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Case Report

Survival of Single piece basal implants in restoring critically impacted canine – A Series of case reports

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Abstract

The prevalence of impacted teeth is a very frequent finding with maxillary canines being the second most common, next to third molars. These teeth pose greater aesthetic deficiencies and are addressed through a variety of treatment modalities. Patients with critically impacted canines, that are not amenable for orthodontic traction are usually opted for extraction. Restoring these teeth with a single piece basal implant aids in immediate loading, and a permanent solution, without using bone grafts. This case series of three patients reports the successful restoration of maxillary canines, after surgically extracting them.

Keywords: Basal Implants, critically impacted canine, Immediate loading, Osseofixation, Single piece Implant.

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Introduction

Maxillary canines are the most commonly impacted teeth second to the third molars. Their prevalence is twice as common in maxilla when compared to mandible. Females are predicted to have a higher incidence of impacted canines than males. Around two-thirds of the teeth are palatally impacted whereas the rest of one-third is buccally impacted.[1] These impacted teeth, might result in overly retained deciduous teeth and/or spacing between the teeth in aesthetic anterior teeth region, compromising the appearance and function.[2] Such cases are usually opted for alignment by orthodontic correction. But few cases of critically impacted canines, which are not feasible for orthodontic traction, are usually opted for extraction, apart from few other surgical treatments.[3] Several treatment modalities have been used when restoring a missing or impacted canine.[4,5]

Restoring a critically impacted canine, with a dental implant immediately after surgically extracting the tooth is already put into practice with good results. However, most of the studies indicate the use of conventional system incorporating autogenous bone grafts and/or platelet rich fibrin, to enhance osseointegration of the implant. This is because the conventional implant system requires adequate

bone and when there is bone deficiency, the prognosis can be variable.[6,7] Even with numerous literature on replacement with dental implants, there are hardly any studies found which highlight the use of basal implantology and immediate loading in such conditions.

Despite an exceptional emphasis on the benefits of immediate loading protocol with basal implantology, its use in such complex cases is still not being incorporated. Basal implantology takes advantage of Osseo fixation into the basal bone providing a great primary stability. This is reinforced by secondary osseointegration of the rest of the implant surface giving a great anchorage. In addition, the use of single piece implants in basal implantology also aids in eliminating the screw access holes that might compromise the structural and aesthetic components of the prosthesis.[8]

Here, we are presenting three case reports where the canines were critically impacted on one/ both the sides. These patients have apparently contacted many dentists and have been suggested different options. They however want to get the impacted canines removed and immediately replaced. So, the canines were extracted, followed by restoration of the same with immediately loaded single piece basal implants.

Case Report 1

A 35-year-old female patient, came with a chief complaint of missing teeth in her upper left back teeth region for 7 years. The patient has no known systemic conditions or any allergies. Her history revealed that she has undergone replacement for the front missing tooth through a fixed dental prosthesis 7 years back, and is constantly bothered with food lodgment and gum inflammation in the area. Her first molar was also extracted due to a deep cavity and wanted to replace both the teeth. On clinical examination, there was a missing tooth in relation to tooth number 23, and a fixed partial denture with marginal discrepancy was noted. Evaluation of soft tissue surrounding the fixed prosthesis revealed swollen erythematous gingiva, indicating moderate inflammation with severe bleeding on probing. The patient did not want to replace the prosthesis, but was looking at replacing the missing tooth with the help of an implant. Radiographic examination revealed the presence of an impacted canine.

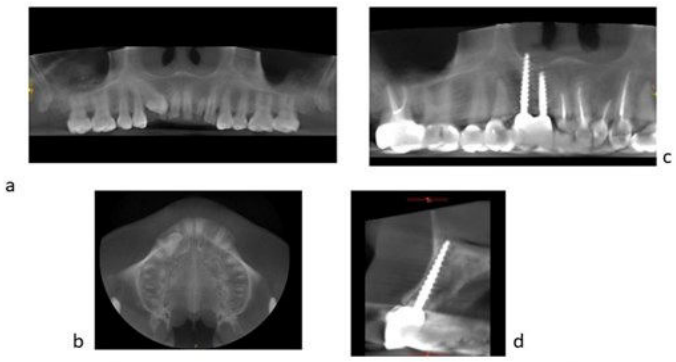
A 3Dimentional CBCT was taken to determine the anatomy and location of the impacted tooth. The CBCT revealed a horizontally impacted canine positioned on the palatal aspect, with the coronal part overlapping the lateral incisor, and the root towards the premolar. The patient was informed about the procedure and a consent was taken before proceeding with the treatment. A complete surgical profile was done prior to the surgery and all the vital signs were documented which were within the normal limits.

Surgical extraction of the canine was planned and executed under local anesthesia of 1:80000 lignocaine solution. To anaesthetize the palatal aspect incisive nerve block and greater palatine nerve block was given. Infraorbital nerve block was administered to anaesthetize the buccal aspect of the impacted tooth. An incision was made on the palatal aspect, near the distal aspect of the lateral incisor. The tooth was removed in multiple pieces, taking care that the surrounding bone is preserved. The socket was then thoroughly curettage followed by placing a single piece implant. An initial pilot drill of 2.8mm diameter was made until the second cortical plate is hit into the nasal floor to achieve anchorage from the thick basal bone. No bone graft was placed, as the bone was very minimally intervened and no big bone defect was present. The implant is then advanced into the prepared osteotomy site engaging the second cortex. The implant thread profile allows for direct screwing into the bone providing primary stability. A torque value of around 50-60Ncm is applied so as to achieve good primary stability. The implants were immediately loaded with a zirconia crown on the second day. (Fig I)

Case Report 2

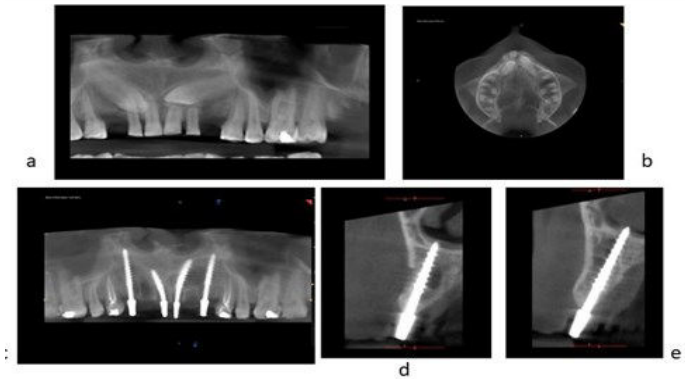
A 34-year-old male patient, complained of missing front teeth for past 10 years. The patient has no known systemic conditions or any allergies. On taking history, the patient informed that his deciduous teeth were removed 15 years back and since then the teeth were missing. On clinical examination, missing teeth were noted in relation to

Fig –1: Pre and immediate post-operative CBCT sections showing the restoration of Critically Impacted Canine



a) Pre-operative sagittal view showing the position of impacted canine b) Panoramic view of the impacted canine c) Post-operative sagittal view immediately after placing the implant d) Post-operative panoramic view immediately after placing the implant

Fig –2: Pre and immediate post-operative CBCT sections showing the restoration of Critically Impacted Canine



a) Panoramic view showing impacted teeth on both sides b) Axial section showing the buccolingual location of the impacted teeth c) Immediate post operative panoramic view with implants d) Immediate post operative sagittal view of the implant on the left side e) Immediate post operative sagittal view of the implant on the right side

Fig-3: Pre and immediate post-operative CBCT sections showing the restoration of Critically Impacted Canine

a) Panoramic view showing critically impacted canine on the right side, b) Axial view showing the buccolingual location of the impacted canine, c) Post – operative panoramic view after restoring the canine, d) Post – operative sagittal view showing the replacement of impacted canine

Fig –4: Pre and immediate post-operative clinical pictures showing the restoration of Critically Impacted Canine

a) Occlusal view of the impacted canine, b) Elevating the periosteal flap to expose the tooth, c) Occlusal view showing the exposed coronal part of the impacted tooth, d) Extraction of the tooth with minimal invasion, e) Atraumatic extraction of complete tooth f) Thorough curettage of the socket after extracting the tooth, g) Immediate placement of single piece implants engaging the basal bone, h) Immediate post-operative picture of the implants, i) Post operative picture showing restoration of the missing tooth with fixed prosthesis j) Final picture of the smile showing restored missing canine which was critically impacted

teeth number 13 and 23, with severe attrition on all the teeth. Radiographic examination showed impacted canines on both the sides.

A 3-dimensional CBCT revealed a palatally impacted right-side canine and the left impacted tooth was in the centre of the alveolar ridge. Adjacent teeth in relation to 21, 22 on the right side showed external root resorption. A consent was taken from the patient after explaining the entire procedure in detail. A complete surgical profile was done prior to the surgery and all the vital signs were documented which were within the normal limits.

The teeth were removed under local anesthesia of 1:80000 lignocaine solution. Greater palatine, incisive and infra orbital nerve blocks were given to completely anesthetize the area. An incision was made on the right-side palatal aspect, distal to lateral incisor to expose the crown and then the tooth was removed in multiple pieces, along with the central and lateral incisors. The impacted tooth on the left was removed through labial approach. Care was taken to preserve the surrounding bone. No bone graft was placed after extracting both the teeth.

Immediately after extraction, the teeth were replaced with the help of single piece implants. The same surgical protocol was followed by a single implantologist in placing single piece basal implants. The implants were placed through the extracted sockets, engaging the nasal floor so that anchorage is gained from the highly dense cortical bone and were immediately loaded with zirconia crowns.(FIG II)

Case Report 3

A 38 year old female patient came with a chief complaint of irregularly placed front teeth and a missing tooth in her upper right front tooth region since many years. The patient has no known systemic conditions or any allergies. History revealed that no permanent tooth erupted after losing her milk tooth and a visit to the local dentist explored the impacted canine and advised for replacement with a fixed dental Prosthesis or an implant. The patient opted to get a partial denture and have been using it since then. On clinical examination, missing tooth was noted in relation to tooth number 13 and peg shaped lateral incisors on both sides. Radiographic examination revealed a palatally impacted canine on the right side.

A 3Dimentional CBCT showed that the canine was horizontally impacted on the palatal aspect, with the coronal part overlapping the root of adjoining lateral incisor, and the root towards the premolar. The patient was informed about the procedure and a consent was taken before proceeding with the treatment. A complete surgical profile was done prior to the surgery and all the vital signs were documented which were within the normal limits. Surgical extraction of the canine was planned and executed under local anesthesia of 1:80000 lignocaine solution. Infra orbital nerve block was given on the buccal aspect. Greater palatine and incisive nerve blocks were given on the palatal aspect. An indentation of the tooth was visible on the palatal aspect, where an incision was made to expose the tooth structure. After reflecting the flap, the tooth was surgically extracted along with the lateral incisor.

Following the extraction, single piece basal implants were placed through the extraction socket. The same surgical protocol was followed by a single implantologist in placing single piece basal implants. After providing a temporary crown for one day, the patient was recalled on the third day and permanent zirconia crowns were cemented onto the implants.(FIG III & IV)

Discussion

Impacted canines pose a great dilemma when planning a correct course of its treatment. If the teeth are in a position feasible for orthodontic traction, they are brought back into alignment. But in cases where orthodontic correction is not possible, surgical removal of the canine remains to be the only option for a long term prognosis. Various treatment modalities are mentioned in the literature. Auto-transplantation of the impacted canine, is a relatively technique sensitive procedure. Wherein, the prognosis depends on the several factors and its long-term success is questionable.[9,10] A permanent solution with a good prognosis can be achieved by replacing the missing tooth

with a dental implant.

While using an implant, few studies suggest the use of a short implant in the missing area, without extracting the tooth. These implants are placed in such a way that they are far from the vicinity of the impacted canines. Another technique suggests placing an implant through the impacted tooth. Although some studies show that the procedure does not involve any complications, there is always a chance of infection of the tooth involved, and implant failure.

In all the cases presented here are, long, single piece implants were placed engaging the highly dense nasal floor to gain enough anchorage. Using a short implant not only limits the surface area for osseointegration of implant but also the prosthetic restoration as the crown to implant ratio would be high. Studies show that implants used near impacted canines are usually 4mm to 6mm in length. These are engaged into the crestal bone, and so the permanent crown is placed after 3 months, to allow osseointegration.[11] In general, the prognosis of short implants (<10mm) is less when compared to long implants (>10mm) and the level of bone loss has a significant impact on the prognosis of the implant. A certain amount of bone loss might have a very slight impact on a longer impact, but might affect a shorter implant to a greater extent.[12]

When impacted teeth are extracted, especially in conditions when they are deeply seated, there exists a bone defect which might not favor the placement of a crestal implant. In such circumstances, the bone defect if filled with a bone graft and implant is placed after a period of 3 months. Our case reports suggest the use of immediate loading basal implant without using a bone graft and their reliable rate of survival. This is because the implants are placed in such a way that the anchorage is gained from the highly dense cortical plate. This technique of basal implantology not only favors immediate restoration of the missing tooth, but also eliminates the use of a bone graft. Thereby reducing the overall duration of the treatment.

Basal implantology gained a tremendous favorability especially in patients with compromised bone. This concept targets basal bone to gain primary stability, which is infection free and less prone to have resorption. Basal implantology is based on the principles of orthopedics and traumatology. It outlines the concept of engaging the cortical bone and gaining primary stability before the implants are biologically osseointegrated. Once the implants are stabilized in the infection free and resorption free cortical bone, they are immediately loaded within the next 72 hours before bone remodeling starts to happen.[13,14]

Basal implantology therefore not only is best suited for patients with compromised bone such as present case series where surgical extraction of impacted canines, leaves crestal bone deficiency near the area, but also provides and immediate replacement of the missing teeth without the need of surgical augmentation. This concept of immediate loading is being widely accepted by patients as the missing teeth are immediately restored thereby leaving a positive psychological impact. studies have also showed that immediate loading implants had a great bone to implant contact and show good success and survival rates. [15] It is however important to note that a good primary stability must be achieved while placing the implants for immediate loading. The primary stability of implants in all these patients in the case series were assessed with Periotest and the implants showed a value of -0.3, -2.8, 1.4, and -5.1.

The patients are under constant follow up with good prognosis. A follow up x ray after 4 months showed good healing and slight bone formation with no evidence of pathology. All the three patients were evaluated after 3 months and 6 months. Clinical examination for any soft tissue alterations such as bleeding on probing, inflammation or infection around the implants, mobility of the implants was assessed thoroughly. Radiographic evaluation with OPG and CBCT was made where bone around the implants was assessed. CBCT examination showed a considerable increase in the bone density around the implant with no radiolucency. Periotest was done to evaluate the stability of the implants and were noted as -0.2, -0.5, -1.6 and 1.2.

Conclusion

With good primary stability and immediate result, basal implantology can be considered as a promising solution in replacing critically impacted canines. Especially

in the anterior aesthetic region where missing teeth have a great impact on the psychological benefit of the patient, this implant technique can provide a fast and an effective outcome without additional surgeries.

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