the soft tissue margin labial to the implant restoration was considerably more apically located than the gingival margin on the adjacent natural tooth (Fig. 1). An acceptable position and contour of both papillae had been achieved. The occlusal relationship was an Angle Class I. The adjacent dentition showed no evidence of periodontal breakdown, and the patient’s compliance with oral hygiene was good. Radiographically, the apicocoronal position of the implant shoulder was located 5.0 mm apical to the cemento-enamel junction (CEJ) of the adjacent incisor (Fig. 2). This was later confirmed on a diagnostic cast that was made from an implant-level impression. A 15-degree labial implant inclination of the implant was also noted. The abutment margin was positioned 4.0 mm apical to the CEJ of the adjacent central incisor (Fig. 3).

Before the surgical procedure described below, a new angled abutment with a hexagonal base (Conexão Implants, São Paulo, Brazil) was selected5 to minimize the
influence of the abutment margin on soft tissue healing after the surgery (Fig. 4).

**Surgical procedure**

After the abutment replacement, the surgical area was anesthetized (Mepivacaine HCl 2%—DFL; Industria e Comércio, Rio de Janeiro, Brazil) using local infiltration. A combined full and partial-thickness flap with 2 vertical incisions made in a trapezoidal arrangement was elevated and epithelial tissues at the mesial and distal papillae were removed. The recipient surgical site was left undisturbed. Donor connective tissue was obtained from the palate using the technique described by Bruno.6 The epithelial band was removed from the graft and only the connective tissue was used. The graft was immediately placed onto the polished abutment surface and the prepared recipient tissue bed and stabilized with 2 inter-proximal and 1 apical resorbable 4-0 suture (Vicryl; Ethicon Inc, Somerville, NJ) (Fig. 5). The flap was then coronally repositioned, fully covering the graft, and sutured with interrupted sutures (Seda 4.0; Ethicon Inc), taking care to avoid excessive tension. An interim prosthesis made of autopolymerizing acrylic resin (Biotone; Dentsply International, York, Pa) was fabricated7 and placed with minimum contact to the peri-

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Fig. 2. Radiographic view of implant shoulder and prepared abutment/crown shoulder in relation to CEJ of adjacent central incisor.

Fig. 3. Localization of crown margin 4.0 mm apical to CEJ of adjacent teeth.

Fig. 4. Placement of new abutment to minimize influence of abutment margin on soft tissue healing.

Fig. 5. Fixation of subepithelial connective tissue graft in recipient site.
implant soft tissue margin. A postoperative antibiotic regimen (amoxicillin, 500 mg, every 8 hours for 7 days) was prescribed.

**Restorative procedures**

Six weeks after the surgery, an implant-level impression using a screw-retained transfer coping to implants with hexagonal base (Conexa Implants) was made and the resulting definitive cast was used for abutment selection and crown design. A second interim prosthesis (Biotone; Dentsply International) was prepared on the definitive cast to develop a new emergence profile for the definitive restoration. This interim prosthesis was highly polished so that it would not jeopardize the health of the peri-implant soft tissue.

The second interim prosthesis was left in place until the definitive restoration was complete. Twelve weeks after the surgery, the definitive impression was made using an individual resin coping (DuraLay; Reliance Dental Mfg Co, Worth, Ill) and polyether impression material (Impregum Penta; 3M ESPE America, Inc, St. Paul, Minn).

An angled abutment with a hexagonal base (17-degree angled abutment, model 14.018; Neodent Implants, Curitiba, PR, Brazil) was fixed to the external hex of the implant replica in the definitive cast. As the longitudinal axis of the implant had a slight buccal inclination, a prosthetic design using a cemented crown over a modified abutment was selected (Fig. 6). The final shape of the abutment was designed according to the longitudinal axis of the implant and guided by the surfaces of the adjacent teeth. The abutment shoulder was prepared approximately 2.0 mm below the gingival level, following the contour of the gingival margin. A metal-ceramic restoration was then fabricated as the definitive restoration. Four months after the surgical soft tissue correction, the abutment was placed with a screw-tightening torque of 32 Ncm as recommended by the manufacturer. A thin layer of condensed white gutta-percha (Dentsply International) was used to isolate the screw. The remaining access opening was filled with composite (SDI, Inc, Bensenville, Ill). After occlusal and proximal adjustments, the definitive crown was luted with a provisional cement (TempBond Clear; Kerr Corp, Orange, Calif) so that it could be removed if additional...
changes were necessary. After 2 weeks, the definitive restoration was cemented with zinc phosphate cement (Cimento de Zinco; SS White Artigos Dentários, Rio de Janeiro, Brazil). At the 18-month recall appointment, the adjacent peri-implant soft tissues were stable and the patient was pleased with the esthetic results (Fig. 7). The peri-implant mucosa margin was 3.0 mm more coronal and at the same level of the adjacent central incisor. There was no erythema or bleeding upon probing. The radiographic assessment showed no sign of bone loss around the dental implant threads during the period of prosthetic loading (Fig. 8).

**DISCUSSION**

Similar to gingival recession in the natural dentition, the described subepithelial connective tissue graft associated with coronal repositioning of the peri-implant mucosa permitted the development of improved soft tissue contours and crown emergence profile. The peri-implant soft tissue margin was re-established, leading to a significant esthetic improvement. The other important factor evaluated in this clinical report was the repositioning of the abutment shoulder by selecting a new abutment. Placing the abutment-restoration junction closer to the CEJ of the adjacent teeth maintained the marginal integrity of the definitive restoration.

Although the technique described in this clinical report demonstrates a successful peri-implant soft tissue reconstruction with a stable esthetic result over 18 months, it cannot be considered a usual procedure. The position of the dental implant shoulder in relation to the CEJ, the amount of keratinized tissue, and the dental implant inclination in the buccolingual axis may alter both the surgical technique and clinical outcomes.

On radiographic examination, there was little or no change in the crestal bone levels adjacent to the dental implant and bordering teeth. The presence of intact bone levels on the teeth adjacent to dental implants is critical for the maintenance or recreation of intact papilla height, which helped to considerably change the unfavorable situation described in this clinical report.\(^8,9\)

Additionally, this report also demonstrates the risk related to immediate dental implant placement after tooth extraction. In spite of the fact that a number of reports advocate the immediate implant placement after extraction as a treatment of choice and attest a good long-term prognosis,\(^10-12\) the clinical esthetic results may be unsatisfactory. First, not only may there be an absence of sufficient soft tissue for primary closure but also an inadequate quantity and quality of soft tissue may make it difficult to establish an esthetic emergence profile with long-term stable soft tissues. Second, the unfavorable pattern and amount of bone resorption after extraction and implant placement may make it difficult to create an esthetic result in the anterior region.

In conclusion, this clinical report suggests that a connective tissue grafting procedure combined with restorative modifications may be a feasible approach to correct unfavorable peri-implant soft tissue levels provided that adequate bone support exists. However, further studies are needed to better understand the indications and limitations of this technique.

**SUMMARY**

The use of a subepithelial connective tissue graft to restore the labial margin discrepancy of a single-implant-supported crown in the anterior maxilla was described. The procedure was successful and demonstrated esthetic improvement and stability of peri-implant soft tissues over a follow-up period of 18 months.

**REFERENCES**


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