

Transsurgical periodontal approach with absolute isolation of the surgical field: a case report

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ABSTRACT

Maintaining an aseptic surgical field is essential requirement for appropriate endodontic and restorative procedures. This report describes two cases requiring subgingival restorations in which a minimally invasive transsurgical periodontal approach was performed to achieve absolute isolation of the operative field. These cases illustrate that the cervical areas of severely compromised teeth often require a multidisciplinary approach for timely clinical and operative management. The trans-surgical periodontal approach helped preserve the supracrestal attachment tissues, enabling absolute isolation in cervical or subgingival areas without compromising periodontal tissue health.

Keywords: permanent dental restoration; periodontics; case report.

INTRODUCTION

Invasion of the supracrestal tissue attachment triggers a persistent inflammatory response that may lead to resorption of the supra-alveolar bone and the formation of periodontal pockets in the affected area (1–3). This tissue structure, composed of the connective insertion and the junctional epithelium surrounding the circumference of the tooth—formerly referred to as the “biologic width”—is now redefined as the supracrestal tissue attachment (4).

To preserve the biological integrity of these tissues, it is essential to have at least 3 to 4 mm of healthy tooth structure above the alveolar crest (5,6). Within this periodontal biological context, and particularly during more complex restorative procedures, it is crucial to ensure

absolute and effective isolation of the operative field to control saliva, sulcular fluid, and bleeding properly. This condition facilitates both the correct preparation of the cavity and the precise execution of the restoration, contributing to more satisfactory clinical outcomes (7).

The implementation of surgical or trans-surgical access techniques at the time of isolation allows for full exposure of preparations or lesions that, in certain cases, would not be achievable using retraction clips (8–10). Controlled elevation of the gingival flap, or its minimal separation through incisive fibrotomy, preserves local vascularization and tissue viability, promoting optimal periodontal healing. In contrast, the use of retraction clips may induce tissue ischemia and, in extreme cases, cause irreversible gingival recession (8,9).

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Among the available alternatives for planning and executing restorative treatment in such scenarios, periodontal surgical procedures represent the option that generates favorable technical conditions for successful management (11). Thus, trans-surgical periodontal intervention emerges as a viable solution, as it reduces the number of clinical sessions and provides favorable outcomes, improving function and, in some cases, patient aesthetics (11–13).

Considering the above, this study illustratively describes minimally invasive periodontal surgical maneuvers to facilitate absolute isolation of the immediate operative field in two clinical scenarios.

CLINICAL CASE 1. BUCCAL CERVICAL RESTORATION

A 27-year-old Caucasian female patient attended the dental clinic of the Faculty of Dentistry at the Universidade Federal de Pelotas (Pelotas, Brazil) with a non-carious cervical lesion extending subgingivally on the maxillary left first premolar (tooth 24, according to the World Dental Federation [FDI] notation). During the medical and dental history, the patient reported no spontaneous dentin sensitivity in the cervical area or any other dental symptoms. Clinical and radiographic examinations revealed normal parameters for the affected tooth, with an initial periodontal probing depth of 1.5 mm (Figure 1).

The treatment plan consisted of a transsurgical restoration using light-cured composite resin under absolute operative field isolation. The patient was informed about the clinical approach, and after signing the institution's informed consent form, the immediate clinical procedures were initiated, including prophylaxis and photographic documentation.

Before the restoration, the patient performed a mouth rinse with 15 mL of 0.12% chlorhexidine digluconate for 1 minute as an intraoral antiseptic measure. Perioral antisepsis was performed with the topical application of 10% povidone-iodine (PVPI) on a sterile gauze, followed by infiltrative anesthesia (2% lidocaine with 1:100,000 epinephrine). To avoid traumatizing and exposing the supracrestal tissue attachment, a delicate flap was raised using a 15c blade scalpel (Albion Surgicals®, Sheffield, England) and a Molt #2 periodontal spatula (LM-Dental®, Parainen, Finland). An intrasulcular incision of approximately 15 mm was made, extending from the distal surface of tooth 23 to the mesial surface of tooth 25, preserving the interdental papilla to facilitate flap displacement and elevation above the cervical lesion (Figure 2).



Figure 1. A) Initial clinical appearance. B) Periodontal probing of the area.

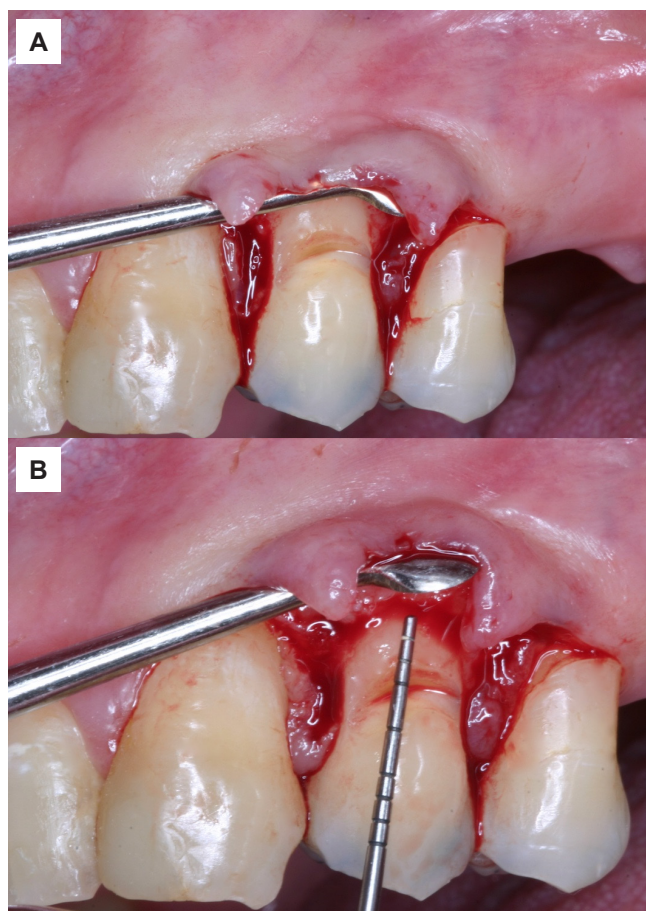


Figure 2. A) Fibrotomy of the region. B) Delicate exposure and periodontal reevaluation.

Subsequently, absolute isolation was achieved using a rubber dam (Higenic®, Coltene/Whaledent, Altstätten, Switzerland) and a Ferrier KSK #212 cervical clamp (KSK Dentech®, Tokyo, Japan), applied passively to facilitate the trans-surgical restoration (Figure 3). Once the restoration was completed, the buccal surgical flap was carefully repositioned and stabilized with simple sutures in the interpapillary region, using 5-0 nylon thread (Ethicon®, Johnson & Johnson Medtech, São Paulo, Brazil).

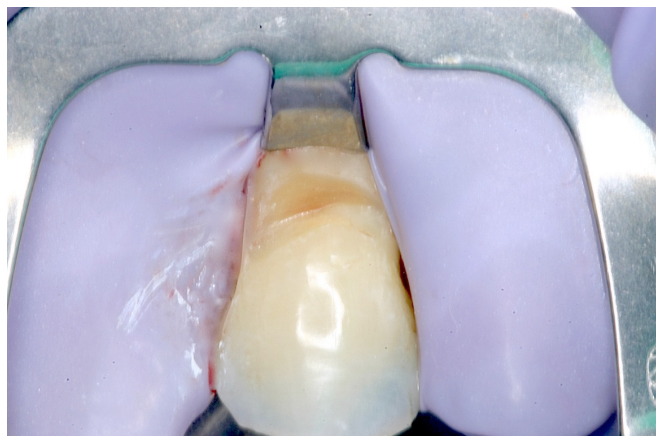


Figure 3. Approximate appearance of the isolated area.

The patient was instructed on all postoperative care, which included not traumatizing the tissue during brushing and returning for suture removal and postoperative evaluation. Ibuprofen 600 mg (Ibupril®, Laboratório Teuto, Goiás, Brazil) was prescribed every 8 hours for 3 days, or as long as pain-related sensitivity persisted.

At 7 days, proper healing of the marginal periodontal tissues was observed (Figure 4). The 14-day postoperative follow-up remained within normal limits, and at 30 days, dental prophylaxis and delicate periodontal probing were performed, confirming periodontal health, with no bleeding on probing, a probing depth of 1.5 mm, and stable clinical attachment levels.



Figure 4. Appearance at 7 days after the trans-surgical procedure.

CLINICAL CASE 2. CERVICAL RESORPTION

A 13-year-old male patient was referred for dental evaluation at the Faculty of Dentistry of the Universidade Federal de Pelotas (Pelotas, Brazil). Due to his age, and with parental consent, a comprehensive extraoral and intraoral examination was performed. The patient presented a clinical history of communicating cervical resorption in the maxillary left lateral incisor (tooth 22, according to the FDI notation) resulting from an avulsion injury sustained at the age of 10, with concomitant pulp necrosis (Figure 5).

During the anamnesis, the patient reported no painful sensitivity in tooth 22, describing only a mild sensation of discomfort. Periodontal probing of the palatal region was inconclusive, as the cervical resorption was located almost at the level of the palatal gingival margin. Based on the diagnostic findings and periodontal probing of the sites adjacent to tooth 22, which revealed an average probing depth of 1 mm, the treatment plan was to seal the cervical resorption lesion so that endodontic therapy could continue under absolute isolation. Once the procedure was defined, the patient's legal guardians were duly informed, and the institutional free and informed consent form was signed.



Figure 5. Initial clinical appearance.

As a preliminary step for the transsurgical restoration, aseptic and antiseptic procedures were performed, followed by local anesthesia using an infiltrative technique (2% lidocaine with 1:100,000 epinephrine) in the area to be treated. Furthermore, to avoid traumatizing or compromising the supracrestal tissue attachment and to allow adequate isolation of the operative field, an incision of the periodontal tissues in the palatal area of tooth 22 was performed using a 12c blade scalpel (Albion Surgical®, Sheffield, England), complemented by a Molt #2 surgical periodontal instrument (LM-Dental®, Parainen, Finland). A palatal intrasulcular incision of approximately 16 mm was made, extending from the distal surface of tooth 21 to the distal surface of tooth 23, while preserving the interdental papilla, to facilitate displacement and elevation of the flap above

the level of the cervical resorption (Figure 6). At this stage, surgical access was obtained to achieve proper absolute isolation of the operative field with the aid of a 212L cervical clamp (SS White Duflex®, Rio de Janeiro, Brazil), which is more anatomical and delicate, to stabilize a medium-thickness rubber dam (Higenic®,

Coltene/Whaledent, Altstätten, Switzerland). With the operative field adequately isolated, the corresponding operative procedures were carried out, including sealing of the defect with resin-modified glass ionomer cement (Vitremer®, 3M ESPE Dental Products, St. Paul, USA), followed by endodontic treatment (Figure 7).

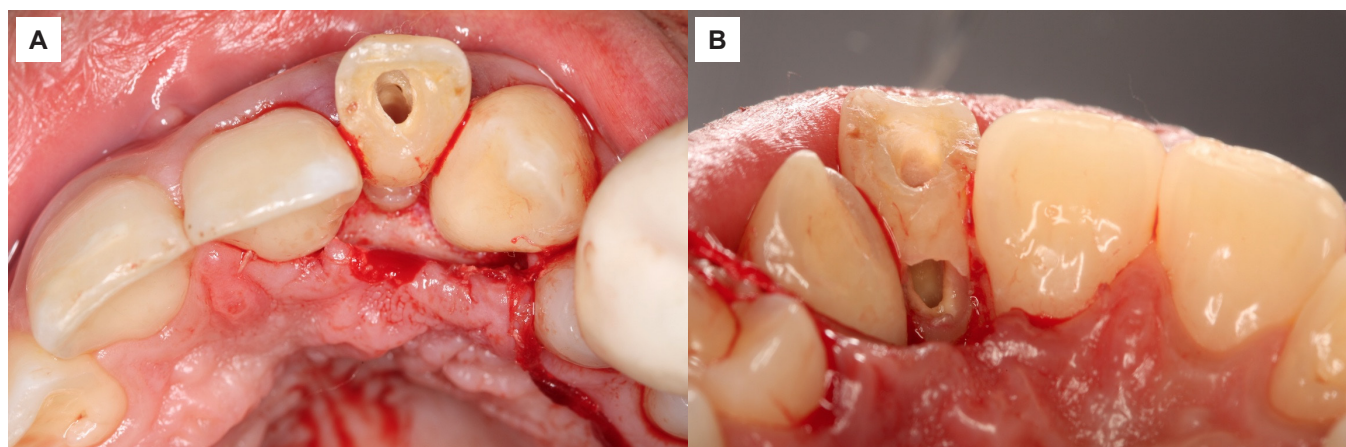


Figure 6. A) Fibrotomy to expose the palatal region with cervical resorption. B) Approximate appearance of the cervical area to be isolated.



Figure 7. Clinical illustration of trans-surgical isolation of the operative field.

Once the endodontic and restorative procedures were completed, the palatal surgical flap of the treated region was carefully repositioned and stabilized using simple sutures in the interpapillary region, performed with 5-0 nylon suture material (Ethicon®, Johnson & Johnson Medtech, São Paulo, Brazil).

The patient received detailed postoperative care instructions and returned for suture removal and post-surgical follow-up. Postoperative medication consisted of Ibuprofen 600 mg (Ibupril®, Laboratório Teuto, Goiás, Brazil), administered every 8 hours for 3 days, or while pain-related sensitivity persisted. At 7, 14, and 30 days after treatment, adequate healing of the marginal periodontal tissues was observed, and periodontal health of the region was confirmed by a final periodontal probing depth of 1.0 mm and absence of gingival bleeding.

DISCUSSION

The health of the marginal periodontal tissues is an essential requirement to ensure the long-term success of restorations with subgingival margins (1,8-10). Failure to comply with these biophysiological limits leads to an immediate inflammatory response, evidenced by increased probing depth and the consequent loss of clinical attachment (3).

The supracrestal tissue attachment plays a fundamental protective role over the dental supporting tissues—root cementum, periodontal ligament, and alveolar bone—against bacterial aggression and toxic byproducts. When this tissue unit is invaded, periodontal physiological balance is disrupted, resulting in apical migration and reorganization of these structures. Consequently, invasion of the supracrestal tissue attachment is associated with an inflammatory process that promotes loss of periodontal support and epithelial tissue migration (4).

The performance of these periodontal surgical procedures allowed adequate visibility and access to the operative field, enabling the fabrication of dental restorations in accordance with established technical principles. This, in turn, favored the restoration and maintenance of the clinical health of previously compromised periodontal tissues (9). The transsurgical restorative technique appears to be a viable option for cases involving intrasulcular or subgingival carious lesions where access and absolute isolation of the operative field are required. However, despite the lack of clinical evidence, some complex cases have been identified in which surgical restorative procedures were performed

using absolute operative field isolation associated either with surgical crown lengthening or with trans-surgical exposure (7,9,10,13).

Invasion of the supracrestal tissue attachment induces alveolar bone resorption to reestablish a new connective tissue attachment, leading to deepening of the gingival sulcus. The chronic combination of these factors causes a localized periodontal problem that results in progressive inflammation of its structures, leading to alveolar bone resorption to restore its dimensions (1).

From a clinical and histological standpoint, the response of supracrestal periodontal tissues to subgingival composite resin restorations may be comparable to that observed on natural root surfaces, provided that the supracrestal tissue attachment is not violated (14). Muscholl et al. (15), when evaluating the clinical quality of subgingival composite resin restorations and the inflammatory status of the supporting periodontal tissues, found no increase in inflammation at sites with composite restorations over a three-year period.

In one of the cases presented, transperiodontal probing was performed before the surgical intervention (Clinical Case 1); however, transsurgical probing—considered the gold standard due to its greater reliability in assessing tissue parameters—was applied in both procedures through careful exposure of the periodontal flap. This probing method allows precise measurement of the invasion of supracrestal tissue attachment, enabling selection of the most appropriate therapeutic approach. In the clinical cases presented, clinical crown lengthening was not performed, as transsurgical exposure was considered the most conservative and sufficient option for the planned procedures.

One of the limitations of the cases described is the absence of a specific protocol for cases requiring trans-

surgical restorations, and the lack of a final photograph of clinical case 2, along with its follow-up.

The use of special or modified clamps, together with the appropriate selection of the thickness and quality of the rubber dam used for absolute isolation, promotes more effective sealing against fluids during the transsurgical procedure. Achieving satisfactory outcomes with this surgical technique highlights the importance of meticulous treatment planning, considering the patient's clinical condition, the extent of bone loss, flap design, the quality and quantity of keratinized mucosa, and tooth position within the dental arch (16).

Surgical procedures are effective alternatives for accessing and creating the necessary conditions to perform immediate restorative procedures or adequately isolate the surgical field. In this regard, the transsurgical isolation technique may be considered a favorable option compared with conventional crown-lengthening surgery or the more aggressive use of retraction clamps on periodontal tissues. Furthermore, this technique allows rehabilitation or immediate treatment to be performed in a single clinical session, providing greater postoperative comfort for the patient. Therefore, the transsurgical periodontal approach represents a viable, safe, and technically accessible alternative for achieving absolute isolation of the operative field (11).

CONCLUSIONS

The clinical cases presented demonstrate that a trans-surgical periodontal approach allows preservation of the biological maintenance of the supracrestal tissue attachment. This approach enables absolute isolation of the operative field in cervical or subgingival areas of severely compromised teeth, without adversely affecting the health of the surrounding periodontal tissues.

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The authors declare no conflict of interest.

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The principles of bioethics were respected by obtaining informed consent from the patient in the first case and from the legal guardian in the second case.

Authorship contribution:

JM: conceptualization, formal analysis, writing of the original draft. **CFS:** supervision, writing – review & editing. **GHG:** supervision, writing – review & editing.

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