Autogenous Dental Transplantation: Case Series

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Abstract: Autogenous dental transplantation is defined as the transfer of a tooth to a recipient site of the same individual, whether it is a recently extracted site or surgically prepared bed. This procedure has proven to be a good and cost-effective alternative for replacing teeth with indications for extraction. Depending on the case, it is possible to maintain the vitality of the tooth and the periodontal ligament, ensuring proprioception and physiological dental mobility. The aim of the study is to describe a series of clinical case reports of autogenous dental transplants, in addition to discussing the results obtained based on current literature. The study features with a series of autogenous dental transplant cases conducted at Euro American University Center, where the indication for such a procedure was the extensive coronal destruction of the first molars in young patients. The surgeries were performed in atraumatic manner using a single-stage technique and semi-rigid splinting with occlusive sutures using 4-0 nylon thread. The results demonstrate significant success in the postoperative period, with the absence of symptoms and maintenance of pulp vitality and periodontal ligament. Based on the studies and case reports, it was observed that transplantation remains a safe and economically viable alternative for the replacement of prematurely lost teeth, within its indications and limitations.

Keywords: Autotransplantation, Oral surgery, Tooth, Autologous transplant.

1. INTRODUCTION

Autogenous dental transplantation is defined as the transfer of a tooth to a recipient site of the same individual, whether it is a recently extracted site or surgically prepared bed [1]. This procedure has proven to be a good and cost-effective alternative for replacing teeth with indications for extraction. Depending on the case, it is possible to maintain the vitality of the tooth and the periodontal ligament, ensuring proprioception and physiological dental mobility [2, 3].

However, it involves a series of factors that influence its success rate and survival. Among these, the root development phase of the donor tooth is considered one of the key factors, with dental root immaturity closely associated with pulp and periodontal ligament healing. Furthermore, the literature also associates younger patients, atraumatic surgical techniques, a favorable position, and minimal extraoral time of the donor tooth with a better prognosis [3-5].

Therefore, the aim of this work is to report a series of clinical cases of autogenous dental transplantation, as well as to discuss the results obtained based on current literature.

2. METHODOLOGY

The study features with a series of autogenous dental transplant cases conducted at Euro American University Center in Brasilia, DF. The data were collected from patient records with their consent. All patients signed the informed consent form, which was approved by the ethics committee of Euro American University Center.

3. CASE REPORTS

3.1. Case 1

A 17-year-old male patient attended the dental clinic at Euro American University Center with a complaint of a "broken tooth." Upon clinical examination, extensive coronal destruction was observed, becoming prosthodontic rehabilitation infeasible. In view of this, the autogenous dental transplantation of tooth 18 to the region of tooth 16 was proposed.

This way, the surgery for both elements was performed atraumatically, and the autogenous dental transplantation was carried out in a single stage. For the surgical procedure, preoperative intraoral

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antisepsis was performed with a mouthwash of 0.12% chlorhexidine, and extraoral antisepsis was conducted with 2% chlorhexidine. Two tubes of the local anesthetic lidocaine 2% + epinephrine 1:100,000 were used to, a straight lever was used for luxation of tooth 16, and forceps 18R were employed for extraction. Curettage of the alveolus and irrigation with sterile saline were performed, with no need for any preparation or curettage of the alveolous. This allowed for the preservation of the periodontal ligament. In the case of tooth 18, only a Seldin 1R lever was used for luxation and extraction, followed by immediate insertion into the recipient alveolus with infraocclusion. Furthermore, occlusal semi-rigid splinting was applied using 4-0 nylon thread for 15 days, maintaining the element in infraocclusion. Postoperative instructions were: Avoiding chewing on the right side for 15 days and taking Dipyrone 500mg every 6 hours for 3 days, along with Nimesulide 100mg every 12 hours for 3 days, for postoperative pain and inflammation control.

Figure 1: Tooth 16 with an extensive coronal destruction.

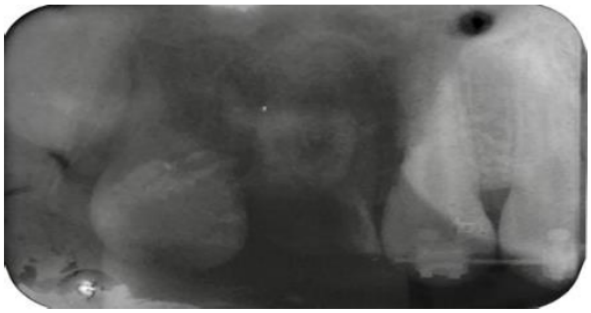

Figure 2: Initial periapical radiograph.

After this period, the patient returned to the clinic for removal of the splint and revaluation. The transplanted tooth still remained in infraocclusion, with degree I of mobility, no painful symptoms during vertical and horizontal percussion tests, and no changes observed in the radiographic examination or discoloration. The patient was advised to start chewing with soft foods on the right side to stimulate the reinsertion of the periodontal ligament.

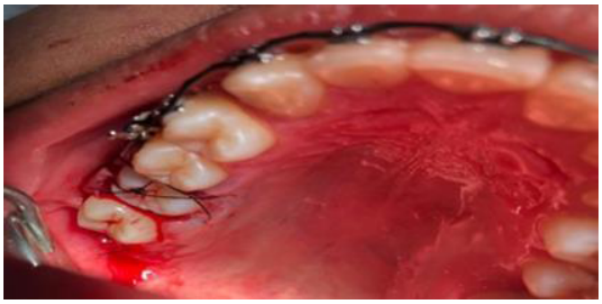

Figure 3: Immediate post-transplantation of tooth 18, with semi-rigid splinting

Figure 4: Periapical radiographic record of the tooth one year after transplantation.

Figure 5: Clinical record one year after transplantation.

Figure 6: Clinical examination of probing depth (PD) one year after transplantation.

The patient was followed up and revaluated one year after the surgery. The recorded observations included normal-looking mucosa, absence of mobility

and bleeding upon probing, good clinical attachment with the following pocket depths: mesio-buccal 3mm, mid-buccal 3mm, disto-buccal 3mm, mesio-palatal 3mm, mid-palatal 3mm, and disto-palatal 4mm. Beyond that, pulp vitality was observed in the cold test, indicating revascularization. No discoloration was noted, and the patient reported negative symptoms during vertical and horizontal percussion tests but positive responses to sensitivity to cold. In the radiographic examination, the tooth displayed normal tissue, with no thickening of the periodontal ligament, the presence of lamina dura, no periodontal or periapical changes, and an appearance of root growth equivalent to 2/3 of root formation.

3.2. Case 2

A male patient, 20 years old, attended at Unieuro College clinic reporting a chief complaint of "broken tooth and pain" for the past two months. After a medical history review, the patient did not report any systemic complications, had no pre-existing health issues or allergies, and was not taking any medications. During the dental clinical examination, an extensive cavity was observed on the occlusal surface of tooth 16, with significant coronal destruction. After a periapical radiograph was taken, it was decided to extract the affected tooth due to the unfavorable prognosis. As an alternative, dental autotransplantation was suggested, given that tooth 18 was healthy and semi-impacted, with its roots still in formation. This option was considered due to the patient's young age and the absence of systemic problems.

The preoperative procedure included measuring Blood Pressure (130x80mmHg), intraoral antiseptic application with 0.12% chlorhexidine, and extraoral antiseptic application with 2% chlorhexidine. The surgical procedure was carried out under local anesthesia, involving the blockage of the posterior superior alveolar nerve, Greater Palatine Nerve, and infiltration with 2% lidocaine + 1:100,000 epinephrine, using 3 tubes. For the extraction of tooth 16, an incision was made with a scalpel and a no. 15 blade, followed by detachment of the mucoperiosteal tissue with a #9 Molt, and extraction performed using the first technique with 18R and 65 forceps. Subsequently, alveolus curettage was performed with a Lucas curette, bone leveling with an osteotome, and sterile saline irrigation. The extraction of tooth 18 followed a similar process, with an incision made using a scalpel and a no. 15 blade, and detachment of the tissue with a #9 Molt. The extraction itself was performed using adapted 18R forceps, applying careful attention to avoid disrupting the periodontal ligament. After extraction, tooth 18 was gently inserted into the alveolus of tooth 16, and an occlusive suture with 4-0 nylon thread was applied. This resulted in a good adaptation without the need for adjustments.

Figure 1: Alveolus of tooth 16 after extraction.

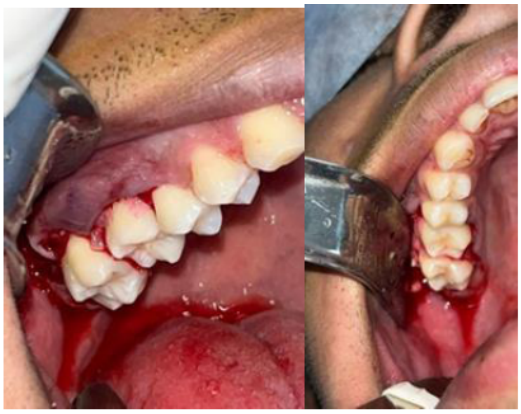

Figure 2: Tooth 18 transplanted into the alveolus of the tooth.

Figure 3: Tooth 18 after transplantation with semi-rigid.

A medicamentation prescription consisted of an antibiotic (Amoxicillin 500mg every 8 hours for 3 days), an anti-inflammatory (Nimesulide 100mg every 12

hours for 3 days), and an analgesic (Dipyrone 500mg every 6 hours for 3 days). The patient returned to the clinic for removal of the occlusive suture after 15 days. One year later, the patient returned for evaluation, and the transplanted tooth showed physiological mobility, no symptoms, pulp vitality, and the presence of lamina dura and root formation in the radiographic examination.

Figure 4: Radiographic image of the transplant after 1 year.

3.3. Case 3

A young patient, 18 years old, male, without any systemic decompensation, therefore classified as ASA I, visited the Unieuro Surgery Clinic for the extraction of teeth 16 and 26. The patient presented extensive caries in tooth 16, making restorative treatment infeasible, and in tooth 26, there was a residual root without the possibility of restorative treatment. After the patient's diagnosis, it was proposed to perform autotransplantation surgery of teeth 18 and 28, which were impacted, into the alveolus of teeth 16 and 26. The patient agreed to the proposed procedure.

To perform the surgery on tooth 26, the entire surgical field was prepared, including mouthwash with 0.12% chlorhexidine. Mepivacaine 1:100,000 was used for anesthesia, with six tubes administered. Blockade of the posterior superior alveolar nerve and the greater palatine nerve was conducted. A molt periosteal elevator was used for mucoperiosteal detachment. Following the detachment, the secondary technique with levers was employed to luxate the residual root, and the primary technique with forceps was used for tooth 26 extraction.

After the extraction of tooth 26, an envelope-type flap was created over the bone crest in the distal region of tooth 27 to facilitate the extraction of tooth 28. During the extraction of tooth 28, an angled Seldin lever was used for luxation and avulsion of the element without coming into contact with the periodontium of tooth 28. After the tooth extraction, the tooth was manipulated only by the crown and positioned in the alveolus of tooth 26 in infraocclusion. Two sutures were placed in the mesial and distal papillae using 4-0 nylon thread. The prescribed medication therapy for the patient included Amoxicillin 500 mg every 8 hours for 7 days, Nimesulide 100 mg every 12 hours for 3 days, and 500 mg sodium dipyrone every 6 hours for 3 days or as needed for pain. After 7 days, the patient returned for postoperative control and to undergo the surgery for teeth 16 and 18.

Figure 1: Initial panoramic.

Figure 2: Final panoramic radiograph.

Figure 3: Alveolus of tooth 26 recipient.

For the surgery on tooth 16, the entire operative field was prepared, including mouthwash with 0.12% chlorhexidine. Mepivacaine 1:100,000 was used for

anesthesia, with the blockade of the posterior superior alveolar nerve and the greater palatine nerve. After the anesthesia took effect, the surgical procedure begins using a Molt periosteal elevator. Following the elevation, mucoperiosteal detachment was performed. Subsequently, the secondary technique with levers was employed to luxate the root of the tooth, and the primary technique with forceps was used for tooth luxation. The use of surgical dental drill 702 was necessary for odontosection. After the extraction of tooth 16, an envelope-type flap was created over the bone crest in the distal region of tooth 17 to facilitate the extraction of tooth 18.

Figure 4: Donor tooth 28.

Figure 5: Figura 16 - Alveolus of recipient tooth 16.

Figure 6: Transplanted tooth 28.

Figure 7: Donor tooth 18.

Figure 8: Transplanted tooth 18.

In the extraction of tooth 18, an angled Seldin lever was used for luxation and avulsion of the element without it coming into contact with the periodontium of tooth 18. After the extraction, the tooth was manipulated only by the crown and positioned in the alveolus of tooth 16 in infraocclusion. Two sutures were placed in the mesial and distal papillae using 4-0 nylon thread. The same medication therapy as previously described was instituted. After 7 days, the patient returned for postoperative control with no mobility observed in both transplanted teeth.

The patient returned to the clinic for the evaluation of the transplanted teeth after 2 weeks, where periapical radiographic and clinical examinations were conducted. Radiographically, the tooth showed good adaptation and still had no noticeable signs of new bone formation. Clinically, there was degree I mobility, healthy gingival contours, and no alteration in tooth color. The tooth was firm and free from postoperative issues. After one year, the patient returned for a clinical and radiographic assessment. Clinically, the tooth presented with physiological mobility, no change in color, no painful symptoms, intact periodontium, and

normal characteristics of the papillae. The probing depth was 3mm for tooth 18 and 5mm for tooth 28, with no bleeding upon probing for tooth 18 and bleeding upon probing for tooth 28. The teeth were in occlusion with the antagonist, and, up to the present moment, the patient had no complaints with positive pulp vitality to cold stimulus. Radiographically, they exhibited lamina dura, a periodontal ligament space with no discernible pulp, periodontal, or periapical changes. There was a slight increase in root length, maintained bone crests, and new bone formation around the entire tooth.

3.4. Case 4

Sixteen-year-old male patient attended the dental clinic at Euro-American University Center with a complaint of "rotten tooth." During the anamnesis, he reported having a heart murmur and denied allergies to medications, this way being classified as an ASA III patient. The clinical examination revealed extensive coronal destruction that prevented prosthetic rehabilitation. Therefore, it was proposed to perform an autogenous dental transplant from tooth 48 to the region of tooth 46.

Figura 1: Initial Panoramic.

Figure 2: Alveolus of tooth 46 after.

Figure 3: Donor tooth 48.

Figure 4: Tooth 48 transplanted, still with dental hood.

Figure 5: Tooth 48 transplanted after two weeks.

Consequently, the surgery for the two elements was performed atraumatically, and the autogenous dental transplant was carried out in a single stage with the preparation of the operative field. As a preventive measure due to the patient's cardiovascular abnormalities, antibiotic prophylaxis was prescribed initially. Therefore, Amoxicillin 2g - 4 tablets of 500mg each (to be taken 1 hour before the procedure) was prescribed.

For the preoperative intraoral antisepsis, a 1-minute mouthwash with 0.12% chlorhexidine was performed, along with extraoral cleaning in periorbital regions of

the mouth using 2% chlorhexidine. The chosen local anesthetic for the patient was 2% lidocaine + 1:100,000 epinephrine, with only 2 cartridges used. For dental luxation, a straight lever was used on tooth 46, and forceps 17 for extraction, followed by curettage of the alveolus and irrigation with sterile saline.

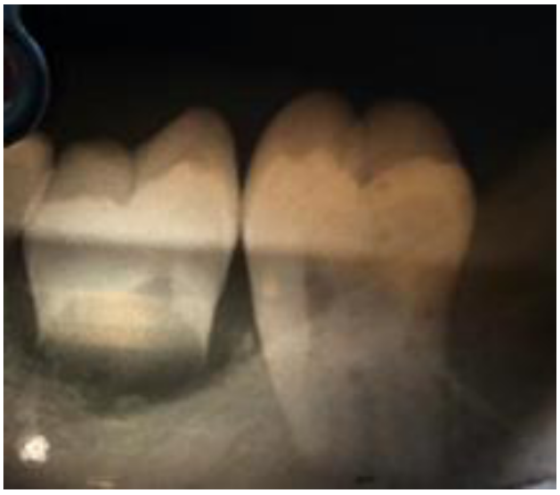

Figura 6: Radiograph of tooth 48 two weeks post-transplantation.

In the case of tooth 48, the same lever was used for luxation and extraction, with immediate placement in the recipient alveolus in infraocclusion. Additionally, a semi-rigid occlusal splint with 4-0 nylon thread was used for 15 days. Postoperative instructions included avoiding chewing on the left side for 15 days and using dipyrone 500mg every 6 hours for 3 days, along with Nimesulide 100mg every 12 hours for 3 days for the control of postoperative pain and inflammation. Besides that, the patient was instructed to continue taking the chosen antibiotic: Amoxicillin 500mg - 14 tablets (Take 1 tablet every 12 hours for 7 days). The patient returned to the clinic after 7 days for a reassessment, where the transplanted tooth still showed infraocclusion with degree I of mobility, without painful symptoms in vertical and horizontal percussion tests. Radiographic examination revealed the beginning of bone neoformation and consequent root formation. The patient was advised to start chewing with soft foods on the left side to stimulate the reinsertion of the periodontal ligament.

The patient returned after 14 days for the removal of the splint, presenting normal soft and hard tissue conditions.

Six months post-surgery, the patient was followed up and reassessed. The recorded findings included normal-looking mucosa, absence of mobility and bleeding upon probing, and good clinical attachment. Additionally, pulp vitality was observed in the cold sensitivity test, indicating revascularization, with no discoloration and negative symptoms in vertical and horizontal percussion tests. The patient also showed a positive response in the cold sensitivity test.

5. DISCUSSION

Slagsvold *et al*. [1] (1974) characterize autogenous dental transplantation as the transfer of a donor tooth to a recipient site, offering a viable solution for replacing lost teeth in young patients. However, authors such as Yang *et al*. [2] (2019), Tsukiboshi *et al*. [3] (2019), and Andreasen *et al*. [5] (1990) associate factors such as patient age, immune response, root formation, extra-alveolar time, and atraumatic surgical technique with the success and survival rate of the transplant.

In case reports, the patients were young with no systemic compromise, showing extensive coronal destruction in clinically examined elements slated for extraction, yet maintaining overall oral health. Radiographic assessment indicated an unfavorable prognosis for prosthetic rehabilitation, leading to the recommendation for extraction. The examination also evaluated the condition of the transplanted elements (third molars), which were either impacted or semi-impacted with incomplete root development.

This way, according to authors such as Yang *et al*. [2] (2019) and Jang *et al*. [4] (2015), dental transplantation is recommended for patients who are young and in good systemic condition, contributing to better tissue repair. Additionally, the donor teeth were either impacted or semi-impacted with incomplete root development, which, according to Andreasen *et al*. [5-7] (1990), are essential characteristics for a favorable prognosis in dental transplantation. These authors report that root immaturity increases the chances of revascularization and preservation of pulp vitality and periodontal ligament, reducing the risk of tooth necrosis and ankylosis.

The surgery for all elements was performed in an atraumatic manner, and the transplantation was carried out using the single-stage technique. This involved disinfection and anesthesia of the operative area, and after the extraction of the donor tooth, it was immediately placed in the recipient site. In the studies by Andreasen *et al*. [5-7] (1990) and Yang *et al*. [2] (2019), the single-stage technique for transplantation showed a better prognosis compared to the two-step technique, where the recipient site is prepared days

before the extraction and transplantation of the donor tooth. Additionally, they, along with Jang *et al*. [4] (2015), link the success of the treatment, among other factors mentioned, to the short extra-oral time of the donor tooth, with the maximum being around 18 minutes.

Furthermore, the donor tooth was placed in infraocclusion and with semi-rigid occlusive retention using 4-0 nylon thread for 15 days. According to Andreasen *et al*. [5-7] (1990), this approach allows the tooth to have physiological mobility and reinsertion of the periodontal ligament helping to prevent ankylosis.

After the procedure, the patients returned to the university only for the removal of the semi-rigid retention after 15 days. After a year, two of them returned for revaluation, and pulp vitality of the donor tooth, absence of mobility and bleeding upon probing were observed, along with new bone and root formation on radiographic examination. Therefore, the transplant has shown success up to this point, consistent with studies such as those by Czochrowska *et al*. [8] (2002) and Andreasen *et al*. [5-7] (1990), which reported success and survival rates of transplants ranging from 70% to 90%.

6. CONCLUSION

Based on studies and case reports, it is evident that transplantation remains a safe and economically viable alternative for replacing teeth lost early due to extensive caries in young patients, showing a high success rate. Besides that, autotransplantation treatment aims to provide aesthetic and functional restoration for the patient.

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