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RESEARCH ARTICLE

VARIOUS SURGICAL TECHNIQUES FOR IMPACTED CANINE EXPOSURE: A REPORT OF THREE CASES

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ABSTRACT

An impacted tooth is often a common problem in dentistry. Maxillary canines and mandibular laterals are seen impacted most commonly in patients undergoing orthodontic treatment without reaching the line of occlusion. These impactions are commonly due to obstructions and the difference in the direction of movement of the tooth. Canines are the cornerstones for esthetic smiles and functional occlusion. Hence, surgical exposure of these impacted canines, guiding them toward the line of occlusion, plays a very important role in the maintenance of the health of the periodontium. A series of cases are discussed on various techniques that can be used in guiding the direction or altering the direction or altering the direction of impacted canines to bring them into a proper occlusion without disturbing the health of the periodontium. These surgical techniques include the closed-eruption method, repositioned vestibular flap, and apically displaced flap.

INTRODUCTION

An impacted tooth that fails to erupt into its normal position may cause esthetic and functional difficulties. Following the third molars, the canine retains its higher incidences of impaction in the oral cavity[1]. more commonly in the maxilla (0.8% to 2.8%) than the mandible (0.2%).[2,3] Maxillary cuspids are commonly impacted due to the following reasons: (1) Physical obstruction caused by adjacent teeth, (2) Loss of space in the arch, (3) Over retained deciduous teeth, and (4) Difference in the direction of movement of tooth. The surgical techniques commonly involve moving the tooth occlusally and posteriorly first, followed by buccal positioning of a tooth. Into its desired position to achieve healthy periodontal tissue around the tooth. During this procedure of surgical exposure of the impacted tooth followed by orthodontic tooth movement, it is important to note that first premolars should not be extracted. The impacted canine is clinically palpated on canine prominence and cross verified with radiographic examinations. The radiographic techniques include the use of lateral, occlusal, panoramic, and periapical radiographs.

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The accurate position of the impacted canine in relation to the adjacent teeth is well appreciated by the same lingual and opposite buccal technique and cone-beam computed tomography (CBCT).[4]

CASE REPORT

There are various surgical techniques for the management of impacted maxillary canines, based on their position of impaction. The treatment modalities may vary from closed to open technique. This case series deals with different case scenarios treated with multiple surgical techniques, which include: (1) the Closed-eruption method (2) the vestibular approach, and (3)the Apically displaced flap.

CASE 1- CANINE EXPOSURE BY CLOSED APPROACH

The complaint of an impacted right maxillary canine was presented by a 24-year-old healthy female. The patient presented with a history of crowding teeth. On radiographic examination, it was seen that the canine is impacted palatally (Figures 1a,1b, and 1c). the choice of treatment was made based on the erupting position of the canine, and the amount of keratinized tissue covering the impacted tooth. As the canine was impacted in a favourable position, treatment was planned with a closed approach method, after getting informed consent from the patient.

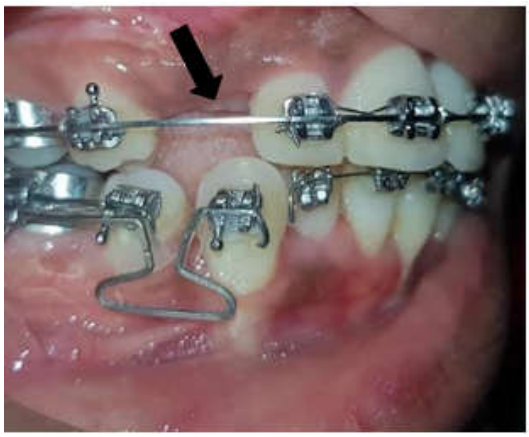

Figure 1a and 1b. Pre-operative clinical view

Figure 1c. OPG of impacted canine wrt 13

A crevicular incision was given from tooth #11 to 14 region palatally (Figure 1d). A full- thickness mucoperiosteal flap was reflected (Figure 1e) to form a tunnel that is used for the traction. The chain of 1.5mm diameter is fixed to the cusp of the impacted canine and attached to the ballista spring (Figure 1f). The flap is then repositioned and sutured again in its original position. Theflap was secured by a non-resorbable 3.0 silk suture. A force of approximately 100 grams is appliedand care is taken to maintain the chain at the centre ofthe alveolar process. During the orthodontic traction phase, the eruption of the impacted tooth is guided through the tunnel, between the external cortical plates and palatal flap. Thus, the cusp of the impacted tooth emerges at the crest ofthe alveolarprocess in the area surrounded by keratinized gingiva (Figure 1g and 1h).

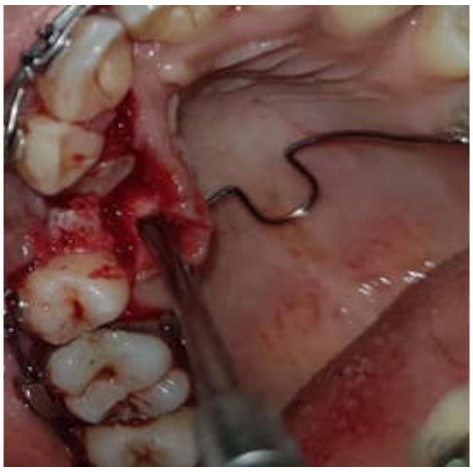

Figure 1d: -Full thickness flap elevatedfrom 11 to 14 on palatal region

Figure 1e. -Exposure of 13

Figure 1f. Braces placed with exposed 13

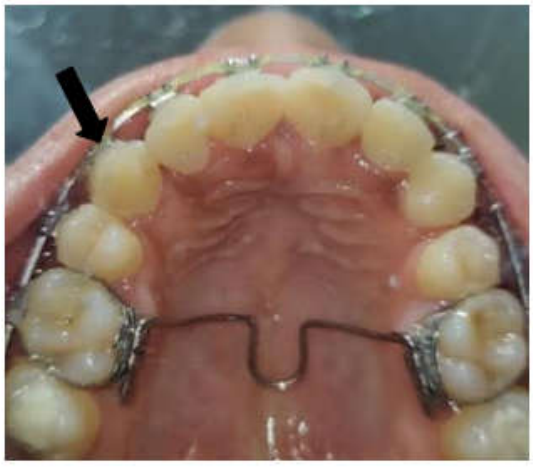

Figure 1g and 1h: -post-operative viewafter 6 months

CASE 2- APICALLY DISPLACED FLAP APPROACH

An 11-year-old healthy female was referred for bimaxillary impacted canines. A soft-tissue prominence indicating an impacted tooth was appreciated on both sides labially, facial to the crest ofthe alveolar process (Figure 2a). Radiographically, the impacted canine was found to be centered mesiodistally between the lateral incisor and the first premolar (Figure 2b). The apically positioned flap was planned in this case after getting informed consent from the patientand the guardian. A semilunar incision using a number 15 scalpel was made on both the impacted sides of the maxillary canine region with sulcular incisions and vertical incisions, maintaining the adequate keratinized gingiva facially (Figure 2c and 2d). A split-thickness mucosal flap was reflected and repositioned apically to cover the cervical aspect of the impacted canine (Figures 2e and 2f). The flap was secured and sutured with no 4.0 non-resorbable sutures (Figure 2g). The force needed to move the canine was achieved by cinching the k-9 spring back about 2 mm after it has been ligated to the canine (Figure 2h).

Figure 2a. Pre-operative clinical view (impacted 13 and 43)

Figure 2b. Pre-operative radiographic view

Figure 2c. Flap reflection with exposed 13 By giving sulcular and vertical incisions

Figure 2d: -Flap reflection with exposed23 By giving sulcular and vertical incisions

Figure 2e. Exposure of 13 with bracket

Figure 2f: -Exposure of 23 with bracket

Figure 2g. Suture placed by apically positioning the flap

Figure 2h. Post-operative clinical view after 1 month

Figure 2i: -Post-operative clinical view after 3 months

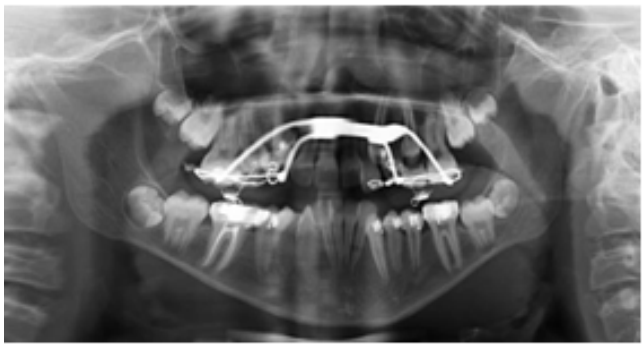

Figure 2j. Post-operative clinical view after 3 months

CASE 3- CANINE EXPOSURE THROUGH THE VESTIBULAR INCISION.

A 22-year-old healthy male presented with the complaint of an impacted right mandibular canine. The patient presented with a history of the crowding in lower front teeth. A portion of the cusp of the canine was palpable with prominence noticed apical to 41 and 31 region (Figures 3a and 3b).

Figure 3a. Pre-operative clinical view (impacted 43).

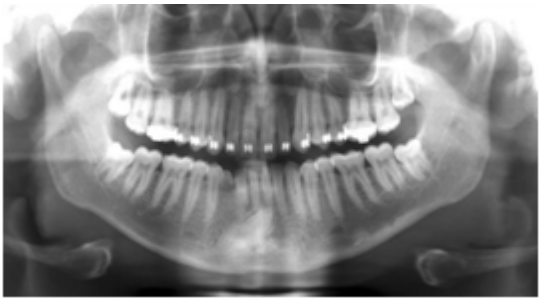

Figure 3b. Pre-operative radiographic view (impacted 43)

Figure 3c: -Canine prominence is seen apical to 41 31

Figure 3d: -Vestibular incision given in41 31 region the tooth was covered withthin bony layer

Figure 3e. Exposure of 43

Figure 3f: -Braces placed with exposed 43 with resorbable sutures

There was a thin bony layer, and mucosa covered the impacted tooth. thechoice of treatment was made based on the erupting position of the canine. Treatment was planned for canine exposure through vestibular incision. A semilunar incision using a number 15 scalpel was given on the impacted lower canine apicaland at the vestibular region of#41 and 31 teeth. A split-thickness mucosal flap was reflected and repositioned apically (Figures 3c and 3d). The flap was secured with a holding suture and sutured with 4.0 non-resorbable sutures (Figures 3e and 3f). The cantilever spring is made by a "0.017×0.025" wire which is inserted into the auxiliary tube of the first molar and connected by a one-point contact to the active unit. The magnitude of force used to extrude the impactedcanine was 60 grams (Figure 3g).

Figure 3g. Post-operative view after 3 months

DISCUSSION

Surgical management of impacted canines involves a multidisciplinary team approach and aims at better esthetic results with correct occlusion. The selection of an appropriate conservative surgical technique with proper orthodontic forces applied plays a very important role in the success of the treatment. The selection of an appropriate conservative surgical technique with proper orthodontic forces applied plays a very important role in the success of the treatment. The factors determining theperiodontal prognosis of the impacted canines are mainly the quality of periodontium, evaluation of the keratinized tissue band's height, and the emergence point's location.[5] In the present study, surgical exposure of impacted maxillary and mandibular canines was done by different approaches based on the criteria given by Pirinen *et al*.[7] The vertical position of the impacted canine relative to the mucogingival line plays an important role. When the tooth is positioned very apical to this line, a gingivectomy may increase the risks of intrusion or recurrence after orthodontic treatment, as well as compromise the esthetic sequelae with the formation of esthetical damaging scarring. In case 1, treatment was planned with a closed-eruption method on the right side based on thevestibular or trans-alveolar position ofthe crown ofthe impacted tooth. In cases 2 and 3, the

tooth was positioned entirely in the alveolar mucosa, which may lead to an inadequate amount of keratinized tissue with gingival recession and plaque accumulation in the future. Hence, theflap should be moved apically to retain the keratinized tissue at the neck of the impacted tooth. In all the cases, the orthodontic bracket was placed immediately following the surgical procedure, and slow orthodontic traction force was given later. Following active orthodontic treatment, surgically exposed teeth were moved into the desired position Recent advancements in surgical canine exposure may involve the superior use of three- dimensional imaging using CBCT replacing the conventional radiographs to identify the exact erupting position of the impacted tooth.[7] Meticulous planning of mucogingival interceptive surgeries done judiciously at the right time with appropriate technique may prevent future mucogingival problems.[8] When the impacted tooth is not surgically exposed, it may lead to root resorption of the adjacent

tooth,[9] cystic formation or infection, periodontal injury, and recurring pain.[10]

CONCLUSION

In the current case series, recent different surgical approaches in canine impaction were shown. With proper crown exposure and planned orthodontic treatment. Continuous follow-up was done for all the cases with the results of an esthetically pleasing smile, adequate keratinized gingiva, and stable periodontium without any surgical complication. Additionally, an interdisciplinary approach by both periodontists and orthodontists may play a major role in the success of any surgical technique.

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