

A Case Report with Two-Year Follow-Up of Auto-Transplantation Tooth

Ahmed Mohammed A. AL-Sareti^{1*}, Haitham Mohammed H. Sharrahi², Faisal Abduh A. Daghreeri², Mohammed M. Al Moaleem^{3, 4*}

¹Faculty of Dentistry, Civilization University, Sana'a, Yemen

²Dental Interns, College of Dentistry, Jazan University, Jazan, SA

³Prosthetic Dental Science Department, College of Dentistry, Jazan University, Jazan, SA

⁴Faculty of Dentistry, University of Ibn al-Nafis for Medical Sciences, Sana'a, Yemen

DOI: [10.36348/sjodr.2023.v08i08.003](https://doi.org/10.36348/sjodr.2023.v08i08.003)

| Received: 29.06.2023 | Accepted: 03.08.2023 | Published: 08.08.2023

*Corresponding author: Ahmed Mohammed A. AL-Sareti

BDS, General Dentist, 1Faculty of Dentistry, Civilization University, Sana'a, Yemen

Abstract

Autotransplantation of a maxillary premolar tooth is a considerable option for tooth replacement in young adult patients, while Hemisection is a conservative way of preserving teeth. In this case report, we describe successful autotransplantation of the mesial root of the mandibular molar to replace the first maxillary premolar with complete root formation. The donor root was immediately placed at the recipient site and splinted for 14 days. Root canal treatment (RCT) was initiated 3 weeks after transplantation. Clinical and radiographic findings at 24 months of follow-up are compared with the results described in the literature. In case of non-extraction, adjacent teeth can be preserved in an economical way, also, case selection is essential in performing sequences of procedures for the success of treatment.

Keywords: Transplantation of root, mandibular molar, donor tooth, autotransplantation.

Copyright © 2023 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

BACKGROUND

Tooth auto-transplantation involves the extraction of a tooth from one site, to be implanted into another site, within the same patient's oral cavity. It is considered a valuable treatment option as an alternative to extraction without replacement, implant-supported crowns, or other treatment options [1, 2]. Also, can be defined as the preplanned repositioning of a certain non-erupted, partially erupted, or fully erupted tooth that is done within the same patient [3, 4]. Autotransplanted teeth have many advantages, such as periodontal ligament proprioception, continuous skeletal growth, and better aesthetics [5].

A study by Kvint *et al.*, showed that 82.0% of transplanted teeth were classified as successful and 98.2 were present at the end of follow-up. No transplants were extracted after 12 months follow-up. The overall survival rate after 60 months was 87.5% [6]. Recently, a review published by Rohof *et al.*, concluded that the survival and success rates of autotransplantation reported after 12,60,120 months were 97.4, 97.8, and 96.3, respectively with an overall of 98.2% survival rate per year, and 96.6% of success rate [7]. In other review,

the survival rates were 97.4–98.0%, and ranged from 81 to 98.2% after 12, and 60 months, respectively [8]. Also, Tooth autotransplantation is a valuable alternative treatment option that requires a multidisciplinary team approach to restore function and aesthetics to the patient. It will become another viable treatment option for those with compromised teeth who still have significant growth potential [9].

Hemisection is a conservative way of preserving teeth. It is a surgical procedure which involves resection and subsequent extraction of a compromised root up to the level of furcation [10-11]. It is indicated are loss of supporting bone around one root, broad subgingival root caries affecting only one root, root perforation caused by resorption or instrument, as well as a RC cannot be obturated due to obstruction, bent root shape, or root fracture [12, 13].

The aim of this case report was to describe the steps of hemi-sectioning of mandibular first molar and used the mesial root and auto-transplant it to restore badly carious maxillary premolar, Also, to assess and follow-up the auto-transplantation after 24-months, and

if this technique can provide long term, cost-effective and biological solution for young female patient.

CASE REPORT

A young female patient with 35 years old attended to dental clinic, Faculty of Dentistry, Civilization University, Sana'a, Yemen. She complained of badly carious tooth in the upper frontal tooth and wants to restore all of her teeth. She has been a khat chewers since 10-years ago, had a fair oral hygiene, and she was medically fit with no systemic diseases.

Extra oral findings were within normal and face symmetry. The intraoral finding shows multiple carious teeth, extracted teeth since many years ago, and destructive teeth. Teeth # 14, and 15 were destructed by caries and extended apically, and failure previous RCT of tooth # 46 with bifurcation involvement (Figure 1 A-B). The radiographic findings show poor crown root ration in relation to tooth # 14 with 9mm root length. The 1st mandibular right-side molar tooth shows separation of mesial and distal root with periapical pathosis in relation to the mesial root, due to failure previous RCT. It had longer mesial root with 13 mm length (Figure 1 C-D).

The case was diagnosed as extraction of the mesial root of tooth # 46 and remaining root of maxillary right first molar. Treatments options were discussed with the patient, and she agreed with removal of remaining root of tooth #14 and replaced it by a mesial root from the tooth # 46 by auto transplantation technique. The treatment plan by phases suggested by Rosenstiel *et al.*, was followed after agreement from the patient (14). It consisted of the following phases:

Phase I: the preparatory phase which included, local anesthesia injection, removing both tooth # 14 and hemi-sectioning for tooth # 46, then by an atraumatic extraction of mesial root was finished, and inserted immediately into the bony socket of tooth # 14, periapical x-ray was taken to confirm the insertion of the auto transported root, then splinting with orthodontic wire and composite resin material (Figure 2 A-D). After two weeks, removing of splinting wire, then RCT for both premolars as the auto transported root and tooth # 15 were started (Figure 2 E-H). Phase II: in the maxillary arch, root canal retreatment for both roots of teeth # 14 and 15 followed by glass ionomer fillings and crown lengthening of both teeth (Figure 3 A-E), later, RCT of distal root of mandibular right 1st molar was carried-out.

Phase III: custom made post and core was constructed, followed by a porcelain fused to metal cantilever bridge to replace the hem-sectioned mesial crown (Figure 4 A-C). Glass fiber posts and composite build up were done for teeth # 14 and 15 (Figure 4 D-G). After 12 months, the final teeth preparation was done following the principles and guidelines for tooth preparation of full crowns, wax-up of crowns, metal try-in, and porcelain build-up then try in as well as occlusal adjustment during different mandibular movements were done (Figure 4 H-K). Finally, cementation of the two crowns with glass ionomer cement (Figure 4 L), followed by immediate intraoral photo as well as periapical x-ray (Figure 5 A-B). All the laboratory and clinical steps were followed by the recommendation and instruction of each material used alone. Phase IV: The patient was followed up after 12 and 24 months, and preapical radiograph was taken at these intervals (Figure 5C).



Figure 1: Preoperative intraoral view A-B, and OPG (C-D)



Figure 2: During preparatory phase as removal of mesial root of tooth # 46 (A), root autoimplanation in area of tooth #14 and splinting (B-G), RCT (H)

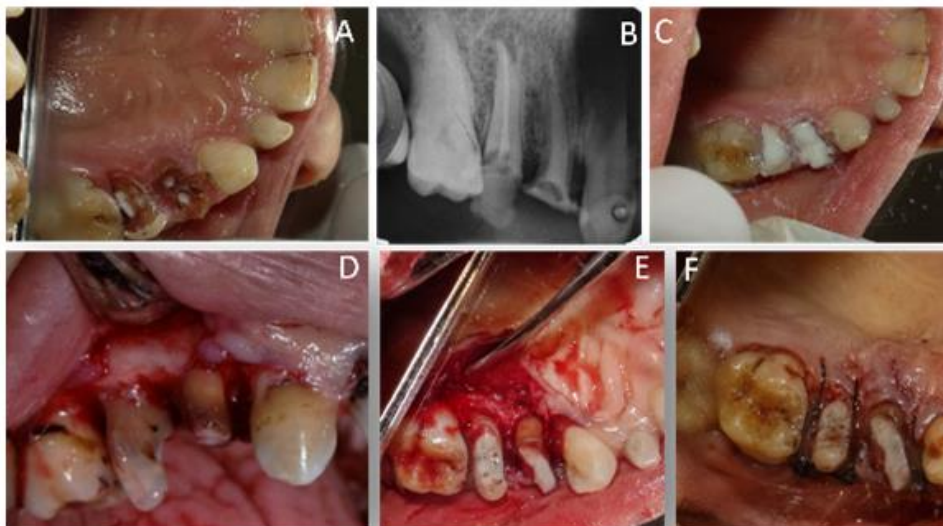


Figure 3: During Phase II as RCT of teeth # 14, and 15 (A-C), and crown lengthening (D-F)



Figure 4: Phase III included prosthetic treatment of mandibular distal root of tooth # 46 (A-C). Post and core buildup of teeth 14, and 15, and prosthodontic steps (D-L)

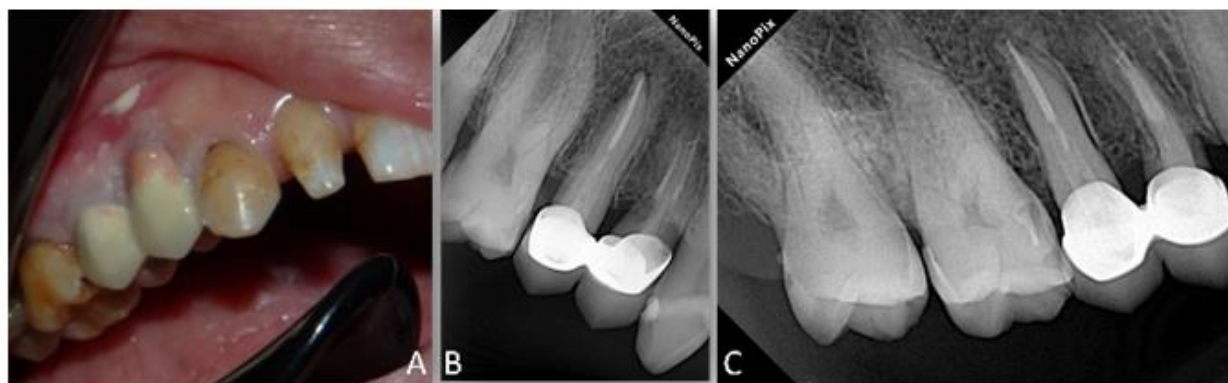


Figure 5: Postoperative as intraoral view (A), preapical (B), and preapical after 24-months (C)

DISCUSSIONS

This case report assessed and followed up an auto-transplantation tooth to replace a missing single root premolar tooth in the maxillary arch. After 24-months follow up the auto-transplantation tooth showed excellent prognosis as well as absent of any clinical and radiographical complications. The same results were mentioned earlier by a group of studies, those mentioned that autotransplanted teeth in a single root in the maxillary arch had reported a good survival rate with absent of pulp condition, mobility, of ankylosis, and root resorption of with complete root formation [7, 15-17].

After two weeks from the autotransplantation, the suture and the splint were removed, then the root had a grade II mobility, this moderate mobility will be as a good indicator to prevent the ankylosis. Also, the healing of the surrounding gingiva was good, and a new bone formation around the root was evident, no periapical lesions, and no external or internal resorption showed after 3-months of autotransplantation.

A hemi-section can only be implemented on mandibular molars, which are the larger, flatter teeth. It cannot be completed on smaller teeth since they lack the strength and stability required to remain functional after sectioning. This technique is usually done after endodontic approach, includes the RCT followed by a post and core of the remaining root and restoring them with appropriate prosthetic material and splinting it with the adjacent tooth to decrease the risk of displacement followed by a fixed prosthodontic prosthesis to maintain the occlusal relationship of the opposing arches [12]. The challenge for this case was that the donor tooth was hopeless and destroyed root for tooth # 46 and it didn't have supra structure part, and crowning cannot be performed without modification the root surface surgically. The time of procedure to preserve the vitality of the PDL to keep. follow up for 2 years, then the root covered with final crown restoration.

The replacement of the extracted root was restored with a cantilever prosthesis supported by the

distal root of the same tooth after RCT and post-build-up. This is in agreement with researchers mentioned the results of hem-sectioning of mandibular molar, followed by a cantilever porcelain fused to metal bridge. In such technique we avoid the destructive preparation of the mesial tooth [10, 19]. In addition, PFM prostheses are still the most familiar dental technicians, easier preparation by most of general practitioners, and less cost effective than other restorative systems [20-23].

The clinical significance of this case was that the tooth was fixed inside socket after 3 weeks without any type of resorption up to date with good gingival healing was good. There is a new bone formation around the tooth root, with no periapical lesions as seen in the preapical radiograph after 24-months in Figure 5C.

CONCLUSION

Auto-transplantation can be a good choice for the treatment of maxillary premolar missing teeth and should be used immediately after extraction from both the hapless teeth and donor root, and it can be recommended as one solution to restore the missing teeth.

REFERENCES

1. Plotino, G., Abella Sans, F., Duggal, M. S., Grande, N. M., Krastl, G., Nagendrababu, V., & Gambarini, G. (2020). Clinical procedures and outcome of surgical extrusion, intentional replantation and tooth autotransplantation—a narrative review. *International endodontic journal*, 53(12), 1636-1652. Doi: 10.1111/iej.13396
2. Aoyama, S., Yoshizawa, M., Niimi, K., Sugai, T., Kitamura, N., & Saito, C. (2012). Prognostic factors for autotransplantation of teeth with complete root formation. *Oral surgery, oral medicine, oral pathology and oral radiology*, 114(5), S216-S228. 10.1016/j.oooo.2011.09.037
3. Armstrong, L., O'Reilly, C., & Ahmed, B. (2020). Autotransplantation of third molars: a literature review

- and preliminary protocols. *British Dental Journal*, 228(4), 247-251. 10.1038/s41415-020-1264-9
4. Dioguardi, M., Quarta, C., Sovereto, D., Troiano, G., Melillo, M., Di Cosola, M., ... & Lo Muzio, L. (2021). Autotransplantation of the third molar: a therapeutic alternative to the rehabilitation of a missing tooth: a scoping review. *Bioengineering*, 8(9), 120.
 5. Plotino, G., Abella Sans, F., Duggal, M. S., Grande, N. M., Krastl, G., Nagendrababu, V., & Gambarini, G. (2020). Clinical procedures and outcome of surgical extrusion, intentional replantation and tooth autotransplantation—a narrative review. *International endodontic journal*, 53(12), 1636-1652. Doi: 10.1111/iej.13396
 6. Kvint, S., Lindsten, R., Magnusson, A., Nilsson, P., & Bjerklin, K. (2010). Autotransplantation of teeth in 215 patients: a follow-up study. *Angle Orthodontist*, 80(3), 446-451. doi: 10.2319/062509-354.1. PMID: 20050735; PMCID: PMC8985723.
 7. Rohof, E. C., Kerdijk, W., Jansma, J., Livas, C., & Ren, Y. (2018). Autotransplantation of teeth with incomplete root formation: a systematic review and meta-analysis. *Clinical oral investigations*, 22, 1613-1624. doi:10.1007/s00784-018-2408-z. Epub 2018 Mar 10. PMID: 29525924; PMCID: PMC5906482.
 8. Singh, A. K., Khanal, N., Acharya, N., Hasan, M. R., & Saito, T. (2022, May). What are the complications, success and survival rates for autotransplanted teeth? An overview of systematic reviews and meta-analyses. In *Healthcare* (Vol. 10, No. 5, p. 835). MDPI. <https://doi.org/10.3390/healthcare1005083>
 9. Algubeal, H. M., Alanazi, A. F., Arafat, A. S., Fatani, B., Al-Omar, A., & ALGUBEAL, H. M. (2022). Autotransplantation of the lower posterior teeth: a comprehensive review. *Cureus*, 14(8), e27875. DOI 10.7759/cureus.27875
 10. Alqahtani, S. M. (2019). Tooth Hemisection. Case Study and Literature Review. *International Journal of Medical Dentistry*, 23(2), 272-76.
 11. Babaji, P., Sihag, T., Chaurasia, V. R., & Senthilnathan, S. (2015). Hemisection: A conservative management of periodontally involved molar tooth in a young patient. *Journal of Natural Science, Biology, and Medicine*, 6(1), 253-255.
 12. Johnston, D. J., Cowan, C. G., & Hussey, D. L. (2000). An unusual indication for root resection. *Journal of Endodontics*, 26(4), 248-250.
 13. Arora, A., Arya, A., Singhal, R. K., & Khatana, R. (2017). Hemisection: A conservative approach. *Indian Journal of Dental Sciences*, 9(3), 206-209.
 14. Rosenstiel, S. F., Land, M. F., & Fujimoto, J. (2016). *Contemporary Fixed Prosthodontics*. 4th ed. St. Louis (MO): Mosby Elsevier; Chapter 6; pp. 138–164.
 15. Machado, L. A., Do Nascimento, R. R., Ferreira, D. M. T. P., Mattos, C. T., & Vilella, O. V. (2016). Long-term prognosis of tooth autotransplantation: a systematic review and meta-analysis. *International journal of oral and maxillofacial surgery*, 45(5), 610–617.
 16. Atala-Acevedo, C., Abarca, J., Martínez-Zapata, M. J., Díaz, J., Olate, S., & Zaror, C. (2017). Success rate of autotransplantation of teeth with an open apex: systematic review and meta-analysis. *Journal of Oral and Maxillofacial Surgery*, 75(1), 35-50. doi: 10.1016/j.joms.2016.09.010. Epub 2016 Sep 15. PMID: 27725103.
 17. Akhlef, Y., Schwartz, O., Andreassen, J. O., & Jensen, S. S. (2018). Autotransplantation of teeth to the anterior maxilla: A systematic review of survival and success, aesthetic presentation and patient-reported outcome. *Dental Traumatology*, 34(1), 20-27.
 18. Johnston, D. J., Cowan, C. G., & Hussey, D. L. (2000). An unusual indication for root resection. *Journal of Endodontics*, 26(4), 248-250.
 19. Karimah, F., Hutami, E. R., Nugraheni, T., & Mulyawati, E. (2021, January). Hemisection as an Alternative Management for Mandibular First Molar with Bifurcation Lesion and Root Fracture: A Case Report. In *4th International Conference on Sustainable Innovation 2020—Health Science and Nursing (ICoSIHSN 2020)* (pp. 209-212). Atlantis Press.
 20. Al-Moaleem, M., Hashim, N., Asiri, K., Makhloti, E., Ahmari, N., & Tikare, S. (2015). Assessment of porcelain fused to metal crown preparations by general practitioners in Saudi Arabia. *British Journal of Medicine and Medical Research*, 7(2), 116-123.
 21. Sadatullah, S., Al-Moaleem, M. M., & Shariff, M. (2015). The Quality Assessment of Teeth Prepared By Fresh Graduates for Ceramo-Metal Full Coverage Crowns. *SJDR*, 6.
 22. Al-Moaleem, M. M., Shariff, M., Porwal, A., AlMakhloti, E. A., & Tikare, S. (2015). Evaluation of the degree of taper and convergence angle of full ceramo-metal crown preparations by different specialists centers at Assir Region, Saudi Arabia. *Saudi Journal of Medicine & Medical Sciences*, 3(3), 198-203.
 23. Al Moaleem, M. M., Alkhayrat, F. M., Madkhali, H. A., Geathy, I. H., Qahhar, M. A. W., Yaqoub, A., & Mattoo, K. A. (2017). Subjective differences between dentists and patients about relative quality of metal ceramic restorations placed in the esthetic zone. *J Contemp Dent Pract*, 18(2), 112-116.