International Journal of Drug Research and Dental Science
Volume 4 Issue 3 (Page: 1-6), 2022 ISSN: 2582-0826

Catch the Timing: A Case Report of Tooth Germ Autotransplantation

Luigi Tagliatesta[1], Matteo Arcari[2*], Laura Porcheddu[3], Rania Ibrahim[3], Giulia Rovelli[3], Marco Lorenzoni[2]

[1]DDS, Specialist in Oral Surgery, Department of Biomedical, Surgical and Dental Sciences, Head of Pediatric Oral Surgery Unit, Santi Paolo and Carlo Hospital, University of Milan, Italy.

[2]Dentistry Student, Department of Biomedical, Surgical and Dental Sciences, Unit of Oral Surgery, Santi Paolo and Carlo Hospital, University of Milan, Italy.

[3]Dentistry Student, Department of Biomedical, Surgical and Dental Sciences, Santi Paolo and Carlo Hospital, University of Milan, Italy.

Case Study

Address of Correspondence Author
Dr. Matteo Arcari; Department of Biomedical, Surgical and Dental Sciences, Unit of Oral Surgery, Santi Paolo and Carlo Hospital, University of Milan, Italy.
E-mail: matteo.arcari.96@gmail.com
Crossref doi: https://doi.org/10.36437/ijdrd.2022.4.3.A

ABSTRACT

Tooth autotransplantation is a procedure that consists in the extraction of an erupted, partially erupted, or unerupted tooth and its repositioning into another point in the oral cavity of the same individual.
It can be considered a legitimate alternative to fill an edentulous space in younger subjects, due to agenesis, traumatic avulsion, root fractures, or big carious processes.
This Case Report describes a successful autotransplantation's case of an open-apex mandibular third molar, in place of a hopeless first mandibular molar, in a growing patient.
After 36 months of follow-up the wisdom tooth showed physiological mobility, absence of infection and ankylosis, positive pulp vitality test, and the periodontal integration was fully formed. The radiographic examinations confirmed a remarkable radicular edification.

Keywords: Autotransplantation, Oral Surgery, Pulp Vitality, Tooth Germ, Traumatology.

Introduction

Dental autotransplantation is defined as the displacement of a donor tooth from its original position to a receiving site, also known as post-extractive alveolus, within the same patient.[1] The developmental stage of the donor's root has been identified as the most important prognostic factor for a favorable outcome of the autotransplantation itself as well as for the maintenance of pulp vitality.[2]

International Journal of Drug Research and Dental Science
Volume 4 Issue 3 (Page: 1-6), 2022 ISSN: 2582-0826

According to Rohof E. C. M. et al.[3], autotransplantation of a germ with incomplete root formation and open apex leads more often to pulp revascularization, avoiding the necessity of endodontic treatment. As a consequence of this, the donor tooth can develop properly and achieve a complete root formation.[4] Moreover, the performance of the surgical treatment at an early age impacts the prognosis in a positive way. Indeed, the age between 15 and 19 years has the greatest survival probability for wisdom tooth autotransplantation.[5,6]

Materials and Methods (Case Report)

A 17-years-old patient presented to our clinic to treat a carious cavity which extended under-gingiva in element 3.6.

An intra-oral X-Ray confirmed the unfavorable prognosis of 3.6, but the orthopantomography (OPT) highlighted the presence of an unerupted germ of 4.8 and its compatibility for an eventual autotransplantation in 3.6's site. (Images 1A and 2) The procedure was proposed to the patient and her parents, explaining the advantages and the risks of the procedure. After their acceptance, informed consent for the surgery was signed.

Professional oral hygiene was carried out a week before the surgery in addition to an antiseptic therapy to reduce the amount of intra-oral bacteria load (rinses with Chlorhexidinedigluconate mouthwash 0.12% twice a day, from three days before the surgery). In order to reduce the risk of infection, prophylaxis with 2 g of Amoxicillin was administered 1 hour before the surgery. After local anesthesia with mepivacaine, 2% with adrenaline 1:100000, atraumatic luxation, and extraction of element 3.6 were carried out.

At the end of the first surgical phase, after local anesthesia, an incision distal to element 4.7 was followed by osteotomy, in order to expose the crown of the germ of 4.8; then, its luxation and atraumatic extraction were performed, avoiding touching the developing roots and the dental follicle to prevent damaging the periodontal ligament cells. Alveoloplasty of the recipient socket (3.6) was not necessary, so element (4.8) was laid down in the socket. Several stitches were given to the element 4.8 with a resorbable 4/0 suture to stabilize the tooth. (Image 3). To prevent the element from being subjected to excessive trauma, a selective grinding was performed, paying attention to the suture's thread, until a condition of minimum sub-occlusion was reached. A periapical postoperative control X-Ray was done at the end of the surgery. (Image 1B)

The following post-operative therapies were provided to the patient:

- Antibiotic therapy with Amoxicillin + Clavulanic Acid for 6 days with a dosage of 1 g every 12h;
- Rinses with chlorhexidine mouthwash 0.12%, 2 times a day for 20 days, to start 24 hours after the surgery;
- Local applications of 1% chlorhexidine gel, 2 times a day for 10 days.

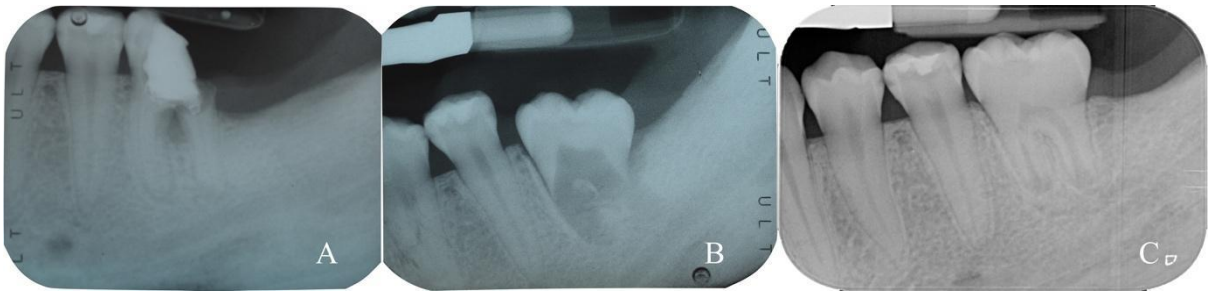

Image 1: Intra oral X-Rays: pre-operative (**A**), post-operative (**B**) and after 36 months of follow-up (**C**).

International Journal of Drug Research and Dental Science
Volume 4 Issue 3 (Page: 1-6), 2022 ISSN: 2582-0826

Image 2: Preoperative orthopantomography that shows cavity on element 3.6 and the germ of element 4.8

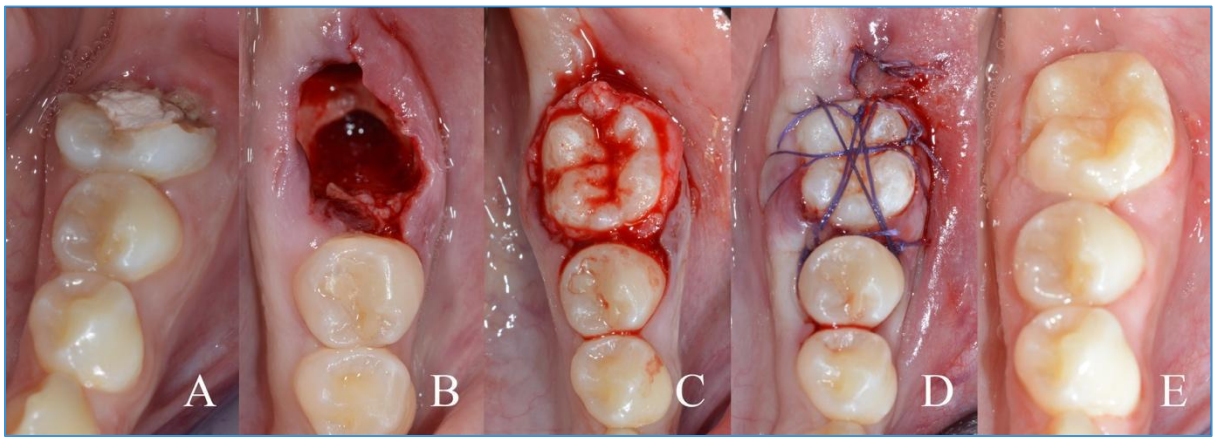

Image 3: From left to right the occlusal view of: (**A**) Initial clinical situation showing carious lesion in 3.6; (**B**) Post-extractive socket of 3.6; (**C**) Donor element (4.8) allocated in 3.6's socket; (**D**) 4.8 stabilized in the socket with stitches; (**E**) Autotransplanted tooth after a follow up of 36 months.

Results

This case report shows two significant outcomes:

1. The transplanted tooth's roots successfully grew in the post-extractive site.
2. Its pulp vitality was preserved.

After 36 months, the radiographic examination showed the transition from stage 1 to 3 of root development, according to the classification of Morrees & Coll. [7] (**Image 1C**) (**Table 2**)

Six months after the surgery, the transplanted tooth showed a positive response to the vitality test. (**Table1**). In addition, the tooth did not show pathological features at clinical and radiographic examinations at 12, 18, 24, and 36 months of follow-up. (**Image 3E**) (**Table 1**)

International Journal of Drug Research and Dental Science
Volume 4 Issue 3 (Page: 1-6), 2022 ISSN: 2582-0826

	1 W	2 W	1 M	3 M	6 M	12 M	18 M	24 M	36 M
Mobility (Miller)	2°	1°	-	-	-	-	-	-	-
Vitality test	Negative	Negative	Negative	Negative	Positive	Positive	Positive	Positivi	Positive
Radiographic examination	•	-	-	-	Intra oral rx	Intra oral rx	-	Intra oral rx	Intra oral rx and OPT
Ankylosis	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
Periodontal probing	n.r.	n.r.	n.r.	n.r.	3 mm<	3 mm<	3 mm<	3 mm<	3 mm<

Table 1: Record of clinical and radiological examination during the 36 months of follow up.

Stage 1	Initial to one quarter root formation
Stage 2	Half root formation
Stage 3	Three quarters root formation
Stage 4	Full root formation with open apical foramen
Stage 5	Full root formation with half-open apical foramen
Stage 6	Full root formation with closed apical foramen

Table 2: The stage of root development according to a qualitative classification by Morrees. [7]

Discussion

Germ autotransplantation represents a valid therapeutic option to replace teeth with an unfavorable prognosis. Transplanted teeth have a normal periodontal ligament and good tissue adaptation, which allows orthodontic movement and permits proprioceptive function so that the patient keeps a natural chewing perception. Furthermore, the transplanted elements maintain the ability to erupt in synchrony with adjacent teeth, adapt to functional requests, and develop a normal marginal gingival contour.[4]

A systematic review and meta-analysis have found a survival and success rate of >95% for autotransplantation teeth with incomplete root formation, identifying immature teeth as the ideal candidates for transplantation, due to their root growth potential and their higher probability of post-procedure pulp vitality maintenance.[5] Indeed, neo-angiogenesis is much more likely to be successful in teeth with an open apex.[9] According to the authors, the apical root foramen should be bigger and greater than 1 mm to have predictable pulp revascularization.[5,10] On the contrary, teeth with closed apex experience pulp revascularization less frequently required, as a consequence, a subsequent endodontic treatment.[11]

It is recommended to check through clinical and radiologic exams for any pathological signs during the follow-up.[12] A negative response to the thermic vitality tests is not a discriminating sign for endodontic treatment.[1] Furthermore, autotransplantation can be considered a valid solution in all those cases in which the insertion of an implant is not possible. In the reported case the patient was too young to be considered for implantology. The possible options were to extract the 3.6 and then wait for the time necessary to insert an implant or to do an autotransplantation. The second choice can be considered a better solution for two main reasons: there's no need to wait for the growth of the patient in order to perform the treatment and, as mentioned before, immature teeth are the best candidate for autotransplantation. Waiting for some time may

also reduce the success of autotransplantation as it involves the simultaneous development of the roots of the donor's tooth and, consequently, the need to perform an alveoloplasty, increasing the operating time and reducing patient compliance. In addition, autotransplantation of immature teeth reduces the possibility of exploiting the revascularization of the pulp.

Autotransplantation provides an adequate therapeutic solution, particularly when the presence of third molars with immature apex or with a root anatomy compatible with the recipient site are available.

Conclusion

As widely demonstrated in the literature, tooth autotransplantation is a valid, safe and predictable technique for the replacement of irremediably compromised teeth.

Despite its limitations, this case report confirms the efficacy of the technique, particularly in young patients who are not eligible for implantology, allowing this opportunity to be considered in the future. The success of the presented case can be attributed to germ incomplete root formation and its potential growth. Furthermore, the open apex of the donor's tooth and the surgical atraumatic technique have been critical to long-term success. A proper follow-up is anyway mandatory.

References

1. Tagliatesta L, Guerri F, Moscone S, Jones J. Autotransplantation of a mature mandibular third molar as alternative to dental implant placement: Case report. Natl J Maxillofac Surg. 2021; 12(1):93. doi: https://doi.org/10.4103/njms.NJMS_192_20
2. Almpani K, Papageorgiou SN, Papadopoulos MA. Autotransplantation of teeth in humans: a systematic review and meta-analysis. Clin Oral Investig. 2015; 19(6):1157-1179. doi: https://doi.org/10.1007/s00784-015-1473-9
3. Rohof ECM, Kerdijk W, Jansma J, Livas C, Ren Y. Autotransplantation of teeth with incomplete root formation: a systematic review and meta-analysis. Clin Oral Investig. 2018; 22(4):1613-1624. doi: https://doi.org/10.1007/s00784-018-2408-z
4. Tagliatesta L, Lorenzoni M, Arcari M. Autotransplantation of conoid maxillary third molar in upper incisive site: A reliable aesthetic solution. Int J Oral Health Dent 2022; 8(2):176-180. doi: https://doi.org/10.18231/j.ijohd.2022.034
5. Rey Lescure M, Valente NA, Chatelain S, Cinquini C, Barone A. Autotransplantation of Two Immature Third Molars with the Use of L-PRF. de Souza LN, ed. Case Rep Dent. 2021; 2021:1-8. doi: https://doi.org/10.1155/2021/6672711
6. COHEN AS, SHEN TC, POGREL MA. Transplanting Teeth Successfully: Autografts And Allografts That Work. J Am Dent Assoc. 1995; 126(4):481-485. doi: https://doi.org/10.14219/jada.archive.1995.0211
7. Northway WM, Konigsberg S. Autogenic tooth transplantation the "state of the art." Am J Orthod. 1980; 77(2):146-162. doi: https://doi.org/10.1016/0002-9416(80)90003-2
8. Moorrees CFA, Fanning EA, Hunt EE. Age Variation of Formation Stages for Ten Permanent Teeth. J Dent Res. 1963; 42(6):1490-1502. doi: https://doi.org/10.1177/00220345630420062701
9. Northway W. Autogenic dental transplants. Am J Orthod Dentofac Orthop. 2002; 121(6):592-593. doi: https://doi.org/10.1067/mod.2002.124795
10. Andreasen JO, Paulsen HU, Yu Z, Bayer T, Schwartz O. A long-term study of 370 autotransplanted premolars. Part II. Tooth survival and pulp healing subsequent to transplantation. Eur J Orthod. 1990; 12(1):14-24. doi: https://doi.org/10.1093/ejo/12.1.14

11. Chung W-C, Tu Y-K, Lin Y-H, Lu H-K. Outcomes of autotransplanted teeth with complete root formation: a systematic review and meta-analysis. J Clin Periodontol. 2014; 41(4):412-423. doi: https://doi.org/10.1111/jcpe.12228
12. Siers ML, Willemsen WL, Gulabivala K. Monitoring pulp vitality after transplantation of teeth with mature roots: a case report. Int Endod J. 2002;35(3):289-294. doi: https://doi.org/10.1046/j.1365-2591.2002.00487.x

How to cite this Article: **Luigi Tagliatesta, Matteo Arcari, Laura Porcheddu, Rania Ibrahim, Giulia Rovelli, Marco Lorenzoni;** *Catch the Timing: A Case Report of Tooth Germ Autotransplantation;* Int. J. Drug Res. Dental Sci., 2022; 4(3): 1-6, **doi:** https://doi.org/10.36437/ijdrd.2022.4.3.A
Source of Support: Nil, **Conflict of Interest:** Nil.
Received: 13-7-2021 **Revised:** 21-8-2022 **Accepted:** 27-8-2022