

Dental Autotransplantation as a Rehabilitative Alternative in Young Patients: A Case Report

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Abstract: Dental autotransplantation (DAT) consists of the surgical transfer of a tooth from one site to another within the same patient, representing a biological, functional, and low-cost alternative for oral rehabilitation, especially in young patients still undergoing growth, in whom dental implants may be contraindicated. This study presents a case report of a 13-year-old female patient with impaction of teeth 46 and 47. After removal of tooth 46 and monitoring of bone healing, tooth 47 was found to be in a horizontal position with no possibility of proper eruption. Therefore, autotransplantation of tooth 47 into the alveolus of tooth 46 was indicated. The procedure was performed in a minimally traumatic manner, including preparation of the recipient socket, positioning of the tooth in slight infraocclusion, and stabilization with sutures. Clinical follow-up showed satisfactory healing, absence of infectious signs, and proper adaptation of the transplanted tooth. After one year and seven months of follow-up, tooth-alveolus integration, new bone formation, preserved pulp vitality, and absence of root resorption were observed, confirming the success of the treatment. The literature highlights that the success of DAT depends on factors such as atraumatic surgical technique, preservation of the periodontal ligament, short extraoral time of the donor tooth, imaging-based planning, and adequate post-transplant stability. Advantages of this method include preservation of alveolar bone, maintenance of dental space, possibility of orthodontic movement, and greater predictability in young patients, particularly when the donor tooth has incomplete root formation. It is concluded that dental autotransplantation, when properly indicated and performed, is a safe and effective alternative for oral rehabilitation in young patients, providing long-term functional, esthetic, and biological benefits.

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1. Introduction

Dental autotransplantation (DAT) is characterized by the surgical relocation of an impacted, unerupted, or erupted tooth to another alveolus within the same individual, aiming to rehabilitate early tooth loss using a more accessible biological option while preserving the greatest possible number of natural teeth. It is a low-cost, long-term option for adolescents with severely compromised teeth or agenesis; thus, autotransplantation of immature teeth is an alternative that may offer additional advantages for patients in the growth phase [1].

The literature describes a series of essential steps for the success of DAT, including: imaging assessment, atraumatic tooth extraction, extraoral handling of the donor tooth, transfer to the recipient socket, and appropriate stabilization. For a high success rate, all



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these steps must be carefully followed [2]. Due to the limitations of implant-based rehabilitation in growing patients, autotransplantation represents a viable alternative in young individuals [3].

The aim of this study was to present a clinical case report of an autogenous tooth transplantation surgery performed at the Oral and Maxillofacial Surgery and Traumatology Service of the Military Police Hospital of the State of Ceará, in Fortaleza, CE, Brazil.

2. Case Report

A 13-year-old female patient, systemically healthy, attended the Oral and Maxillofacial Surgery and Traumatology outpatient clinic of the Military Police Hospital of the State of Ceará in Fortaleza, CE, Brazil, referred by her orthodontist for evaluation of impacted teeth 46 and 47. Panoramic radiography revealed impacted teeth 46 and 47, as well as the tooth germ of 48 (Figure 1). Due to the degree of impaction and the patient's young age, tooth 46 was removed under general anesthesia, with osteotomy and tooth sectioning performed.

Figure 1. Initial panoramic radiograph showing impacted teeth 46 and 47 and the tooth germ of 48.



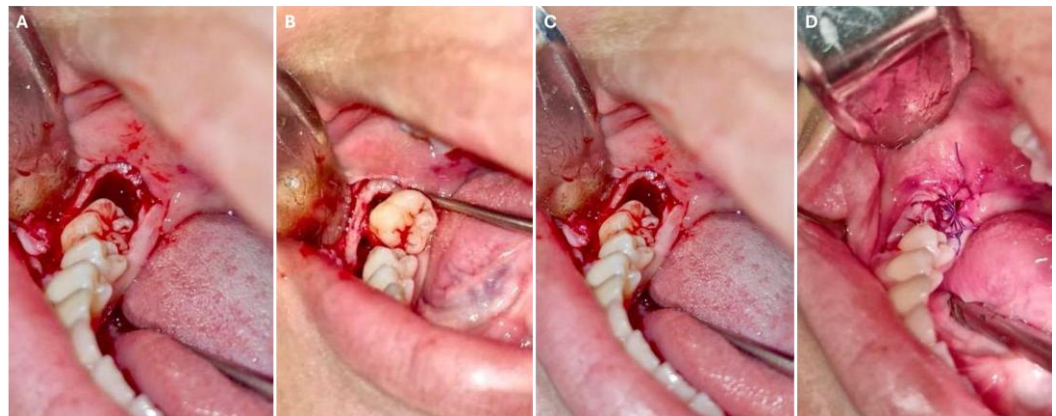
The patient showed satisfactory healing, with no signs of infection, and after one month postoperatively, new bone formation was observed (Figure 2). The initial approach was to maintain tooth 47 with the expectation that it would migrate into the position of tooth 46. In consultation with the team's orthodontist, the possibility of orthodontic uprighting of tooth 47, which was in a horizontal position, was considered using skeletal anchorage and uprighting springs. However, there was a risk of failure of this approach, in addition to the prolonged treatment time, which made this option unfeasible and led to the selection of autotransplantation as a viable treatment for the patient.

Thus, seven months after the first surgery (Figure 3), dental autotransplantation of tooth 47 to the region of tooth 46 was proposed to the patient and her guardian, as it is a low-cost treatment, indicated for young patients and biologically favorable. This approach allows for functional and esthetic rehabilitation, maintenance of space in the dental arch, and preservation of alveolar bone volume, using a tooth with no potential for eruption. Tooth 47 was at Nolla stage 8, considered ideal for autotransplantation due to incomplete root development and greater potential for revascularization. For a more accurate assessment of the procedure, a helical computed tomography scan, the only modality available at the hospital, was requested (Figures 4 and 5).

Figure 2. Panoramic radiograph at one month postoperatively after removal of tooth 46, showing a healing alveolus, mesioangulated tooth 47, and developing tooth germ of 48.



Figure 3. Panoramic radiograph at one month postoperatively after removal of tooth 46, showing absence of mesial movement of tooth 47 and Nolla stage 8.



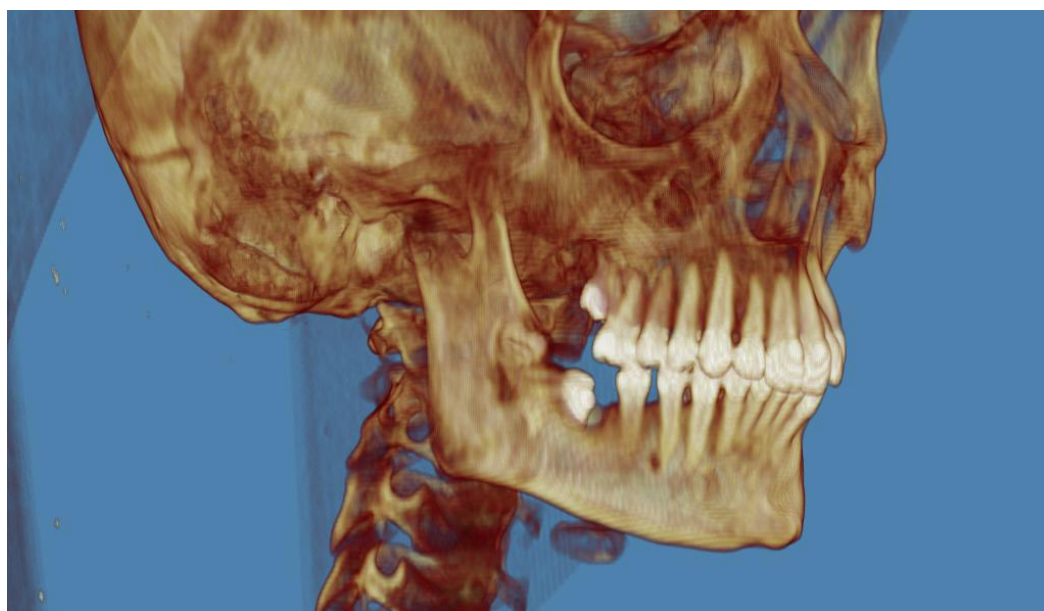
Dental autotransplantation was performed under local anesthesia in an outpatient setting, following principles of minimal intervention and tissue preservation. Initially, the recipient socket was prepared through gradual osteotomy using a no. 702 surgical bur and a no. 8 round bur in high-speed rotation under abundant and continuous irrigation, aiming to prevent bone overheating and ensure proper shaping of the recipient bed. During the procedure, periodic verification of the adaptation of the donor tooth roots to the recipient socket was carried out, and the tooth was kept, whenever possible, within its original socket in order to preserve the viability of periodontal ligament cells.

After adequate preparation of the recipient site, the tooth was carefully positioned, presenting satisfactory primary stability and proper adaptation to the alveolar walls. The tooth was intentionally placed in slight infraocclusion to avoid early occlusal trauma in the immediate postoperative period, which could compromise the healing process, and to favor spontaneous eruption into a functional position, considering the eruptive potential due to still open apices. For stabilization, an “X”-shaped suture was performed using 4-0 Vicryl® resorbable suture (Figures 6A–6D).

Figure 4. Panoramic reconstruction of computed tomography and panoramic radiograph at 7 months postoperatively after removal of tooth 46, showing tooth 47 in a horizontal position.



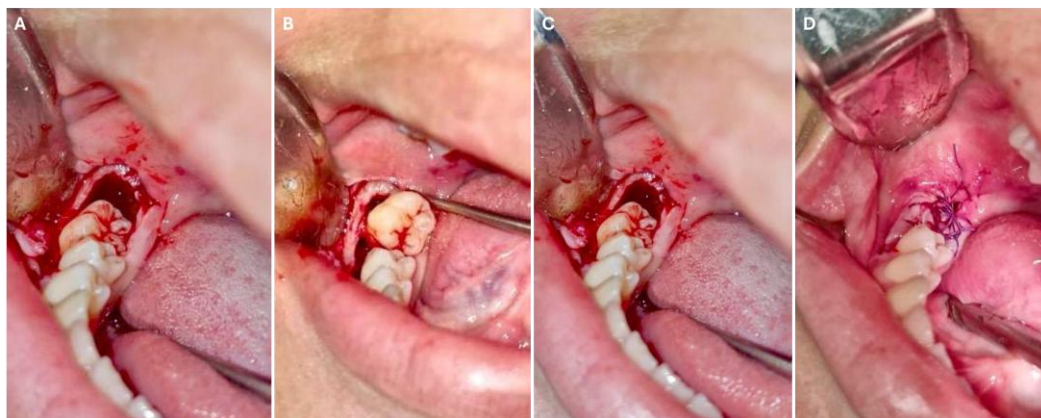
Figure 5. Three-dimensional reconstruction from helical computed tomography at 7 months postoperatively after removal of tooth 46, showing tooth 47 in a horizontal position.



In the immediate postoperative period, antibiotic therapy with amoxicillin 500 mg every 8 hours for 7 days was prescribed, as this was a potentially contaminated surgical site involving osteotomy for preparation of the recipient socket, which increases the risk of postoperative infection. In addition, ibuprofen 600 mg every 8 hours for 3 days and dipyron 500 mg every 6 hours as needed for pain were prescribed, along with instructions for a soft diet. At the 7-day postoperative follow-up, the tooth was in position, with no signs of infection, no excessive mobility, and satisfactory oral hygiene. After 14

days, the tooth exhibited slight mobility, but no infectious or inflammatory process, and the suture remained in place, being removed in the third week.

Figure 6. (A) Intraoperative view of the autotransplantation procedure showing surgical access, gingival tissue flap elevation, and minimally traumatic surgical removal of the donor tooth using a Molt periosteal elevator. (B) Luxation of tooth 47 with maintenance in its original socket to minimize periodontal ligament damage. (C) Adaptation of the transplanted tooth into the recipient socket after osteotomy preparation, positioned in infraocclusion. (D) “X”-shaped suture over the donor tooth using 4-0 Vicryl®.



One month after transplantation, the clinical appearance of the tooth and gingiva was satisfactory, with slight mobility and no pain complaints. The one-month postoperative panoramic radiograph showed good adaptation of the roots of tooth 47 in the socket of tooth 46 (Figures 7A and 7B). A pulp sensitivity test was performed with a positive response, indicating no need for endodontic treatment. In addition, periodontal probing was carried out to assess for possible pockets; however, good periodontal attachment was observed around the entire tooth.

Figure 7. (A) Panoramic radiograph at one month postoperatively after autotransplantation of tooth 47 to the socket of tooth 46, showing good adaptation of the tooth within the socket, thickening of the periodontal ligament with new bone formation, and slight infraocclusion. (B) Clinical image at one month postoperatively showing the tooth in infraocclusion, good oral hygiene, and no signs of inflammation.



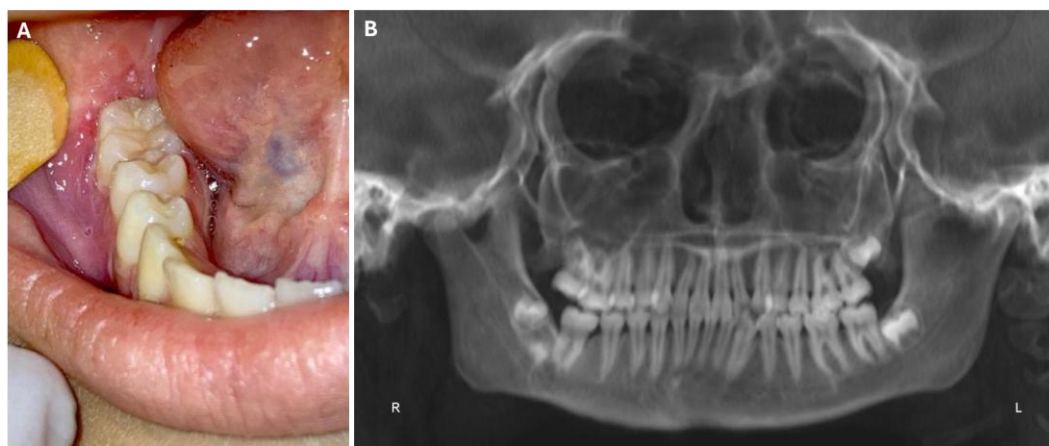
After seven months, a new panoramic radiograph (Figure 8) showed adequate tooth–alveolus integration, with maintenance of the periodontal ligament space and a continuous lamina dura. Bone trabeculation compatible with new bone formation and remodeling was observed in the region. The transplanted tooth was in a functional position, with satisfactory occlusal relationship and a closed apex, with no evidence of root resorption.

Figure 8. Panoramic radiograph at seven months postoperatively after autotransplantation of tooth 47 to the socket of tooth 46, showing the tooth well adapted to the socket, thickening of the periodontal ligament with new bone formation, and the tooth in occlusion with a closed apex.



After one year and seven months postoperatively, good clinical evolution was observed, with no signs of root resorption, and tooth 47 in occlusion (Figures 9A, 9B, and 10). Pulp sensitivity testing and periodontal probing were performed again, both showing positive results and good periodontal attachment around the entire tooth, respectively.

Figure 9. (A) Clinical photograph at one year and seven months after autotransplantation of tooth 47 to the socket of tooth 46, showing the tooth well adapted to the socket, in occlusion, with good oral hygiene and no signs of infection. (B) Panoramic reconstruction from computed tomography and panoramic radiograph at one year and seven months postoperatively, showing the tooth in position and without signs of bone resorption.



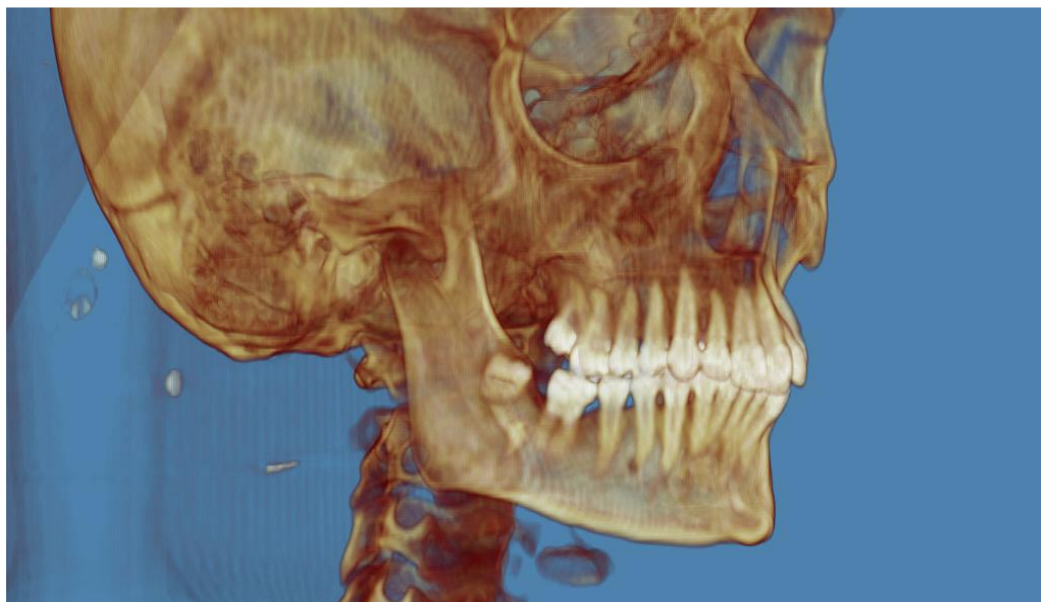
The patient is currently progressing well postoperatively, with no complaints and under annual follow-up at this service.

3. Discussion

Several advantages of dental autotransplantation (DAT) are well described in the literature, including preservation of alveolar bone and gingival tissues, the possibility of orthodontic movement, and maintenance of pulp vitality. It is a treatment with lower cost, shorter duration, and a more natural option for the patient, as supported by Tan et al. [4], who advocate for a biological approach that allows patients to retain the greatest number of natural teeth. However, according to Kumar et al. [5], despite all the described benefits

and its viability, DAT is still underutilized due to lack of knowledge among some professionals.

Figure 10. Three-dimensional reconstruction from helical computed tomography at one year and seven months postoperatively after autotransplantation, showing the tooth in position and without signs of bone resorption.



The disadvantages of this technique include the need for excellent surgical management to minimize trauma to the donor tooth and reduce the risk of irreversible damage to the periodontal ligament, ankylosis, or root resorption, as well as the potential need for endodontic treatment when the transplanted tooth has complete root formation. In cases of incomplete root formation, endodontic treatment is generally not required [3]. In the present case, endodontic treatment was not necessary due to the open apex, the patient's young age, and the confirmation of pulp vitality after endodontic assessment.

The literature indicates that some clinicians recommend endodontic treatment after autotransplantation; however, this procedure has been shown to be unnecessary in donor teeth with open apices. According to Plotino et al. [6], donor teeth with incomplete root formation have an adequate pathway for revascularization. Furthermore, DAT of teeth with incomplete roots shows a success rate of approximately 94%, compared to 84% for teeth with complete root formation [1]. It is important to note that the potential for revascularization and regeneration of periodontal ligament cells is greater in younger patients than in older individuals [7].

Imaging examinations are essential for planning the procedure, as they allow evaluation of the exact anatomy of the donor tooth and recipient site, identification of possible infections, and assessment of the stage of tooth development, since DAT should preferably be performed when the donor tooth has reached Nolla stage 8. Several principles influence treatment outcomes, including precise extraction technique, short extraoral time of the donor tooth, proper storage in saliva or saline solution, and maintaining a distance of 0.5 to 1.0 mm between the tooth and the recipient socket to avoid ankylosis (if too close) or delayed bone healing (if too distant) [1]. This approach is also supported by Plotino et al. [6] and Armstrong et al. [8], who report that successful healing is strongly related to the number of viable cells attached to the root surface. Techniques such as piezosurgery, described by Silva et al. [3], may be used to minimize injury to periodontal fibers, as it employs specific vibration frequencies to facilitate atraumatic extraction.

In some cases, due to the anatomy of the recipient socket, preparation is required before receiving the donor tooth, which may take additional time. Tang et al. [1] reports

that the donor tooth can remain outside the socket for up to 18 minutes, whereas Huang et al. [7] and Plotino et al. [6] suggest that this time should not exceed 15 minutes. Longer extraoral times may increase the risk of ankylosis and root resorption, as well as reduce tooth survival. Therefore, to preserve pH and osmotic balance, the donor tooth should be kept in saliva or immersed in saline solution during preparation of the recipient socket. Ideally, to minimize extraoral time, the donor tooth should remain in its original socket until the recipient site is ready.

Post-transplant stability directly influences prognosis. Insufficient stability may lead to displacement, whereas overly rigid and prolonged fixation may negatively affect healing. Therefore, non-rigid fixation using sutures for 7 to 10 days has been widely adopted [5]. Antibiotic therapy for seven days is supported by some authors. Studies by Tan et al. [4] and Chung et al. [2] indicate higher failure rates in cases where antibiotics were not administered compared to those in which they were used. Conversely, Plotino et al. [6] recommend antibiotic prophylaxis only for specific patients, such as those receiving intravenous bisphosphonates, individuals with prosthetic heart valves, cardiac conditions, bacterial endocarditis, or congenital heart defects. In the present case, the protocol proposed by Tan et al. [4] and Chung et al. [2] was followed, with antibiotic therapy prescribed for seven days to reduce the risk of bacterial infection and, consequently, root resorption. Chlorhexidine also plays an important role due to its bacteriostatic and bactericidal effects, helping to reduce postoperative infections, control dental plaque, and decrease failure rates in DAT [9].

The success of dental autotransplantation is described in the literature based on well-defined criteria, including the presence of a continuous lamina dura, normal periodontal probing depth, absence of inflammatory or pathological signs on radiographic examination, normal gingival contour and color after stabilization, and satisfactory masticatory function without discomfort [1]. These findings were observed in the present case throughout the follow-up period, confirming the success of the treatment.

4. Conclusion

This case report, together with the literature review, demonstrated that dental autotransplantation, when performed with proper planning and technique, represents an effective and viable option for oral rehabilitation in young patients, promoting masticatory function, esthetics, maintenance of the periodontal ligament, and preservation of alveolar bone. Considering the patient's age and the contraindications for dental implants in growing individuals, dental autotransplantation was established as the treatment of choice, demonstrating to be a safe and effective technique when well planned and executed.

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Conflicts of Interest: All other authors declare no conflicts of interest.

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