The Use of Surgical Burs in Autotransplant of Ectopic Impacted Maxillary Canine

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Abstract

Background: Canine auto-transplantation is a surgical procedure applied in cases of ankylosed or severely displaced impacted canines that cannot be resolved orthodontically. This study was conducted to describe the transplantation method associated with orthodontic treatment.

Materials and Methods: This study was carried out on 21 healthy subjects (age range from 18- 24), who were suffering from ectopic impacted maxillary canines, surgical burs were used to drill the alveolar bone of them. The study was conducted from October 2006 to February 2009 in Oral Surgery Clinic of Dentistry College/ Anbar University and private clinic.

Results: Results showed that the use of both methods of drilling resulted in similar healing and period required for stability of transplanted canines.

Conclusion: The use of classical surgical burs or burs of implant surgical kit are helpful in creating socket for autotransplanted maxillary canines.

Key words: Surgical burs, autotransplant of maxillary canine

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Introduction

Studies on incidence of ectopic impacted maxillary canines showed that it is around 18% of all impacted canines[1, 2, 3], and due to the high difficulty in moving the far displaced impacted maxillary canine by orthodontic means, a great need for a method to solve this problem had been established.

The treatment of ectopic impacted cuspids has frequently presented special problems in many orthodontic offices. A patient is often informed of a retained deciduous cuspid with an impacted successor at an age when orthodontic services are resisted. Such problems, along with the difficulties in obtaining improvement, and prolonged treatment times, make the complications of impacted cuspids often difficult to resolve**.**

Management of impacted maxillary canines, that are ankylosed or ectopic, need a combined surgical-orthodontic approach by moving its position onto the edentulous alveolar crest (in the same patient).

Results of several experimental and clinical studies confirm that this method is a safe and useful procedure [4, 5, 6; 7; 8; 9; 10].

Application of this method in combination with orthodontic traction in order to restore impacted canines in the dental arch has offered new perspectives in the treatment of similar cases [11, 12, 13].

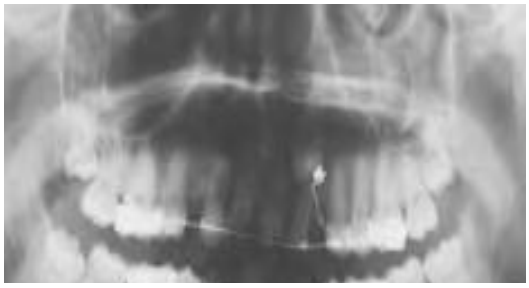
Materials and Method

From October 2006 to February 2009, 21 patients were admitted to the Oral Surgery clinic of Dentistry College/ Anbar University with palatally impacted maxillary canines .

The width of the crown of impacted canine was estimated radiographically, and the mesio-distal distance has been previously calculated orthodontically on the dental cast for the passive settlement of the impacted tooth, which was not enough in some patients, so transverse orthodontic appliance was done for them to create mesio-distal space required for implant (as shown in figure 1 a and b). This pre-surgical orthodontic step lasts about 4-5 months in some patients.

Figure (1) Transverse orthodontic appliance for creating enough mesio-distal space

a



b

Flap was done at the labial crest of the transplant space and extended palatally from 2nd premolar to the central incisor of the same side (as shown in figure 2).

Figure (2) Flap design for Autotransplant of canine in 22 years female patient

Osteotomy is performed using a round medium-size bur (2-3 mm in diameter) at the area of the impacted tooth. The procedure must be both conservative and "aggressive"; this means that tooth roots that are mesial and distal to the osteotomy site must remain intact, but bone removal around the canine crown must be extensive so that canine extraction is non-traumatic avoiding communication between the sinus and the oral cavity.

At the same time and under continuous saline irrigation on the tooth, the receptor site was prepared at the edentulous alveolar crest by forming an alveolus. This is achieved with the use of a cypress-shaped osseous bur of the proper size (included in the surgical sets for placement of root-shaped implants) (Fig.3).

Figure (3) Use of cypress-shaped osseous burin socket formation

Extraction was achieved by placing the instrument mesially and distally to the anatomical tooth cervix and attempting to rotate the canine around its long axis until it is removed. After canine extraction, endodontic treatment was performed always under antiseptic conditions. Many studies have shown that no pulp survived after transplantation trauma; thus, endodontic treatment of an impacted tooth with a completely formed apex is mandatory in order to achieve an acceptable clinical result[14, 15].

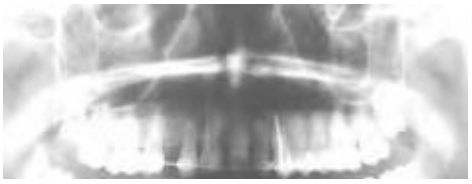
During preparation of socket, the extracted tooth was tried into the socket to get the most proper fitness and parallelism with dental arch.

Tooth placement was tested using slight digital pressure on the incisal canine cusp perpendicularly to the dental long axis. Complete tooth stabilization, and occlusion are all checked.

The most preferable position is the infra-occlusive one, where the tooth has no contact with its antagonists at the occlusal plane[16], then proper gingival margin was created by cutting gingival margine above the transplanted tooth, and suturing the mesial and distal interdental papillae using 3-0 or 4-0 silk that is removed the 8th-9th day.

Bracket was placed on the transplanted canine and ligated to the previously attached orthodontic wire for stabilization, as shown in figure(4 a and b). The patient was instructed to brush 2-3 times a day and continuous use of 2% chlorhexidin mouth rinse and soft diet for the first 15 days in order to keep good oral hygiene.

Figure (4) orthodontic stabilization of transplanted maxillary canine at day 10 after operation



a

b

Patients were followed clinically and radiographically each month after operation to detect any root resorption or periapical change which may occur after tooth transplant [17].

Orthodontic splints were removed after 10-12 months. Transplanted teeth were examined for stability after that period.

Results

Success criteria for this procedure are: (a) tooth mobility, which is clinically tested and (b) root length, which is monitored radiographically (any rate of resorption contributing to tooth mobility results in rejection)[15]. According to the above criteria, this procedure was evaluated.

Radiographic follow-up 8 months later showed alveolar regeneration and no radiographic sign of canine apical resorption.

Fixed appliances were removed 10-12 months after surgical transplantation for all patients with no particular problems, all transplanted canines were stable without any mobility, esthetic of dental arch as well as the gingival margin for all patients were perfectly restored as shown in figure (5).

Figure (5) Clinical picture after fixed appliance removal

Discussion

Success of autotransplanted teeth depends on two main factors, systemic and local factors [18, 3].

The systemic factors include general health of the patient. In this study, all patients were young, healthy and not complaining of any systemic disease.

The local factors include healthy bone of the transplant area with sufficient depth and width to receive the root of transplanted tooth perfectly [19], healthy adjacent teeth as well as the surgical procedure through which, the impacted canine should be intact during surgical extraction[20], also the tooth should be 1 mm below occlusion[10].

In this study, impacted canines were surgically removed without any trauma to the tooth or soft tissue, also the alveolar bone of the implant area was healthy with sufficient depth and width and prepared to suit the shape and size of the root of transplanted canine so that retentive implant was obtained and orthodontic splints were done, all those factors helped in perfect alignment and immobilization of the transplanted tooth which gave good chance for bonny growth around the newly implanted root.

Endodontic treatment for the extracted canine prior to repositioning into the prepared socket prevents dehydration and protein thrombosis which may occur in the pulp, and so reduces the possibility of infection, thus, endodontic treatment of the transplanted tooth was a part of the overall procedure [21].

Splinting is not considered a necessary procedure by certain authors[16] who stated that adjusting the transplanted canine out of occlusion is enough. In this autotransplant, splinting was considered as a basic step to enhance osseointegration and eliminates the possibilities of failure [14; 18.,22;23, 24].

Osteotomy of alveolar bone to prepare socket for transplanted canine was done after extraction of the tooth in order to follow the root anatomy of the transplanted tooth to obtain the maximum fitness. Follow up of all cases showed good retention and healthy gingival depth because all patients were instructed to maintain good oral hygiene to eliminate possible local infection to the area of implant.

Conclusion

Autotransplantation of ectopic impacted maxillary canine constitutes a good treatment with long term stability when orthodontic appliances fail to solve the problem.

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