

Multiple Autotransplantation of Teeth in a Young Individual

Martin Starosta

Department of Dentistry, Faculty of Medicine, University of Ostrava, 703 00 Ostrava, Czech Republic

***Corresponding author**

Martin Starosta, Associate Professor, Head of Department of Dentistry, Faculty of Medicine, University of Ostrava, Ostrava, Czech Republic.
E-mail: martin.starosta@osu.cz

Received: March 23, 2024; **Accepted:** March 29, 2024; **Published:** April 02, 2024

ABSTRACT

The tooth autotransplantation is currently considered as a reliable method of replacing a lost tooth, especially in young individuals. In these persons, due to skeletal growth, conventional dental implants cannot be used, which have a negative impact on the growth of the alveolus and jaw at the anchorage. In contrast, the use of own teeth allows uninterrupted growth of both the alveolus and the jaw, and the fully integrated autograft behaves similarly to a naturally grown tooth in that location. This case report shows the use of autotransplantation for upper canine retention and subsequent replacement of the upper molar with a lower molar.

Keywords: Young Individuals, Tooth Autotransplantation, Orthodontic Treatment

Introduction

Tooth autotransplantation, which is defined as the transfer of a tooth from one site to another in the same individual, was most elaborated by Scandinavian authors [1-4]. Since the beginning of this century, this type of plantation has been considered a reliable replacement for a missing tooth, especially in young individuals. In growing individuals, a classical dental implant is contraindicated and here we use a biological implant that is inherent to the body, which is capable of osteoinduction and does not interfere with any ongoing growth processes in the surrounding area [5,6]. In this case report, autotransplantation of upper canines was performed after their unsuccessful inclusion in orthodontic therapy and subsequent replacement of the upper destroyed molar with a lower wisdom tooth.

Case Report

In March 2019, a 17-year-old girl was referred to our clinic for consultation with the possibility of autotransplantation of both upper canines. She was generally healthy, a non-smoker, took no medications and reported no allergies. The main problem was initially retinated canines in the upper jaw. At the time of the examination, orthodontic therapy had been ongoing for two years, and the canine crowns had been surgically exposed (at another office) and the orthodontist was trying to get them

into a regular position. Despite a year and a half of orthodontic treatment, there was no significant change in canines positions. Repeated slight subluxation was also performed to interrupt the presumed ankylosis. Due to the failure of this procedures, autotransplantation was considered and the girl was referred for consultation. The initial clinical and radiographic picture is shown in figures 1 and 2. The periodontal status of the other teeth was normal and oral hygiene was maintained despite long-term application of fixed orthodontic appliances in the upper and lower jaw. The meziodistal distance at the sites of the canines was sufficient and the volume of the alveolus in these areas allowed autotransplantation. Given the consent of the parents and the cooperation of the girl, we planned an autotransplantation of both upper canines.



Figure 1: Frontal view before canines autotransplantation

Citation: Starosta M. Multiple Autotransplantation of Teeth in a Young Individual. J Stoma Dent Res. 2024. 2(2): 1-6.

DOI: doi.org/10.61440/JSDR.2024.v2.08



Figure 2: A panoramic radiograph before canines autotransplantation

In May 2019, autotransplantation of both upper canines was performed. First the canine in area 13 was transplanted, then in area 23. Surgery was performed under antibiotic cover with broad-spectrum penicillin (Augmentin 1g, GlaxoSmithKline®) and local anesthesia (Supracaine, Zentiva®). After uncovering the mucoperiosteal flap at the site of the future transplantation shaft, the tooth to be autotransplanted was gently extracted without the use of extraction levers. The tooth was then placed in saline for the duration of alveolar preparation. According to the root dimension of the transplanted tooth, the alveolus was prepared in the desired location and the tooth was inserted into its new position. After the retraction and soft tissue preparation, the suture was made with 5/0 monofilament (Resopren, Resorba®). The transplanted teeth were then temporarily fixed with a rubber chain to the surrounding locks of the orthodontic appliance (Figure 3). After completion of surgery, the patient was instructed on postoperative care, which consisted of continued use of antibiotics (for one week), use of analgesics as needed, cooling of the operated area on the day of surgery and the following day, and diet modification. Only a soft diet for two weeks and avoidance of mechanical hygiene in the operated area were recommended. Only chlorhexidine solution (Corsodyl, GlaxoSmithKline®) for lavage twice a day was recommended. After two weeks, the clinical status was checked (Figure 4), a control intraoral X-ray was performed and the sutures were removed. Satisfactory tissue healing was ongoing and replacement of the provisional fixation with a temporary passive fixation in the arch of the upper fixed orthodontic appliance was recommended. The next follow-up was in 2 months. Due to sufficient healing of the periodontium, active orthodontic treatment was recommended with completion of the adjustment of the position of the transplanted teeth. A control orthopantomogram was also performed (Figure 5). In December, a follow-up appointment was held after the completion of orthodontic treatment (Figure 6). The canines were in regular alignment, the patient had no problems and was satisfied with the aesthetic and functional results (Figure 7.). Intraoral radiographs did not show periapical lesion in either of the transplanted teeth. However, tooth 13 showed evidence of cervical resorption (Figure 8) and therefore endodontic treatment was recommended. Another inspection took place in June 2020. The condition of both autotransplanted canines were stable and tooth 13 did not show any further progression of cervical resorption after endodontic treatment (Figure 9).

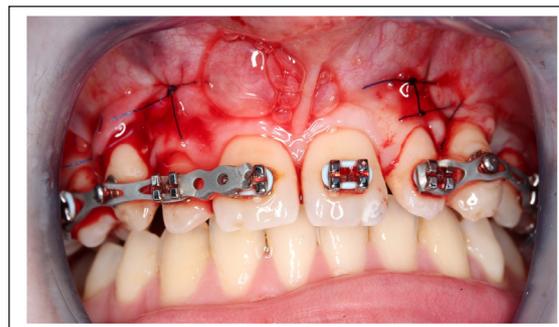


Figure 3: The upper canines after autotransplantation



Figure 4: Two weeks after autotransplantation of upper canines



Figure 5: A panoramic radiograph two months after canines autotransplantation



Figure 6: Frontal view after finishing of orthodontic treatment.



Figure 7: The smile of the girl after treatment



Figure 8: The intraoral x-ray of tooth 13 with cervical resorption on distal part



Figure 9: The intraoral x-ray of tooth 13 six month after endodontic treatment

During the wearing of the fixed orthodontic appliance, the crown of tooth 26, was destroyed by caries and indicated for extraction. Due to successful autotransplantation, the patient inquired about the possibility of a similar solution for molar replacement. The OPG indicated the possible use of a retinated wisdom tooth 38. (Figure 10). After discussion, the patient was scheduled for extraction of the destroyed tooth 26 and autotransplantation of tooth 38 into the site of tooth 26. Everything took place under similar conditions as previous autotransplantations but fixation of the molar was made by monofilament cross-stitch over the tooth occlusion (Reopren 5/0, Resorba ®) (Figure 11,12). After 14 days, the sutures were removed and the clinical and radiological status was checked (Figure 13,14). Healing was satisfactory and at the next follow-up in 3 months, the tooth was firmly cast in its new position, without any subjective problems (Figure 15).

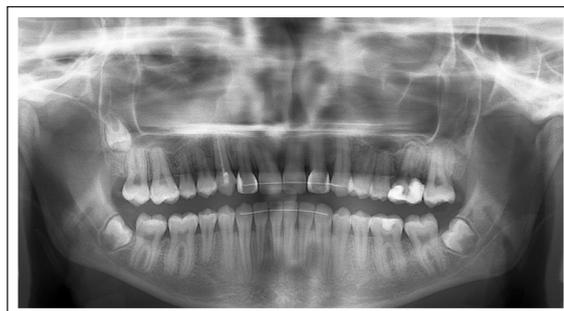


Figure 10: A panoramic radiograph after succesfull canines autotransplantation and before extraction of tooth 26 and wisdom tooth (in area 38) autotransplantation



Figure 11: The wisdom tooth in saline solution

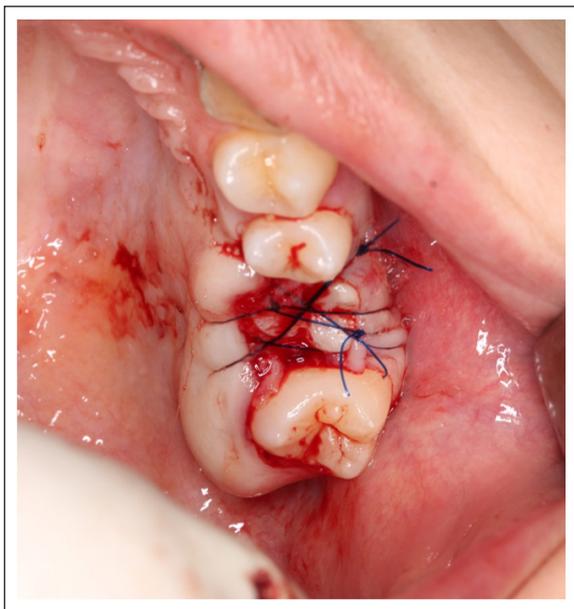


Figure 12: The wisdom tooth in new position in upper jaw

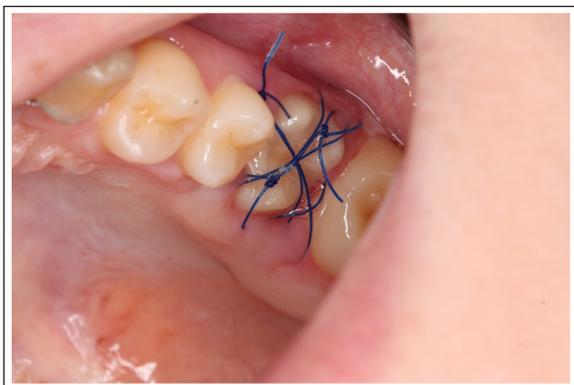


Figure 13: Two weeks after molar autotransplantation



Figure 14: The intraoral x-ray of autotransplanted wisdom tooth, two weeks later

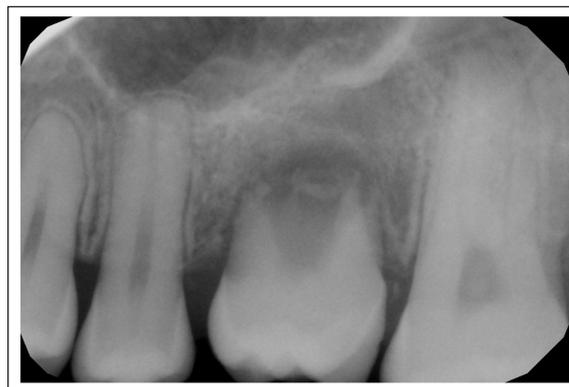


Figure 15: The intraoral x-ray of autotransplanted wisdom tooth, 3 months later

At the last follow-up of all three autotransplanted teeth, which took place after 4 years, the condition of all autografts was satisfactory (Figure 16,17). The patient had no subjective discomfort, the periodontal sulcus depth did not exceed 2 mm, the teeth were sufficiently strong and showed no signs of ankylosis. During the Periotest (Siemens®) examination we measured positive values in both canines (+2) and transplanted molar (+4). X-ray examination showed stable peridontium in all teeth. The transplanted molar had completed root development and signs of obliteration of the pulpal cavity (Figure 18). The cervical resorption of tooth 13 was not in progress and tooth 23 was free of periapical lesion (Figure 19,20).



Figure 16: The four years after treatment – frontal view



Figure 17: The four years after treatment – detail of autotransplanted molar in upper jaw



Figure 18: The intraoral x-ray of autotransplanted wisdom tooth, 4 years later



Figure 19: The intraoral x-ray of tooth 13, 4 years after autotransplantation

Discussion

One of the important factors influencing the success of autotransplantation is not only the patient's cooperation and the gentle and quick execution of the procedure, which depends on the experience of the dentist, but also the stage of root development [7,8]. In determining the stage of root development, the Moorrees's classification is most commonly used [9]. The most suitable developmental stage for autotransplantation is considered to be when $\frac{3}{4}$ of the root length is developed and the apex is wide open (stage IV). In these cases, pulp revascularization and tertiary dentin formation occurs, which is reflected on the radiograph by obliteration of the pulpal cavity and continued root development [10,11]. This picture was perfectly demonstrated in the case of molar autotransplantation. It was transplanted at the second stage of root development, when the length of the crown is greater than the length of the developed roots. Even at this low root developmental stage, there was no disruption of development and the roots completed their growth. In the case of canines,



Figure 20: The intraoral x-ray of tooth 23, 4 years after autotransplantation

these were already fully developed teeth in the VI stage of root development. However, due to the age of the patient, the canines were not primarily indicated for endodontic treatment although this is often indicated [12]. The right upper canine had invasive cervical resorption and was therefore indicated for endodontic treatment. After endodontic treatment, the resorption stopped. The left upper canine showed no signs of root resorption or periapical lesion and was left without endodontic treatment. In all three cases of autotransplantation, the only complication was cervical resorption, and none of the teeth developed ankylosis. This corresponds to the most frequently described complications of tooth autotransplantation [13]. We consider this case of multiple autotransplantation in one individual to be a successful addition to orthodontic treatment.

Conclusion

One young individual underwent autotransplantation of three teeth. In all cases, the transplanted teeth healed without problems.

This type of treatment can be considered a suitable and reliable method in the indicated cases.

References

1. Andreasen JO, Paulsen HU, Yu Z, Ahlquist R, Bayer T, et al. A long-term study of 370 autotransplanted premolars. Part I. Surgical procedures and standardized techniques for monitoring healing. *Eur J Orthod.* 1990. 12: 3-13.
2. 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: 14-24.
3. Andreasen JO, Paulsen HU, Yu Z, Schwartz O. A long-term study of 370 autotransplanted premolars. Part III. Periodontal healing subsequent to transplantation. *Eur J Orthod.* 1990. 12: 25-37.
4. Andreasen JO, Paulsen HU, Yu Z, Bayer T. A long-term study of 370 autotransplanted premolars. Part IV. Root development subsequent to transplantation. *Eur J Orthod.* 1990. 12: 38-50.
5. Mankani N, Chowdhary R, Patil BA, Nagaraj E, Madalli P. Osseointegrated dental implants in growing children: a literature review. *J Oral Implantol.* 2014. 40: 627-631.
6. Bohner L, Hanisch M, Kleinheinz J, Jung S. Dental implants in growing patients: a systematic review. *Br J Oral Maxillofac Surg.* 2019. 57: 397-406.
7. 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: 1613-1624.
8. Lucas-Taulé E, Bofarull-Ballús A, Llaquet M, Mercade M, Hernández-Alfaro F, et al. Does Root Development Status Affect the Outcome of Tooth Autotransplantation? A Systematic Review and Meta-Analysis. *Materials (Basel).* 2022. 15: 3379.
9. Moorrees CF, Fanning EA, Hunt EE Jr. Age variation of formation stages for ten permanent teeth. *J Dent Res.* 1963. 42: 490-502.
10. Kim E, Jung JY, Cha IH, Kum KY, Lee SJ. Evaluation of the prognosis and causes of failure in 182 cases of autogenous tooth transplantation. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2005. 100: 112-119.
11. Jang Y, Choi YJ, Lee SJ, Roh BD, Park SH, et al. Prognostic Factors for Clinical Outcomes in Autotransplantation of Teeth with Complete Root Formation: Survival Analysis for up to 12 Years. *J Endod.* 2016. 42: 198-205.
12. Aoyama S, Yoshizawa M, Niimi K, Sugai T, Kitamura N, et al. Prognostic factors for autotransplantation of teeth with complete root formation. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2012. 114: S216-228.
13. Singh AK, Khanal N, Acharya N, Hasan MR, Saito T. What Are the Complications, Success and Survival Rates for Autotransplanted Teeth? An Overview of Systematic Reviews and Metanalyses. *Healthcare (Basel).* 2022. 10: 835.