



Title	Immediate oral surgical management of external dental fistula : Technical note of immediate tooth autotransplantation
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1 **ABSTRACT**

2 Tooth auto-transplantation, that is the surgical movement of a tooth from its original location
3 to another site within the same person, is an alternative to dental implantation because it can
4 save time, provide faster healing and function, and has esthetic advantages. A unique sensory
5 system can be maintained, and the procedure promotes proper healing of the periodontal
6 environment. We report on a case of external dental fistula with apical periodontitis, in which
7 immediate tooth auto-transplantation of the right mandibular posterior tooth (tooth 47) was
8 performed with a favorable outcome 6 years postoperatively. An important advantage of this
9 procedure is that the transplanted tooth functions early at the recipient site and this procedure
10 is minimally invasive therapy for apical periodontitis of mandibular molars accompanied with
11 an external dental fistula.

12 **Keywords**

13 Tooth auto-transplantation; external dental fistula; minimally invasive therapy
14

15 **1. Introduction**

16 Tooth auto-transplantation is the surgical movement of a tooth from its original location to
17 another site within the same person. It can be performed in patients with traumatic tooth loss,
18 impacted or ectopically positioned teeth, congenitally missing teeth, large endodontic lesions,
19 and localized apical periodontitis [1-3]. Tooth auto-transplantation is an alternative to dental
20 implantation because it can save time, provide faster healing and function, and has esthetic
21 advantages [3, 4]. Moreover, it also has advantages of maintaining a unique sensory system and
22 promoting proper healing of the periodontal (PDL) environment to sound tissue [3, 5].

23 We report a case of external dental fistula with apical periodontitis, in which immediate
24 tooth auto-transplantation in the right mandibular posterior tooth (# 47) was performed with a
25 favorable outcome 6 years postoperatively.

1 2. Case report

2 A 27-year-old woman presented to our department in November 2013 with a chief
3 complaint of localized redness and swelling of the right lower jaw. Clinical examination
4 revealed a 2 cm diameter depression on the skin buccal lesion (Fig. 1A). There was no intraoral
5 acute inflammation, such as swelling and redness of the surrounding gums (Fig. 1B). In addition,
6 tooth 47 exhibited no mobility, tenderness, or percussion pain. Panoramic radiographs and
7 dental x-ray revealed radiolucent transmission in the root apex portion of tooth 47 with the right
8 mandibular wisdom horizontal impacted tooth (tooth 48; Fig. 1C, D). Based on clinical and
9 imaging findings, the therapeutic strategy included extraction of teeth 47 and 48, and auto-
10 transplantation of tooth 48 to the tooth 47 position.

11 The upper and lower parts of the buccal alveolar bone of tooth 47 remained (Fig. 1E, F).
12 We believe that this tooth auto-transplantation was possible if we could prevent damage to the
13 buccal alveolar bone and periosteum of tooth 47 and gain a bone bridge formation for defect
14 between the upper and lower alveolar bone. Teeth 48 and 47 were extracted, and periapical
15 granulation was enucleated completely after scraping. During surgery, we removed a cord
16 structure connected to a lump just under the skin (Fig.2A-E). The depression in the skin that
17 suggested an external dental fistula disappeared (Fig. 3A). The transmitted image of the root
18 apex of the auto-transplanted tooth remained, but the auto-transplanted tooth had no clinical
19 and radiographic problem (Fig.3.B, C). Engraftment of the transplanted tooth was successful,
20 and the external dental fistula disappeared.

21 While a bone defect in the tooth 47 buccal bone cortex was found on preoperative cone-
22 beam computed tomography (CBCT), new bone formation in the buccal side was confirmed 3
23 years after transplantation (Figs. 3D, E). There is no significant change in the permeability of
24 the root apex of auto-transplanted tooth after surgery. We consider that there is probably partial

1 scar formation in apex area. In addition, the patient had no esthetic concern. At 6 years
2 postoperatively, the progress of the transplanted tooth was satisfactory (Figs. 4A, B).
3 Auto-transplanted tooth did not present any significant clinical or imaging problems at 7 years
4 postoperatively (Figs. 4C, D, E).

5 **3. Discussion**

6 External dental fistula is encountered frequently in dental and oral surgery [6, 7]. The most
7 common tooth causing an external dental fistula is the mandibular first molar [8]. The condition
8 commonly stems from chronic apical periodontitis [6-8]. For most of external dental fistulas,
9 tooth extractions are common. We believe that in our case, conservative treatment involving
10 root canal alone was almost impossible for healing of a dental fistula, since root canals lack
11 predictability. There are several methods in this case. The lower right mandibular second molar
12 had three roots, a large lesion, and a large bone defect on the buccal side. We thought the
13 predictability of root canal treatment for this tooth was poor. In addition, this site was difficult
14 to be operated on, and we concluded that the prognosis for apical root resection was low. In
15 general, the right mandibular second molar is extracted and a prosthetic treatment with a bridge
16 is commonly used. However, there is a demerit of the anterior and posterior teeth that needs to
17 be cut. Another option is to extract the right mandibular second molar and use an implant.
18 However, it is not covered by insurance and the cost is too much for the patient. Extraction of
19 the lower right mandibular second molar and orthodontic movement of the wisdom tooth is
20 considered to be a treatment with high predictability. However, the orthodontic treatment takes
21 a long time and was not accepted by the patient. Therefore, we suggested auto-
22 toothtransplantation, and the patient agreed. Another possible solution is orthodontic therapy
23 including. However, patients sometimes refuse orthodontic therapy because of the time and
24 expense involved.

1 This patient insisted on maintaining the number of teeth in her arch. Immediate tooth auto-
2 transplantation was selected as the final treatment option. Although some problems exist, such
3 as long-term root resorption, tooth auto-transplantation can provide patients with immeasurable
4 benefits because PDL tissue regeneration can be expected if auto-transplantation is successful
5 [5, 9, 10]. For this purpose, a healthy donor tooth and healthy recipient site are essential.
6 However, some bone resorption and/or bacterial infections can be expected if an infectious
7 lesion remains in cases of immediate tooth auto-transplantation. During surgery, we completely
8 eliminated a periapical infectious lesion of tooth 47 and the cord-like fibrous tissue connected
9 to the external skin fistula. A buccal cortical bone defect was detected during surgery, but the
10 upper alveolar portion was recognized. We paid careful attention not to damage the upper
11 alveolar portion of tooth 47.

12 A root canal treatment of the transplanted tooth 48 was performed after 3 weeks. Insufficient
13 buccal width in the recipient bone site might cause loss of buccal bone coverage, and
14 consequent loss of PDL integrity [11, 12]. The solid report on auto-transplantation of 50 teeth
15 with mature roots reported lack of buccal bone width as the only significant predictor for tooth
16 transplant failure [11]. The novelty of our report is that osteogenesis to support the transplanted
17 tooth is suggested even in the presence of a large buccal bone defect, if the buccal periosteum
18 remains intact. Fortunately, CBCT showed buccal bone regeneration 7 years postoperatively,
19 with the upper portion of the bone partially connected to the lower portion of the alveolar bone
20 process. Successful transplantation even with an inflammatory periapical lesion as in our case
21 is expected as long as complete elimination of the apical infectious tissue is accomplished, and
22 a wide range of buccal healthy periosteum remains [12, 13].

23 During tooth auto-transplantation in cases with large bone defects, it is important to preserve
24 the periosteum in respectful way and keep the periodontal ligament viable. Although the
25 periosteum is important in bone healing, the activity of the periodontal ligament is also essential

1 for healing of the alveolar bone around the grafted tooth. An advantage of auto tooth
2 transplantation is bone healing. A viable PDL of the transplanted tooth can induce alveolar bone.
3 Stem cells derived from PDL can differentiate into osteoblasts [13]. Differentiated osteoblasts
4 form bone tissue around the transplanted tooth. Alveolar bone regeneration can be observed in
5 the recipient socket around the transplant [12, 13]. The PDL of teeth plays an important role in
6 bone remodeling. Various biological aspects of alveolar bone formation are partly regulated by
7 the PDL and periosteum [13].

8 Careful case selection and treatment planning is essential for the success of tooth auto-
9 transplantation [9, 11]. The donor tooth and recipient bone site should be examined carefully
10 for suitability and appropriate dimension using CBCT imaging [13, 14]. The recipient site
11 should have adequate bone buccal support with sufficient attached keratinized gingival tissue
12 to allow tooth stabilization and it should be free of infection [11-13]. In our case, there was a
13 buccal bone defect at the recipient site, but the transplanted tooth and size of the transplant floor
14 were well adapted, and the postoperative transplanted tooth stability was very good. In addition,
15 the total treatment cost usually is lower than with other treatment plans, including implant-
16 based prosthetic rehabilitation, prosthetic restoration, and/or orthodontic space closure.

17 Favorable adaptation in cervical region of transplanted tooth between the tooth and
18 membrane decreased the infection rate and facilitated uneventful healing and PDL reattachment
19 [13]. In our case, the healing was satisfactory despite the partial bone buccal defect of the
20 transplanted tooth, and the sizes of teeth 48 and 47 were approximately the same. In our case,
21 the transplanted tooth must be treated endodontically, since the vitality is not maintainable.
22 Therefore, root canal therapy is recommended within a short time after transplantation.

23 The most important advantage of this method is that the transplanted tooth functions at the
24 recipient site during mastication. This method does not require preparation of adjacent teeth for
25 bridge work.

1 **4. Conclusions**

2 Our case experience suggested that immediate tooth transplantation after extraction of a
3 causative tooth is a less invasive therapy for apical periodontitis of mandibular molars
4 accompanied with an external dental fistula.

5 **Ethical approval**

6 Informed consent from the patient has been obtained before submission of this paper.

7 **Conflict of interest**

8 The authors declare no conflict of interest.

9 **Acknowledgment**

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11 **References**

- 12 [1] Abella F, Ribas F, Roig M, González Sánchez JA, Durán-Sindreu F: Outcome of
13 Autotransplantation of Mature Third Molars Using 3-dimensional-printed Guiding Templates
14 and Donor Tooth Replicas. *J Endod* 2018;44:1567-74.
- 15 [2] Almpani K, Papageorgiou SN, Papadopoulos MA: Autotransplantation of teeth in humans:
16 a systematic review and meta-analysis. *Clin Oral Investig* 2015;19:1157-79.
- 17 [3] Parvini P, Obreja K, Trimpou G, Mahmud S, Sader R: Autotransplantation of teeth. *Int J*
18 *Esthet Dent* 2018;13:274-82.
- 19 [4] Rohof ECM, Kerdijk W, Jansma J, Livas C, Ren Y: Autotransplantation of teeth with
20 incomplete root formation: a systematic review and meta-analysis. *Clin Oral Investig*
21 2018;22:1613-24.
- 22 [5] Machado LA, do Nascimento RR, Ferreira DM, Mattos CT, Vilella OV: Long-term
23 prognosis of tooth autotransplantation: a systematic review and meta-analysis. *Int J Oral*
24 *Maxillofac Surg* 2016;45:610-7.
- 25 [6] Bai J, Ji AP, Huang MW: Submental cutaneous sinus tract of mandibular second molar origin.
26 *Int Endod J* 2014;47:1185-91.
- 27 [7] Brown RS, Jones R, Feimster T, Sam FE: Cutaneous sinus tracts (or emerging sinus tracts)

- 1 of odontogenic origin: a report of 3 cases. *Clin Cosmet Investig Dent* 2010;2:63-7.
- 2 [8] Kumar U, Dharmani CK, George BJ, Abraham S: Conservative management of persistent
3 facial cutaneous sinus tract with a dental origin. *BMJ Case Rep* 2014;2014.
- 4 [9] Aoyama S, Yoshizawa M, Niimi K, Sugai T, Kitamura N, Saito C: Prognostic factors for
5 autotransplantation of teeth with complete root formation. *Oral Surg Oral Med Oral Pathol Oral*
6 *Radiol* 2012;114:S216-28.
- 7 [10] Juslin J, Jääsaari P, Teerijoki-Oksa T, Suominen A, Thorén H: Survival of Autotransplanted
8 Teeth With Open Apices: A Retrospective Cohort Study. *J Oral Maxillofac Surg* 2020.
- 9 [11] Mejàre B, Wannfors K, Jansson L: A prospective study on transplantation of third molars
10 with complete root formation. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2004;97:231-
11 8.
- 12 [12] Waikakul A, Ruangsawasdi N: Autogenous tooth transplantation in a severely insufficient
13 alveolar ridge without a bone graft: Two case reports. *Oral and Maxillofacial Surgery Cases*
14 2019;5:100129.
- 15 [13] Tsukiboshi M, Yamauchi N, Tsukiboshi Y: Long-term Outcomes of Autotransplantation of
16 Teeth: A Case Series. *J Endod* 2019;45:S72-s83.
- 17 [14] EzEldeen M, Wyatt J, Al-Rimawi A, Coucke W, Shaheen E, Lambrichts I, Willems G,
18 Politis C, Jacobs R: Use of CBCT Guidance for Tooth Autotransplantation in Children. *J Dent*
19 *Res* 2019;98:406-13.

20 **Figure legends**

21 **Fig.1.** Clinical examination revealed a 2 cm diameter depression on the skin buccal lesion (A).
22 There was no intraoral acute inflammation, such as swelling and redness of the surrounding
23 gums (B). Panoramic radiographs and dental x-ray revealed radiolucent transmission in the root
24 apex portion of tooth 47 with the right mandibular wisdom horizontal impacted tooth (C, D).
25 The upper and lower parts of the buccal alveolar bone of tooth 47 remained (E, F).

26 **Fig.2.**

27 Teeth 48 and 47 were extracted, and periapical granulation was enucleated completely after

1 scraping (A). Left side was causative tooth and right side was harvested donor tooth. The lower
2 right mandibular second molar had three roots (B). During surgery, a mucoperiosteal flap was
3 gently elevated at the recipient site buccally and we removed a cord structure connected to a
4 depression just under the skin. There was a buccal bone defect at the recipient site (yellow
5 arrow). Recipient site was prepared after tooth removal. The transplanted tooth and size of the
6 transplant floor were well adapted, and the postoperative transplanted tooth stability was very
7 good (yellow arrow) (D).

8 **Fig. 3.** The skin recesses that suggested an exodontic fistula disappeared (A). The transmitted
9 image of the root apex of the autotransplanted tooth remained, but the autotransplanted tooth
10 had no clinical problem (B, C). While a bone defect in the tooth 47 buccal bone cortex was
11 found on preoperative cone-beam computed tomography (CBCT), new bone formation in the
12 buccal side was confirmed 3 years after transplantation (D, E).

13 **Fig. 4.** The patient had no esthetic concern. At 6 years postoperatively, the progress of the
14 transplanted tooth was satisfactory (A, B). At 7 years postoperatively, the progress of the
15 transplanted tooth was satisfactory (C, D, E).

16
17

Figure 1

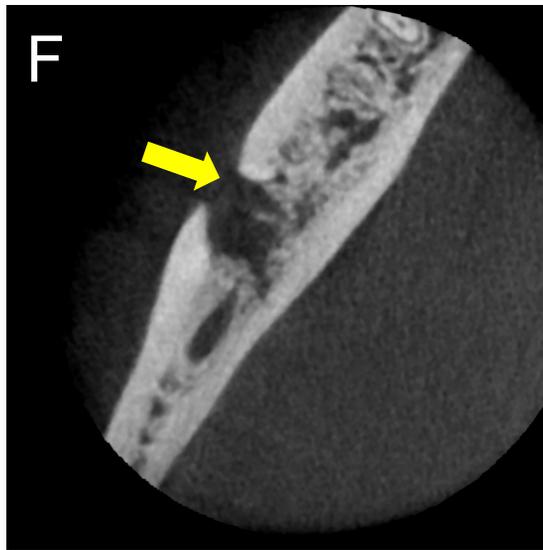
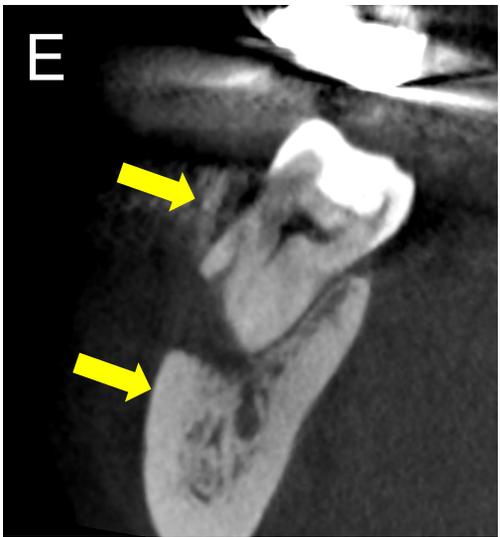
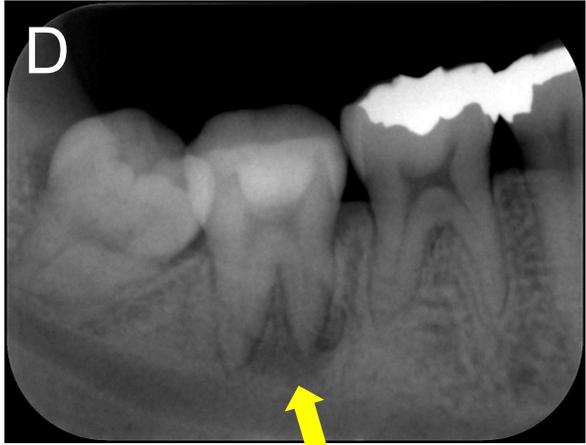
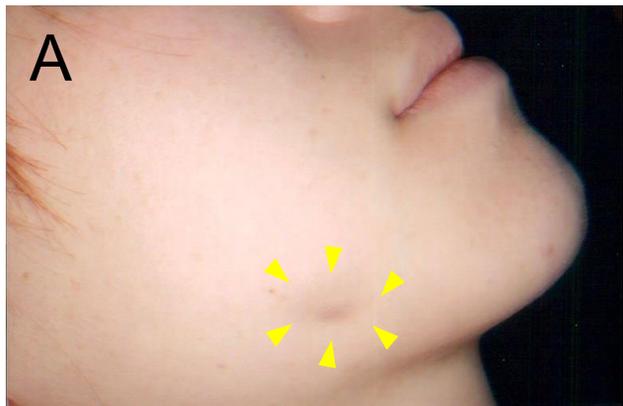


Figure 2

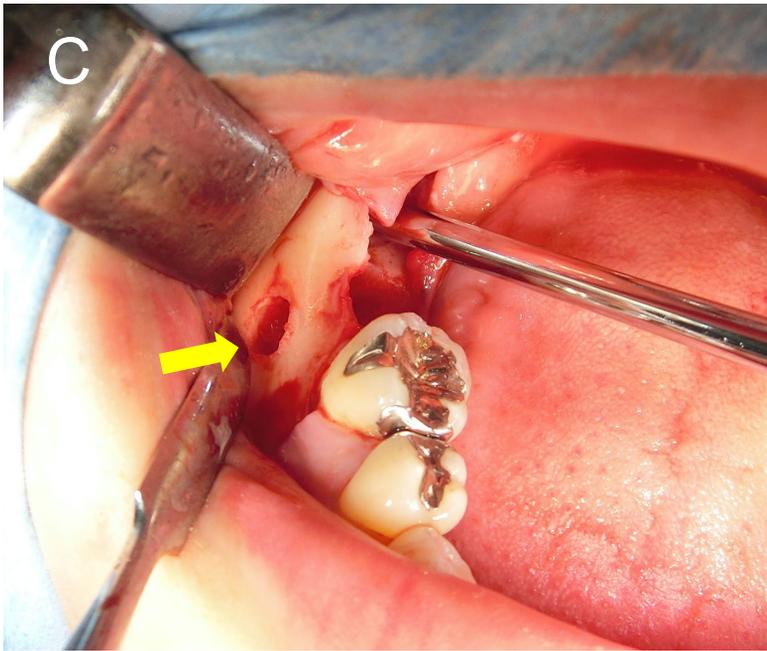
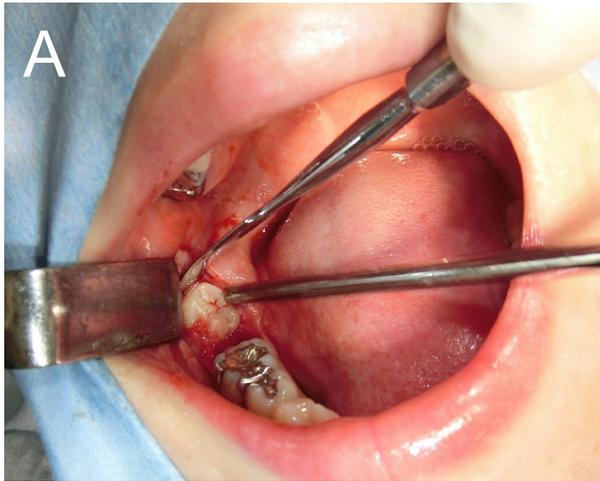


Figure 3

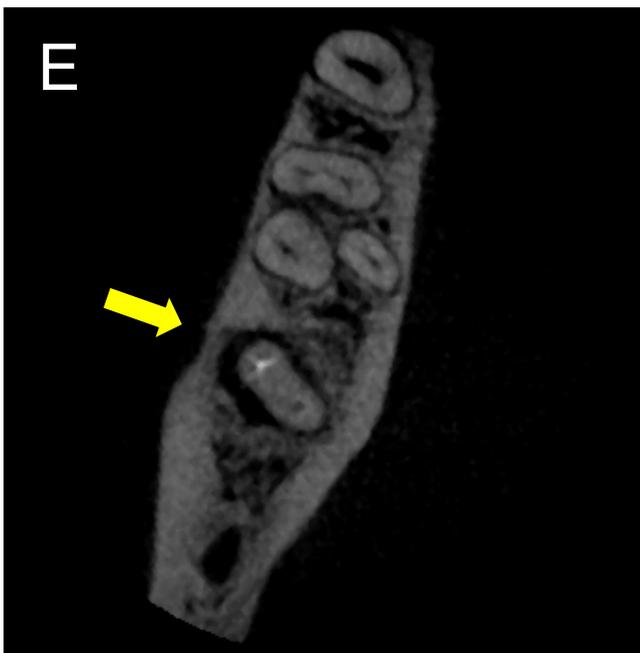
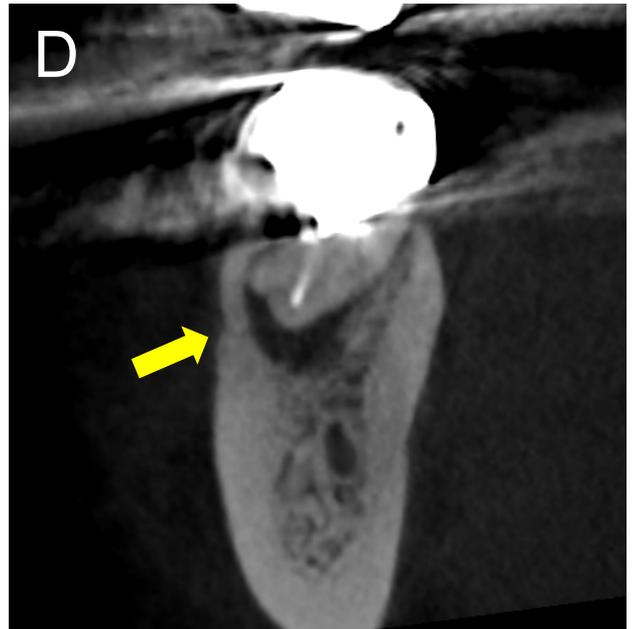


Figure 4

