En Bloc Autotransplantation of Retained Canine in the Mandible: A Case Presentation

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Missing canines compromise function and esthetics and therefore should be restored. In case of a retained canine, there can be a conservative approach of classic orthodontic eruption. If that is not effective, an alternative treatment method is to remove the retained tooth, followed by implant placement or transalveolar autotransplantation of the retained canine. En bloc autotransplantation of a retained canine, with surrounding bone, preserves canine periodontium and increases chances for revascularization and vitality of the transplanted tooth. This paper presents an en bloc autotransplantation of retained canines in the mandible in two female patients resulting in canine vitality after 1.5 years with proper pocket depth, physiologic tooth mobility, and positive reaction to ethyl chloride. Int J Periodontics Restorative Dent 2020;40:403–407. doi: 10.11607/prd.4664

Materials and Methods

The study involved two female patients, 14 and 15 years of age (Patient 1 and Patient 2, respectively). Both patients were diagnosed with a retained right canine in the

Canine teeth are important for both function and esthetics. Canine guidance protects the hard tissues and periodontium of adjacent teeth and is especially important in bruxers and patients with other parafunctions and harmful habits.

Retained canines appear in approximately 2.2% of the population and it happens predominantly in the maxilla. Retained canines in the mandible are less frequent, and its orthodontic correction is much more challenging because of less bone space for maneuvering, the high bone density, and close proximity of teeth, mandibular canal, and mental foramen.

Therefore, if classic orthodontic and surgical treatment cannot be applied because of the location of the retained canine or is not effective, the treatment of choice may be tooth extraction followed by implant placement or autotransplantation of the retained canine. This paper aims to evaluate the efficacy of transalveolar autotransplantation of retained canine in mandible.
mandible. Patient 1 was pretreated orthodontically to make space for the transplant of the retained canine en bloc with surrounding bone (Fig 1a). Patient 2 was initially qualified for classic orthodontic and surgical treatment (Fig 1b); for the first 18 months, the retained canine was pulled towards the orthodontic appliance, but got stuck against the apex of the right central incisor, causing occlusal plane changes (Fig 2). It was then decided to utilize transalveolar en bloc autotransplantation of the retained canine into its proper position in the alveolar ridge.

**Autotransplantation Procedure**

The authors did not find clear guidelines for en bloc autotransplantation of a canine in available publications and therefore made their own protocol.

Following a thorough analysis of the computed tomography scans, the anatomy of the retained tooth and topography of the surrounding structures (condylar canal, mental foramen, and roots of the adjacent teeth) were established. Based on the analysis, the bone block with the root and crown was isolated from the bone. In cooperation with an orthodontist, the scope of orthodontic treatment before the planned procedure was agreed on (restoration of adequate space for the graft, parallel positioning of roots of the adjacent teeth, etc) as well as final positioning of the block with the tooth in the arch after transplantation.
The procedure was done in local anesthesia with 4% Ubistesin Forte (3M ESPE). After flap elevation, the crown of the retained canine was exposed (Fig 3a). Based on previous measurements in the computed tomography image, the location and range of the entire bone block was marked with a piezo scaler. Later, the bone was drilled deeper, to the previously calculated depth, covering the entire tooth structure to avoid damaging the adjacent anatomical structures (Fig 3b). Then, the prepared bone block was extracted with the canine (Fig 3c). In the recipient site, a cylinder bur (Meisinger) was used to

**Fig 3** Patient 2. (a) Exposed crown of the mandibular right canine. (b) Bone block with the canine processed in the donor site directly before harvesting. (c) Extracted bone block. (d) Recipient site shaped to match the block with the tooth/prepared recipient site. (e) Bone block with the canine in the recipient site and (f) covered with allogeneic bone granulate, stabilized with a wire from the side of the vestibule.
form a graft bed into a shape that allowed normal positioning of the tooth in the arch (Fig 3d). The final position of the tooth was agreed on with the orthodontist while the procedure was being performed (Fig 3e). The recipient site was then prepared to accommodate the extracted block with the canine. The tooth was stabilized with surgical wire from the vestibular side. The donor site was filled with granulated allogenic bone soaked with platelet-rich fibrin (PRF) and then covered with PRF membranes (Fig 3f).

The wound was closed with sutures and patients were prescribed an antibiotic (Augmentin, 1 g) twice daily for 7 days. A soft diet was recommended for 6 weeks with special care to the operated side.

Results

The healing period was uneventful. In both cases, the surgical stent stabilizing the block with the tooth was removed after 6 weeks. The grafts were consolidated with the native bone, and the teeth that were positioned on the crest (Fig 4a) had physiologic mobility and normal pocket depths. The color of the crowns was not different than the color of neighboring teeth. Reaction to ethyl chloride, however, was negative at that time in both patients. Testing was repeated at 3 and 6 months after surgery and the reaction was positive; the transplanted teeth were vital.

Three months after surgery, the canines were braced to establish final position of the crown (Fig 4b). Orthodontic appliances were removed 8 months after surgery in Patient 2 and after 18 months in Patient 1, demonstrating proper function and esthetics that remained during the whole follow-up period of 18 months after surgery.

Discussion

Several treatment options can be applied in cases of retained permanent canines, including removal of deciduous canines at the stage of mixed dentition,5,6 as well as surgical
tooth exposure of the retained tooth in order to move it with orthodontic appliance anchored to neighboring teeth7 or to a mini-implant placed in to the arch bone.8 If the location of the retained tooth is not favorable, it is recommended to extract the tooth and replace it with an implant or to leave the retained canine under regular radiographic evaluation.5 The alternative solution is translveolar tooth autotransplantation.9–11

The presented method of tooth autotransplantation is similar to published ones10,12–15 and different only in that the authors have been transplanting teeth en bloc with the surrounding bone and periodontium, increasing probability of the teeth to revascularize and remain vital, which is unpredictable when the apex canal is already obliterated as seen in the two patients herein.

Conclusions

En bloc autotransplantation of a retained canine in the mandible can give very good functional and
esthetic results in a short period of time (18 months), as demonstrated in this study. Longer follow-ups allow for further assessment and may result in propagation of this method.

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References