Morpho-functional restoration of an element in esthetic area through modified intentional replantation: A case report with 16 months follow-up

ABSTRACT
This study aims to evaluate the success of the morpho-functional restoration of a tooth with subgingival carious lesion using the modified replantation technique, which entails the rotation of the element of 180° on its axis. This study has a follow-up of 16 months. A 68-year-old man comes to rehabilitate the esthetic and the functionality of element 1.2, affected by destructive carious process extended below the gingival margin. At the clinical and radiological examination, the possibility of a conservative approach is excluded due to the total lack of healthy dental tissue to construct the ferula. It is executed the technique of modified intentional replantation, followed by a rehabilitative phase. After 16 months of follow-up, it can be appreciated the stability of the hard and soft tissue, the lack of pathological probing or symptomatology, and radiographically there is no evidence of bone or root resorption. The modified intentional replantation can be a valid alternative to the surgical lengthening of the clinical crown, to the orthodontic extrusion or to the surgical extrusion. This variation allows obtaining an apical stop during the replanting phase, which contributes to the stabilization of the element. Due to the short follow-up examination from us, further studies are necessary.

Keywords: 180°, crown lengthening, intentional replantation, orthodontic extrusion, rotation, surgical extrusion

INTRODUCTION
An element with destructive caries with subgingival extension may require a multidisciplinary approach, involving a combination of conservative–prosthetic techniques, and surgical or orthodontic treatments. The reason why the extension of the decayed margin below the gingival level can be a problem for the morpho-functional recovery of the element is threefold:
1. Impossibility of performing margin relocation due to the extension of the carious lesion.
2. Possibility of margin relocation, but with consequent invasion of the biological width with restorative materials and increase of periodontal tissue inflammation.
3. Lack of adequate ferula for the following prosthetic rehabilitation, as a better prognosis of the element is expected when 2 mm of healthy dentin can be obtained.[1]

The clinical crown lengthening is a well-documented technique, but with disadvantages: The involvement of the hard and soft tissues of the adjacent teeth and the change in bone and gingival profile, a possible problem in aesthetic areas.[2]

The rapid orthodontic extrusion is also valid, but is generally not accepted by the patient as it requires fixed

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orthodontic appliances which can create discomfort and are unaesthetic.

The surgical extrusion is a procedure where the residual portion of the element is repositioned more coronally, within the original alveolus.\(^2\)

The intentional replantation consists in the extraction of a tooth and its immediate re-insertion into the socket.\(^3\) This technique is a therapeutic alternative for the management of coronal–radicular fractures when these extend to the subgingival level and periodontal surgery is not recommended for esthetic reasons.\(^4\) In this case, we proposed the same technique but with a variation: The element was extracted and replanted following a 180° rotation around its long axis. This variant allows an apical stop to be obtained during the replantation phase, due to the incongruity between the element and the alveolus, which contributes to the stabilization of the tooth, and the vestibular exposure of the carious margin, easier to be reconstructed.

This method permits to obtain enough coronal healthy tissue to allow prosthetic rehabilitation.

**CASE REPORT**

The patient presented to our attention for rehabilitation of the carious element 1.2 with a subgingival fracture of the anatomical crown.

The objective and radiological examinations excluded a conservative restoration, because not enough healthy dental tissue was present at cervical level.

Two solutions were proposed to the patient: The extrusive orthodontic treatment, followed by conservative restoration, or the implant placement. Both were rejected on economic or esthetic motivations. It was, therefore, agreed with the patient to implement an intentional replantation procedure, with a modified technique. He signed the informed consent.

Endodontic treatment and filling of tooth 1.2 was performed, and a week later intentional replantation was carried out [Figures 1 and 2].

The patient was given an antiseptic rinse with chlorhexidine mouthwash 0.2% for 1 min and asked to sign an informed consent for surgery. Local anesthesia with mepivacaine 2% and adrenaline 1:200.000 was injected, and the tooth was dislocated and avulsed with thin levers and forceps, preserving the periodontal ligament cells that would affect the healing and the long-term success of the intervention [Figure 3]. Then the element was replanted with a 180° rotation around its long axis, with the conventionally called front–back technique [Figure 4]. Finally, a soft splinting was performed with sutures and flowable composite [Figures 5 and 6].

A post-surgical check-up was done at week 1, and at week 3 the sutures were removed, noting Miller grade 1 mobility. One month later, the tooth had no pathological mobility (Miller grade 0). An intracanal glass fiber pin was cemented.
and the element was built up. An impression was made for the creation of a temporary crown, and a month later the tooth was prepared so the temporary crown was relined and cemented [Figure 7].

Due to the Sars-CoV2 pandemic, the patient was seen again after 8 months and the element showed no pathological mobility, no signs of inflammation, no soft tissue recession and the radiographic examination showed complete healing of the alveolus and restoration of the periodontal ligament.

The case was finalized by cementing a ceramic zirconia crown [Figure 8].

RESULTS

Nearly 16 months after surgery, stability of the hard and soft tissues around the tooth, absence of pathological probing and symptoms in the affected tooth were appreciated. Radiographically there were no bone or root resorption,

and the tooth showed no pathological mobility or ankylosis [Figure 9].

DISCUSSION

Intentional replantation using a modified technique is a therapeutic alternative indicated in all cases of subgingival fractures and caries involving elements in the esthetic area.

In this case, the technique was chosen because the patient refused both implant solution and orthodontic extrusion, surgical extrusion was excluded due to the root conformation of the tooth, and there was no indication for a clinical crown lengthening as the affected element was in the esthetic region.

Intentional replantation using a modified technique differs from the traditional one in the 180° rotation of the tooth around its long axis. This allows an apical stop and stability of the element in the coronal–apical direction to be achieved. In fact, only soft splinting with sutures is sufficient to stabilize the tooth during the first stages of healing.
Potential post-operative complications that may arise due to this procedure are root resorption and ankylosis, that usually occur due to damage of the periodontal ligament fibers during the avulsion surgical phases, and/or due to the presence of contaminants during the surgery.\textsuperscript{[9]} Success is excellent as the time spent by the tooth outside the alveolus and the probability of contamination of them are minimal: It has been suggested to maintain the extracted tooth extra oral for $<15$ min.\textsuperscript{[7]} The semi-rigid splinting should not be maintained $>3$ weeks to avoid the onset of ankylosis phenomena of the root.\textsuperscript{[8]}

A good endodontic therapy and an adequate prosthetic rehabilitation are essential to obtain a good prognosis of the treated element.

Tetragonal zirconia was chosen for the substructure of the prosthetic crown because the abutment showed significant discoloration in its apical region. Esthetic features were obtained by layering feldspathic ceramics.

**CONCLUSION**

Within the limitations of this study, intentional replantation with a modified technique can be a valid alternative to clinical crown lengthening and orthodontic extrusion in an esthetic setting, as it does not require intervention on the bone profile or modify the gingival profile, and it avoids the use of fixed orthodontic devices, poorly accepted by patients.

Unlike the traditional technique, this variant permits to obtain an apical stop during the replantation phase, which contributes to the stabilization of the element.

However, this technique is not without risks, mainly related to the surgical management of the tooth to be extracted and possible inflammatory complications that may involve the periodontal ligament fibers.

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**Conflicts of interest**

There are no conflicts of interest.

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**Figure 8: Finalized case**

**Figure 9: Periapical x-ray – 16 months of follow-up**