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Case Study

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CLINICAL EFFECTIVENESS OF 3 DIFFERENT TOOLS IN MANAGEMENT OF SURGICAL EXPOSURE OF IMPACTED CANINE DURING ORTHODONTIC THERAPY: A CASE REPORT

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ABSTRACT

Title: Comparison of clinical effectiveness of 3 different tools in management of surgical exposure of impacted canine during orthodontic therapy. **Objective:** To compare clinical effectiveness in management of surgical exposure of impacted canine during orthodontic therapy with regards to –time required, intra -operative bleeding, post operative wound healing, patient discomfort and ease of attachment bonding. **Methodology:** Orthodontic patients with impacted canine requiring exposure were selected. Scalpel, electrosurgery and laser were 3 tools used for exposure. Parameters assessed using these tools were time required, intra -operative bleeding, post operative wound healing, patient discomfort and ease of attachment bonding. Follow up visit were performed at 1-2 weeks post- surgery. **Results:** The results of the study showed significant difference with respect time required for the surgery, intraoperative bleeding, patient discomfort/pain and ease of attachment bonding to impacted canine. **Conclusion:** Selection of an appropriate surgical technique for canine exposure is important. The level and position of tooth impaction, bone thickness and available keratinized soft tissue are the important factors in selecting the surgical approach. Thus, laser and electrocautery provides a promising method for treatment of surgical exposure of impacted canine. They also offer advantages such as increased haemostatic effect, improved visibility and increased patient acceptance.

KEYWORDS: Scalpel, electrosurgery and laser were 3 tools used for exposure.

INTRODUCTION

Canines are the cornerstone of the maxillary and mandibular dental arches.[1] Permanent canines are the foundation of a balanced smile and functional occlusion.[2] Maxillary canines are one of the most commonly impacted teeth and rank second after third molars in terms of the frequency of impaction.[3] Maxillary cuspids impaction occurs in approximately 2% of the population. The incidence of canine impaction in the maxilla is more than twice that in mandible. In western population, canine impaction occurs in the palatal aspect in 85% and in buccal aspect in 15% of the cases. Of all patients who have impacted maxillary canines, 8% have bilateral impactions. Approximately one third of impacted maxillary canines are located labially and two thirds are located palatally.[5,6] Most common reasons for their impaction are loss of space, over retained deciduous teeth and deflection (labially or palatally) of the lateral incisor.[4]

Amongst all these, arch length discrepancy is thought to be the most common etiologic factor for labially impacted canines, which were in accordance with the Jacobs study who reported that 85% of palatally impacted canines had sufficient space for eruption, whereas only 17% of labially impacted canines had sufficient space.[7] Therefore, arch length discrepancy is thought to be a primary etiologic factor for labially impacted canines.[8]

The orthodontic treatment of impacted maxillary and mandibular canine remains a challenge to clinicians. However, early diagnosis, prompt intervention and suitable interdisciplinary strategy could save the time, expense and avoid more complex treatment in permanent dentition. Generally, management of impacted canine compromises surgical removal of soft and hard (bone) tissue covering the tooth thereby exposing the crown, followed by orthodontic traction to bring the canine to the dental arch and guide into occlusal equilibrium.[10]

Scalpels, electrosurgery and lasers are three tools used in gingival surgery. However, to date there is a lack of studies comparing these three methods side by side to determine which has the most favourable outcomes and highest patients' acceptance. When comparing outcomes

of dental lasers and electrosurgery to scalpel surgery, studies have shown the first two procedures causes less bleeding, pain, overall post operative discomfort. Laser equipment used in medical and dental fields are generally expensive. However, continue advancement in technology have made new and more affordable laser equipments available for dental clinician. Given the advancements in medical and dental health, patients expect faster healing process and minimal discomfort. Therefore, exploring the best treatment approach for management of surgical exposure of impacted canine will provide great benefit for both clinicians and patients.

The purpose of this case report is to compare the clinical effectiveness of three different tools in the management of surgical exposure of impacted canine during orthodontic therapy with regards to: time required for the surgery, intraoperative bleeding, patient discomfort/pain and ease of attachment bonding to impacted canine.

Case Report 1

A female patient aged 21 years with impacted canine in the upper left arch reported to periodontist, who was referred from his orthodontist for an interdisciplinary approach of treatment. No significant medical history was manifested and on clinical examination, there was an over retained deciduous canine. To accurately pin point the position of completely embedded impacted canine and decide the modality of treatment, a cone beam computed tomography (CBCT) was taken. The images demonstrated palatal impacted canine. Routine blood investigations were carried out and a signed informed consent was obtained before the procedure. A 2% lignocaine hydrochloride local anaesthetic nerve block was administered. Deciduous tooth extraction was done. Electrocautery was used for exposure of canine, soft tissue covering over the canine was removed, the bone was trimmed with micromotor with continuous irrigation and the canine was exposed. Immediately after exposure, a lingual button with ligature wire was bonded on accessible impacted canine. The ligature was then tied and attached to the main arch wire, in order to give mild eruptive forces and guide the impacted tooth into arch. Analgesics were prescribed, postoperative and oral hygiene instructions were given. The patient was followed by his/her orthodontist.

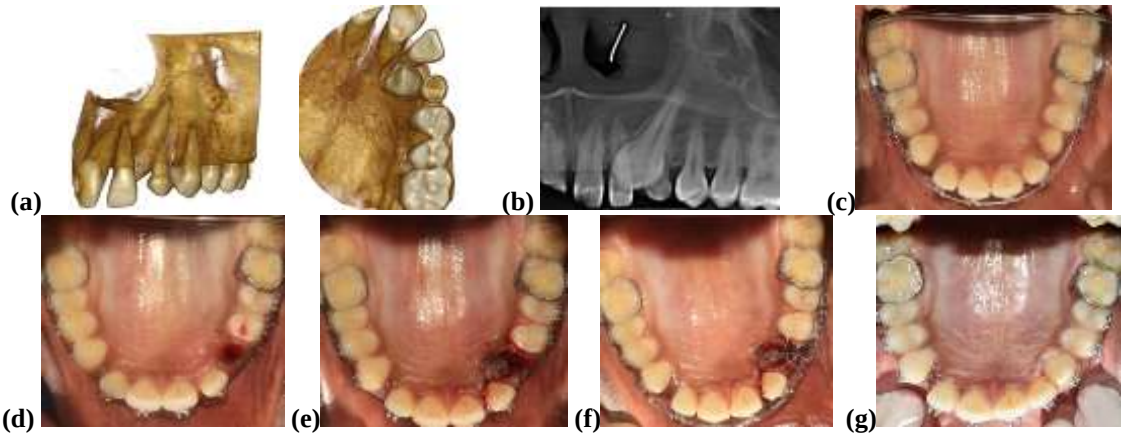


Fig 1: (a) CBCT pre-treatment showing impacted left maxillary canine. (b) OPG showing impacted canine. (c) maxillary occlusion view showing retained deciduous maxillary canine. (d) Extraction of deciduous maxillary canine. (e) maxillary occlusion view after surgical exposure of impacted canine with lingual button and arch wire attached to impacted canine. (f) Ballista spring placed (g) follow after 1 month.

Case Report 2

A male patient aged 14 years with impacted canine in the lower left and right arch reported to periodontist, who was referred from his orthodontist for an interdisciplinary approach of treatment. No significant medical history was manifested and on clinical examination, the area of concern was only seen as an edentulous region o both side of the arch. To accurately pin point the position of completely embedded impacted canine and decide the modality of treatment, a cone beam computed tomography (CBCT) was taken. Routine blood investigations were carried out and a signed informed consent was obtained before the procedure. A 2% lignocaine hydrochloride local anaesthetic nerve block was administered. For exposing right side canine, two vertical releasing incisions with 980nm diode laser was used. Laser parameters used were power- 1.5 watts, continuous wave, contact mode. A full thickness flap was reflected and bone covering the impacted canine was removed with round bur with continuous irrigation to avoid damage to the bone and exposed canine. Immediately after exposure, a lingual button with ligature wire was bonded on accessible impacted canine. The ligature was then tied and attached to the main arch wire, in order to give mild eruptive forces and guide the impacted tooth into arch. And then the flap was apically displaced and sutured. Same procedure was followed to expose the left arch mandibular canine, full thickness was reflected, with the bone trimmed over the impacted canine and a lingual button with ligature wire was bonded on accessible impacted canine. The ligature was then tied and attached to the main arch wire, in order to give mild eruptive forces and guide the impacted tooth into arch. Flaps were sutured using interrupted sutures.

Analgesics were prescribed, postoperative and oral hygiene instructions were given and the patient was followed by his/her orthodontist.

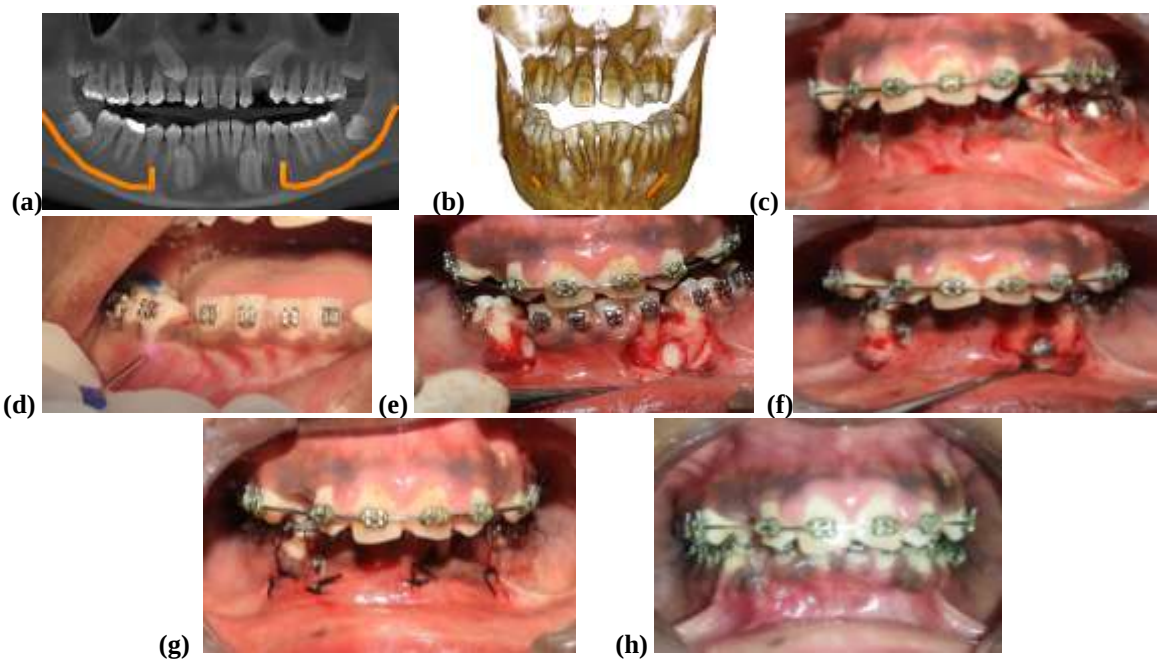
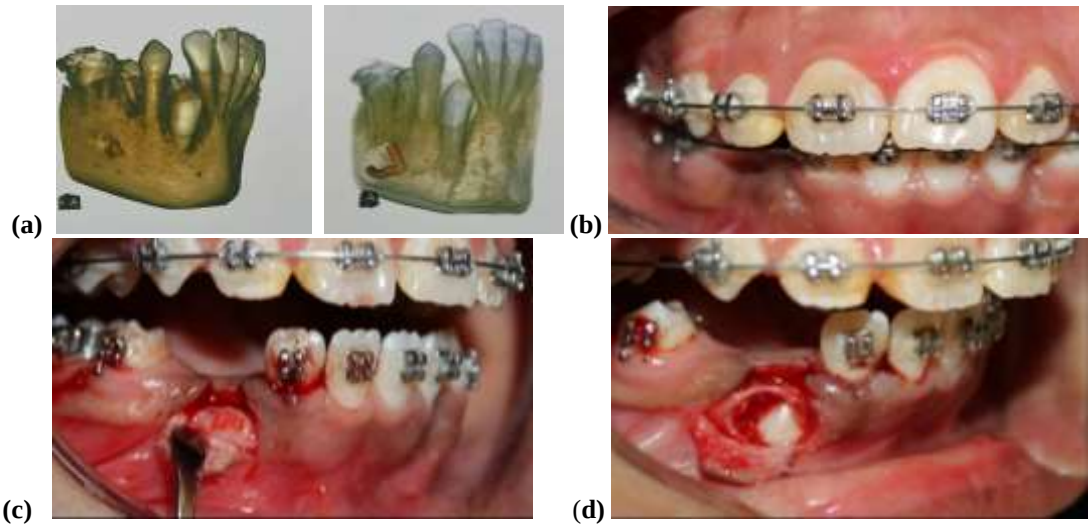


Fig 2: (a) OPG pre-treatment showing impacted left maxillary canine. (b) CBCT view (c, d) Vertical incision placed with laser on right arch and left arch (e) Flap reflected and bone trimmed --- view after surgical exposure of impacted canine (f) lingual button and arch wire attached to impacted canine. (g) Sutures were placed (h) follow up after 1- month.

Case Report 3

A female patient aged 13 years with impacted canine in the lower right arch reported to periodontist, who was referred from his orthodontist for an interdisciplinary approach of treatment. No significant medical history was manifested and on clinical examination, the area of concern was only seen as an edentulous region. There was no gingival bulge or blanching present on palpation. Radiographic investigations were done with the help of CBCT to accurately locate the position of impacted canine. Routine blood investigations were carried out and a signed informed consent was obtained before the procedure. A 2% lignocaine hydrochloride local anaesthetic nerve block was administered. Two vertical releasing incisions were in the area to be operated. Full thickness flap reflected, bone was trimmed over the canines using micromotor with continuous irrigation and a lingual button with ligature was bonded to the impacted canine. The ligature wire was then tied and attached to the main arch wire, in order to give mild eruptive forces and guide the impacted tooth into arch. Analgesics were prescribed, postoperative and oral hygiene instructions were given and the patient was followed by his/her orthodontist.



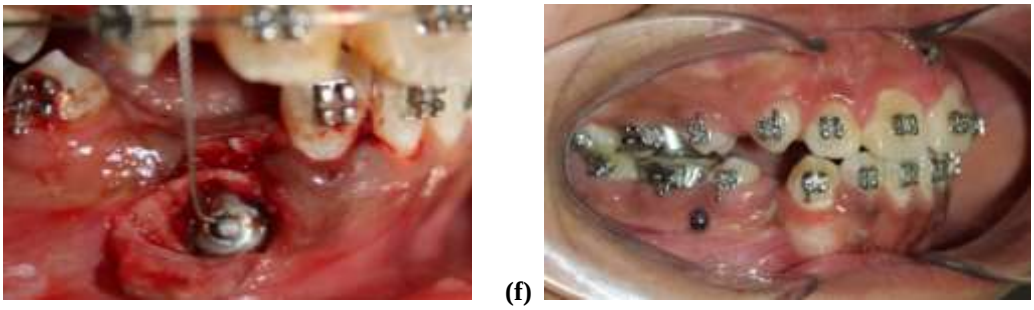


Fig 4: (a) CBCT pre-treatment showing impacted left maxillary canine. (b) impacted canine in lower arch (c) Vertical incision placed and flap reflected (d) Bone trimmed --- view after surgical exposure of impacted canine(e) Lingual button and arch wire attached to impacted canine. (f) Follow up after 1 month.

DISCUSSION

Diagnosis of impacted canine plays an important role to determine the right time to intervene. Clinical examination involves inspection which includes lateral incisor inclination, mobility of deciduous canine and location of canine bulge if present palpation should be done bucally as well as palatally with the index finger from the proximity of lateral incisors to the first premolar region. Various radiographic aids are employed to find the position of impacted canine, often assisted by IOPA using same-lingual-opposite-buccal rule and this is important in cases where root of impacted canine is in close vicinity/ overlapping another tooth root. CBCT is of particular interest and is advocated to know the exact root position of impacted canine in relation to the surrounding structures and plan accordingly proper direction of force to be applied without affecting nearby structures.[11]

There are several treatment options available for correction of impacted canine, observation, intervention, relocation, and extraction but the best treatment option with long term prognosis bring these teeth in alignment.[12] In this case report all the impacted canines were exposed and were referred to the orthodontist to be positioned into proper alignment with the remaining permanent teeth.

Minimum removal of surrounding bone during exposure of impacted canines and maintenance of oral hygiene are the crucial factor for final clinical height of the crown after orthodontic treatment.[13]

According to Profitt et al, there are three categories of problems when dealing with an impacted tooth: surgical exposure, attachment to tooth and orthodontic mechanics to bring the tooth into the arch.[14] Bishara et al advocated surgical exposure of the impacted canine with no orthodontic traction only when the tooth has a correct axial inclination. Removing smaller amounts of overlying bone during surgery results in reduced bone loss after orthodontic treatment. The exposed tooth remain periodontally healthy with proper handling of soft tissues during surgical phase and proper post operative oral hygiene practices. Ideally mechanical traction should be activated immediately after surgery, and force should be applied to an existing fixed or removable appliance.

This case report shows that there was a significant difference in terms of time required for surgery. The surgeries performed using laser and electrocautery are time conserving because of bloodless operating field whereas surgery performed by scalpel incision were time consuming. These results were in accordance with the study done by Azma et al.[16] Mazarei et al[17] who noted that time required for the oral surgical procedure performed by laser incision was more as compared to scalpel incision but the results were contradictory to the study done by Amaral et al. this disparity may be due to the facts like depth, position of tooth reflection of flap and experience of surgeon.[18]

Lasers and electrocautery when used in placement of incision, the blood vessels were subjected to photocoagulation and thermocoagulation. This leads to shrinkage of proteins and vessel walls that in turn seal off the blood flow. Thus, intraoperative bleeding was highly reduced by use of lasers and electrocautery. Therefore, the bonding of the attachments on to the exposed canine was easier with laser and electrocautery than with scalpels. This result is highly significant and in accordance with the Mahitab Mahmoud and Amaral et al.[18,19]

Post- operative pain was assessed by using a Visual Analogue scale (VAS), which ranges from 1-10 in ascending order of pain, as it takes little time to describe to patient and is easily understood by the patient. The results showed that post operative pain was more with scalpel technique when compared to laser and electrocautery techniques. This is in accordance with the studies done by Landucci et al[20], who noted less pain in laser incision group.

The result showed that exposure of canine using laser and electrocautery provide excellent access and visibility to the surgical site as compared to scalpel incision.

RESULT

The results of the study shows significant difference with respect to time required for the surgery, intraoperative

bleeding, patient discomfort/pain and ease of attachment bonding to impacted canine.

CONCLUSION

• Selection of an appropriate surgical technique for canine exposure is important. The level and position of tooth impaction, bone thickness are the important factors in selecting the surgical approach. Proper treatment plan with inter-disciplinary approach of both periodontists and orthodontists plays a major role in success of surgical exposure of impacted canine. Thus, laser and electrocautery provides a promising method for treatment of surgical exposure of impacted canine. They also offer advantages such as increased haemostatic effect, improved visibility and increased patient acceptance.

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