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## Case Report

# Autotransplantation of conoid maxillary third molar in upper incisive site: A reliable aesthetic solution

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### ABSTRACT

**Introduction:** In the management of anterior dental trauma, the maintenance of the traumatized elements has to be preferred, but sometimes this results impracticable. Among different options, autotransplantation provides an adequate therapeutic solution, particularly in crowded arches, in presence of supernumerary elements or when third molars with a root anatomy compatible with the recipient site are available.

**Case Report:** This paper presents a case of autotransplantation of a conoid upper third molar (1.8) inside the alveolus of a central incisor undergone at root resorption, after a long time maintenance of the traumatized element 2.1 and different treatments. Furthermore, a comparison of the therapeutic alternatives is proposed.

**Discussion:** Due to their root anatomy, premolars and supernumerary monoradicated teeth are adequate to be transplanted in incisors' sockets. In the presented case, the presence of a conoid third molar consented the transplantation of the latter, which represented a more conservative treatment than transplanting a premolar. The use of a 3D-printed replica made through a CBCT scan permitted the substantial reduction of the extra alveolar time, avoiding the periodontal ligament contamination and guaranteeing a higher success rate. Due to the complete formation of the donor tooth, root canal treatment was carried out.

**Conclusion:** Autotransplantation represents a valid and biological alternative in the management of traumas of the anterior dental trauma.

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## 1. Introduction

The management of anterior dental trauma is a challenging scenario, requiring a multidisciplinary approach in order to preserve the high aesthetical role of the area. According to the Literature, the anterior maxilla is the principal site for traumatic dental injuries, and traumas occur mainly between 8 and 12 years old.<sup>1</sup> The maintenance of the traumatized elements has to be preferred, but if they cannot be replanted, maintained or crown-root fractures turn out, replacement solutions must be provided. The viable options are: no treatment, osseointegrated implants, fixed or removable prosthesis, acid-edge bridges, orthodontic gap closure or

autotransplantation.<sup>2</sup>

If untreated, the absence of a permanent tooth causes severe damage to the alveolar process, which subsequently may require extensive surgeries to repair, in order to achieve an esthetically and functionally satisfactory result.<sup>3</sup>

Filling an anterior space with an implant-supported crown is a major challenge from both esthetic and functional aspects. In fact, clinical success depends not only on persisting osseointegration but also on harmonious integration of the crown in the dental arch.<sup>4</sup> Furthermore, the aesthetic outcomes are subjected to aging, as the three most significant negative observations for long-term follow-up (more than 5 years) are:

1. Darkening of the labial gingiva,

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- 2. Infraocclusion of the crown even in adults
- 3. Gingival retraction.<sup>5</sup>

Patients may also refuse implant-prosthesis or prosthetic rehabilitations due to their costs.

Autotransplantation provides an adequate therapeutic solution, particularly in crowded arches, in presence of supernumerary elements or when third molars with a root anatomy compatible with the recipient site are available.<sup>6</sup>

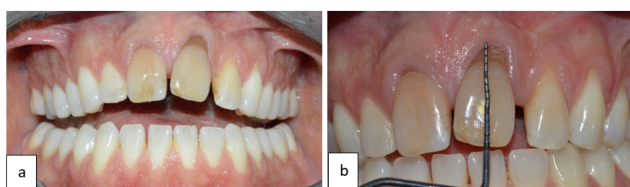
The aim of this paper is to present a case of autotransplantation of a conoid upper third molar (1.8) inside the alveolus of a central incisor undergone at root resorption, after a long time maintenance of the traumatized element 2.1 and different treatments.

## 2. Case Report

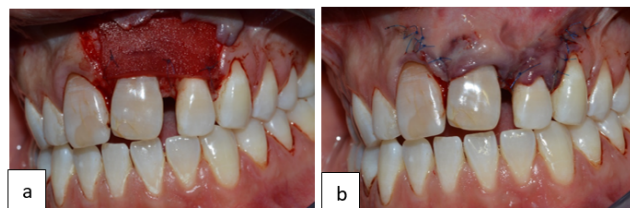
A 33-year-old male patient, classified as ASA I (American Society of Anesthesiologists), has been treated for the consequences of a trauma that occurred years before involving the anterior maxillary elements.

Right after the trauma, it was decided to maintain the elements involved, so teeth 1.1, 2.1 and 2.2 were treated endodontically at the age of 11. Three years later, a periapical radiolucent lesion appeared around the root of element 2.1, so it was enucleated and apicectomy and retrograde endodontic treatment was carried out.

After 19 years, recession of the gingival margin occurred, with a CAL (Clinical Attachment Loss) of 3 mm in correspondence of element 2.1. (Figure 1) It was decided to perform periodontal surgery in order to augment the keratinized tissue and obtain root coverage: a CAF (Coronally Advanced Flap) was carried out and a porcine 3D collagen graft (Mucoderm Straumann) was inserted between periosteum and mucosa. (Figures 2 and 3)



**Fig. 1:** a): Case presentation; b): Detail of the recession in correspondence of 2.1



**Fig. 2:** Periodontal surgery a): Collagen graft; b): CAF suture



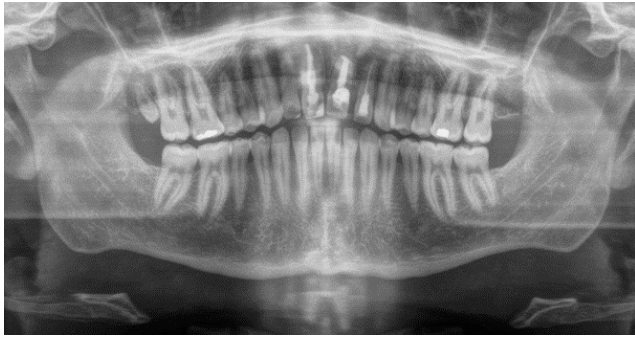
**Fig. 3:** 2 months follow-up

At the radiographic 8 months follow-up root resorption was detected. Considering the presence of conoid element 1.8, the patient was offered an autotransplantation of the latter, previously carrying out an orthodontic extrusion of element 2.1 with the aim of coronally increasing the amount of bone around the tooth. (Figures 4 and 5) Under plexic anesthesia with mepivacaine and vasoconstrictor, tooth 2.1 was extracted with light dislocation forces. (Figure 6) Afterwards, a 3D-printed replica of element 1.8, obtained from CBCT scan, was used to check its fitting into the recipient socket. (Figures 7 and 8) Since the palatine cusp of the donor tooth was more developed than the buccal one, it was inserted in the alveolus with a rotation of 180° around its major axis. (Figure 9) This would allow a more conservative preparation of the prosthetic abutment, sacrificing less healthy tooth substance. Completed the surgery, the element’s crown was provisionally reconstructed through a composite restoration and rigidly splinted for 4 weeks. (Figure 10) At week 8, endodontic treatment was performed. (Figures 11 and 12)



**Fig. 4:** Orthodontic extrusion

After 9 months of follow-up, it was proposed an aesthetic rehabilitation with veneers of elements 1.3, 1.2, 1.1 and 2.2 in addition to a crown on the transplanted element. A preventive bleaching of the frontal sector was carried out to improve the discolouration of the prosthetic abutments. (Figure 13)



**Fig. 5:** Orthopantomography showing the conoid 1.8



**Fig. 9:** Donor tooth positioning



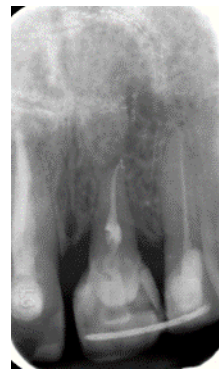
**Fig. 6:** Atraumatic extraction of 2.1



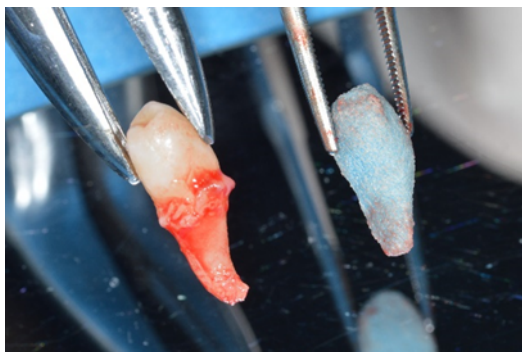
**Fig. 10:** Rigid splinting



**Fig. 7:** 3D replica checking



**Fig. 11:** Endodontic treatment of the transplanted tooth



**Fig. 8:** Donor tooth positioning 3D replica checking



**Fig. 12:** Composite reconstruction of 2.1



**Fig. 13:** Prosthetic definitive restoration

One year later, the clinical check-up showed an optimal esthetical outcome with healthy, symmetrical and normochromic gingival contour. Radiographically no periapical radiolucent lesions or pathological bone resorption occurred, and the development of a normal periodontal ligament was proved. (Figure 14)



**Fig. 14:** One year after cementation

### 3. Discussion

In the management of traumas, replantation of an avulsed tooth is indicated when the element is without contamination, advanced periodontal disease and the alveolar socket is sufficiently intact to provide a seat for the exarticulated tooth.<sup>4</sup> Post-traumatic complications can affect not only the teeth but also the supporting structures, possibly causing pulp necrosis, root resorption, infections and pulp canal obliteration. According to the Literature, root resorption appears to be the most concerning complication because it could lead to the loss of traumatized teeth, and it may begin shortly after the trauma or after a few years.<sup>7,8</sup>

In approaching the rehabilitation of the anterior maxilla, apart from orthodontic gap closure, autotransplantation of teeth appears to be the most biological solution.<sup>2</sup> In fact the transplanted tooth has a normal periodontal ligament, which allows its orthodontic movement and permits the proprioceptive function, so that the patient keeps a natural

chewing perception. Furthermore, the element maintains the ability to erupt in synchrony with adjacent teeth, to adapt to functional requests and to develop a normal marginal gingival contour.<sup>9</sup>

In recent Literature, it has been proposed the transplantation of premolars for incisive replacement.<sup>10</sup> This option is particularly valid in cases with crowded arches, Class II or III malocclusion.<sup>11</sup> Due to their root anatomy, premolars and supernumerary monoradicated teeth are adequate to be transplanted in incisors' sockets. Usually contouring by grinding and veneering with direct composite restoration, or better, bonded porcelain restoration is recommended to achieve an appearance that perfectly matches that of an incisor. Periodontal conditions, including the crown-to-root ratio, was shown to be about the same as that of the natural central incisors in the same patients.<sup>12</sup>

In the presented case there were no orthodontic reasons to extract a premolar and therefore the possibility of transplanting a third molar was preferable. This would be an optimal option even in patients with hyper-divergence, as extracting the third molar would reduce the posterior vertical dimension. In particular, the presence of a conoid and monoradicate upper third molar allowed its transplant, rather than sacrificing a premolar. A third molar has in fact a less important masticatory function if compared to other teeth, in particular a premolar, therefore it appeared more easily "sacrificable". In addition, third molars are generally related to decay and pericoronal infections due to their distal position and difficulties in domiciliar hygiene.<sup>13,14</sup>

In tooth transplantation favorable considerations are preservation of the healthy periodontal ligament cells and good tissue adaptation. These aspects are related to surgery, in particular the number of fitting attempts of the donor tooth, the distance between the recipient alveolus and the root of the donor tooth, the extra-alveolar time, the skill of the surgeon, and the atraumatic extraction of the donor tooth.<sup>15,16</sup> 3D-printed replicas from CBCT scans should be used as surgical guides during autotransplantation. This permits the preparation of the neo-alveolus prior to the extraction of the donor tooth. Moreover, it reduces the extra-alveolar time and minimizes the number of fitting attempts, preventing injury of PDL cells or pulp.<sup>16,17</sup>

In addition, with mature donor teeth as in this case, revascularization is less reliable after tooth autotransplantation. Endodontic treatment is therefore mandatory to prevent or halt the development of infection-related root resorption. Finally, the absence of splinting may accelerate destruction from trauma and instability during healing.<sup>18</sup>

### 4. Conclusion

Autotransplantation appears to be the most biological solution in replacement of missing anterior teeth, secondary

to orthodontic space closure. In this case, the presence of a conoid upper third molar, permitted its transplantation in position 2.1, thanks to its root's anatomy. The presence of a supernumerary tooth or a conoid third molar, is a great advantage in cases of crowded jaws, improving crowding and making it possible not to sacrifice the premolar for the replacement of the incisor.

The successful follow-up confirms that the use of a printed 3D-replica reduces extra-alveolar time, allowing the maintenance of the periodontal ligament health.

Following the transplantation and the endodontic treatment, the prosthetic restoration permitted the satisfaction of the patient's esthetic expectations.

## 5. Source of Funding

Self-funded.

## 6. Conflict of Interest

The authors declare that they have no conflict of interest.


## 7. Consent


The authors obtained informed consent from the patient.

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