# AUTOTRANSPLANTATION OF MATURE MAXILLARY INCISORS; A REPORT OF TWO CASES

**Obeng Ani C.I.[1], Appiah-Kubi E.[2], Frimpong P.B.[3]**

[1] Dental Department, Holy Family Hospital, Techiman
[2] Department of Orthodontics/peadodontics, Komfo Anokye Teaching Hospital
[3] Department of Oral Medicine and Oral Pathology, University of Ghana Dental School.

Corresponding Author: Dr. Clement Obeng Ani, Holy Family Hospital, Techiman,
ORCID iD:-0009-0009-2872-8347
Correspondence e-mail: isaaclems10@gmail.com

DOI: https://dx.doi.org/10.4314/gdj.v21i1.9

## ABSTRACT

Autotransplantation is the transplantation of embedded (in bone) or erupted teeth in the same individual, from one site to another, into extraction sites or surgically prepared sockets.
The success of autotransplanted teeth depends on some key prognostic factors. These include the viability of the periodontal ligament (PDL), the stage of root formation, the extra-alveolar time for the donor tooth, and the patient's age.
We present two cases of autotransplantation involving ectopically positioned mature maxillary incisors, which have been followed up for two years and one and a half years for cases 1 and 2, respectively, without complications.
It can be concluded that autotransplantation is a viable treatment option for missing or ectopically positioned teeth with satisfactory aesthetic and functional results.

**KEYWORDS:** Autotransplantation, maxillary incisors, ectopic, teeth, mesiodens, malocclusion

## INTRODUCTION

Autotransplantation is the transplantation of embedded(in bone) or erupted teeth in the same individual, from one site to another, into extraction sites or surgically prepared sockets[1].
This procedure was first reported in the literature in the 1950s 5 and has evolved to become a viable treatment option for replacing missing, ectopic, and extracted teeth due to advanced caries[2-5].
The early literature focused on autotransplantation of immature wisdom teeth to replace permanent first molars with poor prognosis[5]. Subsequently, many authors have successfully performed the procedure using canines, maxillary first premolars, and incisors[2,3,6,7]. In Ghana, Amuasi et al.[8] and Amoah et al.[9] have reported successful cases of autotransplantation using mandibular premolars.
The success of autotransplanted teeth depends on some key prognostic factors. These include the viability of the periodontal ligament(PDL), the stage of root formation, the extra-alveolar time for the donor tooth, and the patient's age, among others[1,10-15].
Successful tooth transplantation improves esthetics, arch form, dentofacial development, mastication, speech, and arch integrity[1]. Some authors have recommended a multidisciplinary approach to ensure good aesthetic and functional outcomes.[7,16]

In this paper, the authors present two cases of autotransplantation involving ectopic maxillary permanent central and lateral incisors in an adolescent female and adult male patient, respectively.

## CASE PRESENTATIONS

### CASE 1

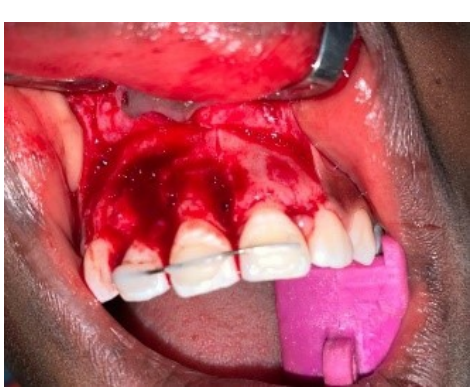
A 13-year-old female patient was referred to the oral health department of the Holy Family Hospital, Techiman, complaining of poor arrangement of the upper front teeth. Both patient and relatives had noticed an abnormally growing tooth in the midline of the maxilla, resulting in malalignment of the front teeth. This was posing a major cosmetic challenge to the patient. The rest of the medical and dental history was non-contributory.
On examination, the patient appeared calm and generally healthy, without any visible facial deformity.
Intraorally, the permanent dentition from the incisors to the second molars was present in each quadrant. Significantly, a conically shaped supernumerary tooth was seen in the midline of the maxilla with a labially erupted central incisor (11), directly overlying the ipsilateral lateral incisor(12) shown in Fig. 1 B, C.
A working diagnosis of Angle's Class I malocclusion complicated by mesiodens was made. A periapical radiograph was requested, which confirmed the presence of a mesiodens and revealed complete root formation of the ectopic central incisor (Fig.1 A)
The first line treatment option, surgical extraction of the supernumerary tooth followed by orthodontic correction of the malocclusion, was suggested to the patient and relatives. Relatives, however, declined the orthodontic option, citing financial challenges and the inconvenience of travelling to a distant facility to access the service. They rather consented to the second option of autotransplantation of the ectopic central incisor following surgical extraction of the mesiodens.
The patient was scheduled for autotransplantation at a convenient date under local anesthesia.
Intraoperatively, a mucoperiosteal flap was raised, and extraction of the mesiodens was performed. The ectopic Central incisor was extracted and preserved in a physiologic saline solution (0.9% NaCl solution) for 12 minutes. The socket at the recipient site was prepared using round and fissure-type surgical burs fitted to a slow, straight handpiece to meet the root morphology of the incisor. Intermittent drilling motion and copious irrigation with 0.9% NaCl solution were used. The ectopic incisor was transplanted and splinted to the adjacent teeth using 0.7mm stainless steel wire and light-cured composite resin for 12 weeks. Autogenous bone graft was harvested from the donor socket area and used to graft the recipient site to improve bone healing and support. The mucoperiosteal flap was returned and sutured using 3/0 Vicryl® resorbable suture. An immediate post-operative radiograph was taken.
The auto-transplanted tooth was root-treated after two(2)weeks. A single-visit root canal treatment was performed using a 2% Milton® solution, and the canal was

obturated using Endoseal® and Gutta-percha points(Gapadent®). The splint was kept in situ for 12 weeks (approximately three months) to ensure adequate bone healing. The case has been followed up for 2-years without any significant complications. (fig 1-F &G)

A

B

C



D

E

F

G

**Figure 1 -showing pre-operative, intra-operative and post operative images of the case.**
**A- Pre-operative periapical showing a supernumerary tooth in the midline**
**B&C- Pre-operative intraoral images showing the ectopic 11 and the mesiodens.**
**D&E-Intra-operative images showing the autotransplanted 11 with a composite wire splint**
**F-Post-operative intraoral image after 2years**
**G-Post-operative periapical after 2years**

**CASE 2**

A 36-year-old male patient presented to the Oral Health department of our hospital with complaints of poor arrangement of his upper front teeth. He had noticed the malaligned teeth growing up and admitted to the situation affecting his bite and smile. His past medical and dental histories were unremarkable.

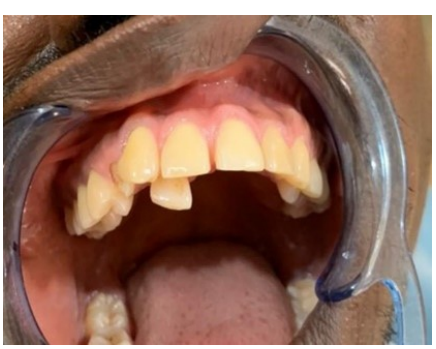
On examination, the patient was well nourished with no apparent facial abnormality.

Intraorally, he had a complete set of permanent dentitions. For status localis, he had a retained primary canine in the first quadrant(53); the ipsilateral canine had drifted into the lateral incisor position (12). The Lateral incisor was ectopically positioned palatal to the 11 and 13(fig.2-A&B).

A diagnosis of Upper anterior crowding(Angle's class I malocclusion) complicated by a retained deciduous canine was made. Treatment options were discussed with the patient, including Orthodontic correction, Restorative management, and autotransplantation of the lateral incisor. The patient opted for autotransplantation after orthodontic and restorative consultations. The cost and duration of treatment influenced his decision.

The autotransplantation and post-operative management procedures were the same as in case 1 presented above, except that no bone graft was required. Since a lateral incisor was transplanted into the canine position, it was necessary to recontour the crowns to enhance the aesthetic outlook.

This case has been followed up for one (1)year and six (6)months with satisfactory functional and aesthetic outcomes. The patient is still being reviewed to determine any future complication



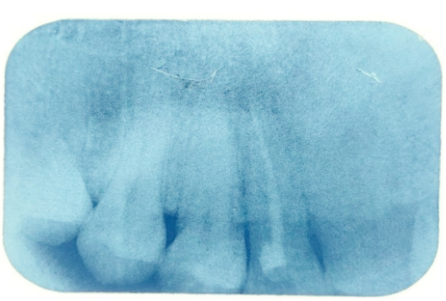
A

B

C

D

E



F

**Figure -2-showing pre,peri and post operative and follow-up images of the second case.**
**A&B- Pre-operative intraoral images showing the retained deciduous canine(53) and the ectopic lateral incisor 12 palatal to the canine and central incisor.**
**C- Intra-operative image showing the recipient and donor socket**
**D-Intra-oral image at 1 year follow up review**
**E-immediate post-operative periapical showing the transplanted 12.**
**F-Post-operative periapical showing the root treated 12 at 1year 6months.**

## DISCUSSION

Autotransplantation is a practicable alternative to the management of simple malocclusion due to crowding or missing teeth and can be an affordable treatment option compared to orthodontic treatment or prosthetic rehabilitation[15].

In the cases presented, malocclusion involved a few teeth, and affordability was a major concern for the patients, making autotransplantation a suitable treatment option.

The favorable prognostic indicators in these two cases include the young age in the first case, adequate space, and absence of infection at the recipient site. These factors favorably compare with the findings of many studies[6,12,14,15,16].

The most significant factor for successful autotransplantation is maintaining the viability of periodontal ligament cells in the donor tooth. This can be achieved by minimizing extra-oral time during the surgical operation[2]. Furthermore, it is recommended that the extra-alveolar time for the donor tooth is kept below 15 minutes, limited manipulation of the donor's tooth in the recipient socket, atraumatic extraction, and keeping the donor tooth in an appropriate environment to maintain the viability of the PDL cells[1,16-18].

To ensure a favorable outcome in the treatment of our cases, an atraumatic extraction of the donor teeth was done, and teeth were kept in 0.9% NaCl solution during recipient socket preparation.

There is controversy concerning the fixation type and duration of the transplanted tooth[19]. While some authors recommend no splints or, at best, short-term flexible splints to avoid inflammatory root resorption and ankyloses18, others propose rigid fixation where the stability of the donor tooth is required[8,13,18]. The latter recommendation was favorable in our first case, where additional bone support was required. The composite resin wire splint was left in situ for 3 months, at which time sufficient bone healing was expected. Though primary stability was achieved in the second case, an additional resin wire splint was provided for 4weeks.

There is documented role of endodontic therapy in the success of autotransplanted teeth with closed apex in the literature. In a study by Cui et al., among 29 transplanted teeth, eight of the 20 teeth that did not receive root canal therapy(RCT) were removed, while all nine teeth that had been treated were in good condition[11]. According to the statistical results, RCT can greatly improve the success rate of autogenous tooth transplantation. This finding compares favorably with our post-operative treatment modality. It is consistent with that reported by Candeiro et al. [16]. In our case, RCT was performed two weeks after autotransplantation, which was consistent with the recommended 7- 15 days [5,8,11,15]. A single-visit technique was used since there was no evidence of infection of the canals at the time of treatment. Standard materials such as 2.5% NaOCl (Milton) solution, Endoseal®, and Gutta-percha points were used as an irrigant, root canal cement, and filling material respectively, during the root treatment.

Treatment failure is evidenced by clinical and radiographic changes such as hypermobility, increased pocket depth (more than 4mm), and external root resorption[1]. In our case, there is a need for continuous follow-up to assess the long-term outcome.

## CONCLUSION

Autotransplantation is a viable treatment option for replacing missing and ectopically positioned teeth and can serve as a cost-effective treatment modality compared to dental implants and orthodontic treatment.

Careful patient selection, considering prognostic indicators, will ensure a high success rate. A multidisciplinary approach will enhance desirable aesthetic and functional outcomes.

## REFERENCES


1. Almpani K, Papageorgiou SN, Papadopoulos MA. Autotransplantation of teeth in humans: a systematic review and meta-analysis. Clin Oral Invest [Internet]. 2015 Jul 1 [cited 2024 Jan 14];19(6):1157–79. Available from: https://doi.org/10.1007/s00784-015-1473-9

2. Kim MS, Lee HS, Nam OH, Choi SC. Autotransplantation: A Reliable Treatment Modality for Severely Malpositioned Teeth. Journal of Clinical Pediatric Dentistry [Internet]. 2017 Jan 1 [cited 2024 Jan 14];41(5):388–91. Available from: https://meridian.allenpress.com/jcpd/article/41/5/388/78906/Autotransplantation-A-Reliable-Treatment-Modality

3. Ambrósio MFS, Cançado RP, Oliveira BCG, Masioli MA, Cunha DL. Dental autotransplantation as a alternative treatment for the loss of permanent anterior teeth in children. Dental Press J Orthod. 2022 Sep 23;27(4):e22spe4. doi: 10.1590/2177-6709.27.4.e22spe4. PMID: 36169499; PMCID: PMC9507021.

4. Sicilia-Pasos J, Kewalramani N, Peña-Cardelles JF, Salgado-Peralvo AO, Madrigal-Martínez-Pereda C, López-Carpintero Á. Autotransplantation of teeth with incomplete root formation: systematic review and meta-analysis. Clin Oral Investig. 2022 May;26(5):3795–805.

5. Amos MJ, Day P, Littlewood SJ. Autotransplantation of Teeth: An Overview. Dent Update [Internet]. 2009 Mar 2 [cited 2024 Jan 14];36(2):102–13. Available from: http://www.magonlinelibrary.com/doi/10.12968/denu.2009.36.2.102

6. Grisar K, Nys M, The V, Vrielinck L, Schepers S, Jacobs R, et al. Long-term outcome of autogenously transplanted maxillary canines. Clinical and Experimental Dental Research [Internet]. 2019 [cited 2024 Jan 14];5(1):67–75. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/cre2.159

7. Berlin-Broner Y, Torrealba Y, Flores-Mir C, Levin L. Multidisciplinary Approach for Autotransplantation and Restoration of a Maxillary Premolar into an Area of an Avulsed Anterior Tooth: A Case Report with a 6-Year Follow-up. J Endod. 2023 May;49(5):590–6.

8. Amausi AA, Sabbah DK, Asiamah IK, Ntiamorah C, Akwei R. Case report: Management of Angles Class I Malocclusion with Bimaxillary Dentoalveolar Proclination. West African Journal of Orthodontics [Internet]. 2021 Dec 13 [cited 2024 May 1];10(2):28–36. Available from: https://www.wajo.oauifeedu.ng/index.php/wajo/article/view/230

9. Amoah KG, Hewlett SA, Nartey NO. Newman MA. The replacement of an avulsed maxillary incisor using premolar autotransplantation: a case report. Ghana Dental Journal, 2015 vol.12 (1) 28-30.

10. Sugai T, Yoshizawa M, Kobayashi T, Ono K, Takagi R, Kitamura N, et al. Clinical study on prognostic factors for autotransplantation of teeth with complete root formation. International Journal of Oral and Maxillofacial Surgery [Internet]. 2010 Dec 1 [cited 2024 Jan 26];39(12):1193–203. Available from: https://www.sciencedirect.com/science/article/pii/S0901502710002997

11. Cui X, Cui N, Li X, Du X, Zhang S, Wu C, et al. Effect of Root Canal Therapy on the Success Rate of Teeth with Complete Roots in Autogenous Tooth Transplantation. Scanning [Internet]. 2021 [cited 2024 Jan 14];2021. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8062180/

12. Barber SK, Kenny K, Czochrowska E, Plakwicz P, Houghton NY, Day PF. Identifying important prognostic factors and outcomes for autotransplantation of developing teeth: Clinicians' perspectives. Dent Traumatol. 2023 Jul;39 Suppl 1:30–9.

13. Tsukiboshi M, Yamauchi N, Tsukiboshi Y. Long-term outcomes of autotransplantation of teeth: A case series. Dental Traumatology [Internet]. 2019 [cited 2024 Jan 14];35(6):358–67. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/edt.12495

14. Kafourou V, Tong HJ, Day P, Houghton N, Spencer RJ, Duggal M. Outcomes and prognostic factors that influence the success of tooth autotransplantation in children and adolescents. Dent Traumatol. 2017 Oct;33(5):393–9.

15. Badalyan VA, Zedgenidze AM. [Success factors for dental autotransplantation]. Stomatologiia (Mosk). 2020;99(4):81–5.

16. Candeiro GT, Alencar-Júnior EA, Scarparo HC, Furtado-Júnior JH, Gavini G, Caldeira CL. Eight-year follow-up of autogenous tooth transplantation involving multidisciplinary treatment. J Oral Sci. 2015 Sep;57(3):273-6. doi: 10.2334/josnusd.57.273. PMID: 26369494.

17. Park JH, Tai K, Hayashi D. Tooth Autotransplantation as a Treatment Option: A Review. Journal of Clinical Pediatric Dentistry [Internet]. 2011 Mar 16 [cited 2024 Jan 26];35(2):129–35. Available from: https://doi.org/10.17796/jcpd.35.2.97816254u2140x88

18. Jang Y, Choi YJ, Lee SJ, Roh BD, Park SH, Kim E. Prognostic Factors for Clinical Outcomes in Autotransplantation of Teeth with Complete Root Formation: Survival Analysis for up to 12 Years. Journal of Endodontics [Internet]. 2016 Feb 1 [cited 2024 Jan 26];42(2):198–205. Available from: https://www.sciencedirect.com/science/article/pii/S0099239915009887

19. Ashurko I, Vlasova I, Yaremchuk P, Bystrova O. Autotransplantation of teeth as an alternative to dental implantation. BMJ Case Rep [Internet]. 2020 Jun 11 [cited 2024 Jan 14];13(6):e234889. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7295376/