

# TREATMENT OF MAXILLARY RETAINED CANINE WITH IMPLANTS: NEW PERSPECTIVES

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## SUMMARY

**Purpose.** The surgical-orthodontic treatment of impacted maxillary canine (IMC) remains a challenge to today's clinicians. The aim of the present paper is to describe an unconventional treatment of IMC with insertion of implant into the retained canine and 3 years follow-up.

**Case report.** A 55-year-old female patient attended to rehabilitate her maxillary left canine site. An unconventional approach was proposed to the patient. A large diameter tapered implant (Ø 5 x 18 mm) was inserted (Nobel Active, Kolten, Swisse). An immediate loading prosthetic rehabilitation was performed. After checking for implant stability the prosthetic steps were carried out and a single crown was delivered with Procera system.

**Conclusion.** The patient was happy of this kind of single non-invasive session for treating IMC. At the 3-year control, the implant did not show any mobility or signs of peri-implantitis clinically or radiographically. In addition patient was satisfied of aesthetic results.

**Key words:** impacted teeth, surgical techniques, orthodontic treatment, multidisciplinary treatment.



## Introduction

The surgical-orthodontic treatment of impacted maxillary canine (IMC) remains a challenge to today's clinicians. Therapy of IMC involves the exposure of the retained canine, its traction in the arch and the alignment and levelling with orthodontic equipment. Bone loss, root resorption and gingival recession around IMC are some of the most common complications. Therapies of IMC are generally very long and complicated, so alternative methods have been studied to restore the missing canine.

IMC can be defined as the infraosseous position of the tooth after the expected time of eruption, whereas the anomalous infraosseous position of the canine before the expected time of eruption can be defined as a displacement. Most of the

time, palatal displacement of the maxillary canine results in IMC (1).

IMC is a common finding of oral pathology and represents 2% of patients seeking orthodontic treatment. IMC is one of the most frequently impacted teeth, second only to third molars with the prevalence ranging from 0.8 to 5.2% depending on the population examined. The incidence of IMC is more than twice than that in the mandible, and the ratio of palatal to buccal impaction is 8 to 1.8% of IMC is bilateral and it is twice more common in girls than boys.

Primary etiological causes of IMC include space deficiency, disturbances in tooth eruption sequence, trauma, retention of primary canine, premature root closure, rotation of tooth buds, as well as localized pathological lesions (cysts, odontomas). The long developmental path of the IMC was described as follows: the maxillary

cuspid follows a more difficult and tortuous path of eruption than any other tooth. Superior canines are high in the maxilla in deciduous dentition, and then they erupt towards the occlusal plane, gradually up righting itself until it seems to follow the distal root of the lateral incisor. They then seem to be deflected to a more vertical position; however, often erupts into the oral cavity with a marked mesial inclination.

Previously some clinical papers dealing with implants deliberately placed in IMC were published. Since implant placement requires an adequate quantity and quality of bone (2-10), the related procedures were aiming to avoid invasive surgeries while treating IMC. The follow-up of these prosthetically driven implants placed through IMC was ranging 2 to 3.5 years.

Since then, more cases of IMC have been successfully treated and the principle governing these protocols has been extended to inserting implants in contact with radicular dentine while seeking to optimize aesthetics. The biological rationale of bringing implants into contact with IMC has been extensively addressed elsewhere; it was found to get a trustworthy support from available histological data (11).

It is pointless to say that these innovative protocols for treating IMC need long-term documentation with large numbers of patients before being accepted in routine use by the clinical community. A large number of cases of IMC is not documented because they are treated by general dental involving at best a few patients per year in the hands of every practitioner; so, getting sizable numbers requires time. Before getting the compulsory numbers, the way to start paving a conceivable route for such an unconventional protocol for IMC treatment is to provide long-term documentation even on a small numbers of cases; this would help starting evaluating its long-term fate.

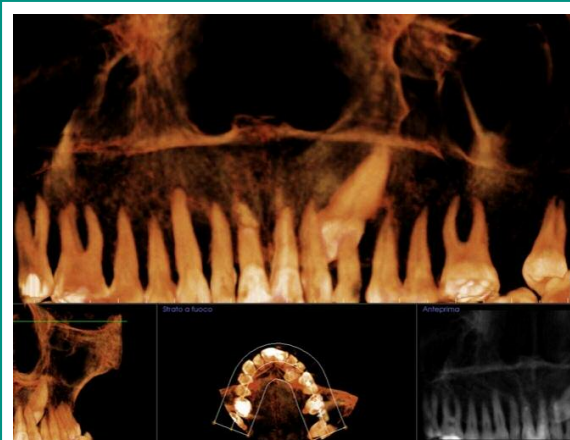
The first few cases with IMC that have been treated with this unconventional implant protocol have been reaching now a follow-up of 5 and more years. The aim of the present paper is, therefore, to describe a case report and 3 years follow-up.

## Case report

A 55-year-old female patient attended to rehabilitate her maxillary left canine site. Her temporary canine showed a deep decay (Figure 1). A cone-beam computed tomography (CBCT) was performed showing IMC closed to the alveolar ridge (Figure 2). For aesthetic reasons, the patient vigorously refused to consider the orthodontic path prescribed by previous orthodontists. The classical surgical approach of IMC was then explained; it consisted in removing decidu-



**Figure 1**  
Deep decay of the deciduous canine.



**Figure 2**  
A cone-beam computed tomography (CBCT) showing retained canine close to the alveolar ridge.

ous canine and subsequently IMC, grafting the area and placing an implant after 6 months of healing and again waiting for the same amount of time. She asked for a shorter and less invasive solution.

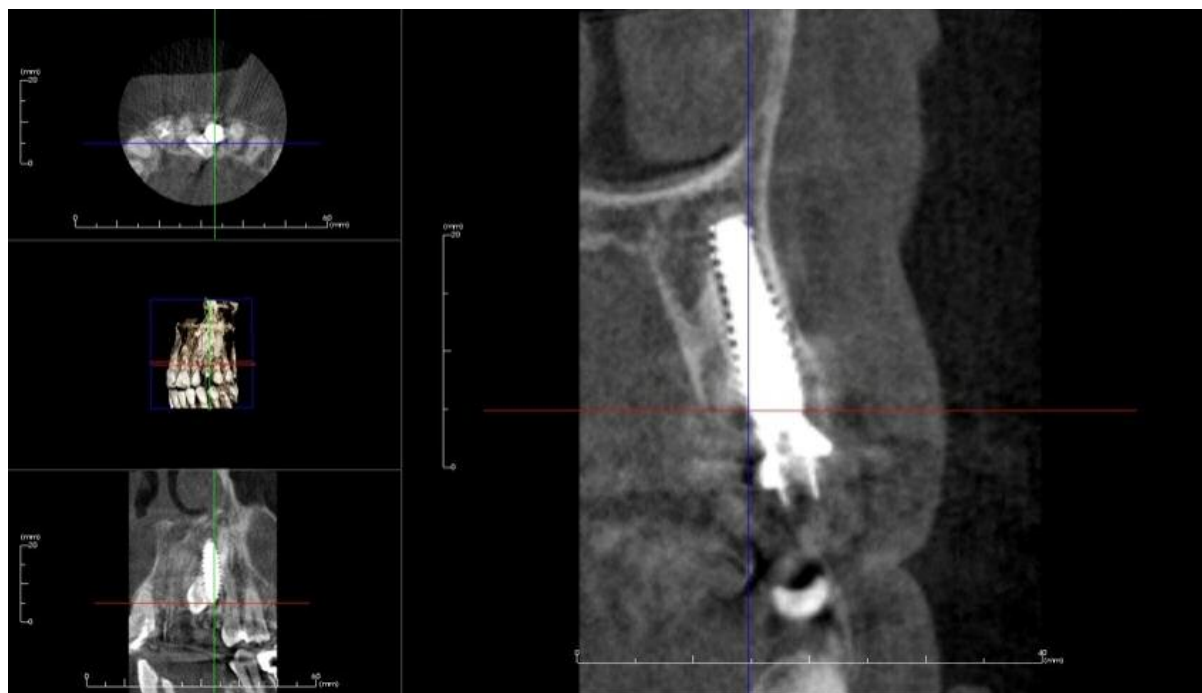
Following patient's wishes an alternative approach was then proposed; it was relying on a previous case that has been successful during 6 months until the canines were removed. Patient was reassured that if this treatment will fail, she would go for the conventional way at no additional cost. The patient accepted to cope with the risk.

A large diameter tapered implant ( $\text{\O} 5 \times 18 \text{ mm}$ ) was inserted (Nobel Active, Kolten, Swisse) (12-16). The impacted site was drilled following the manufacturer recommended drilling sequence to place the fixture with a direct contact with IMC. Primary stability of fixture was achieved and then the gingiva was sutured over the implant (Figure 3). The patient reported no post-operative pain. An immediate loading prosthetic rehabilitation was performed (Figure 4). After check-



**Figure 4**  
Immediate loading prosthetic rehabilitation.

ing for implant stability the prosthetic steps were carried out and a single crown was delivered with Procera system (Procera Networks, Inc. 47448 Fremont Blvd., Fremont, CA 94538, United States) (Figure 5). The patient was happy of this kind of single non-invasive session for



**Figure 3**  
Fixture inserted in retained canine.



**Figure 5**  
Single crown delivered with Procera system.

treating IMC. At the 3-year control, the implant didn't show any mobility or signs of peri-implantitis clinically or radiographically. In addition the patient was satisfied of aesthetic results.

## Discussion

This unconventional protocol allowed implant placement in IMC. Traditional therapy with retained canine exposition and alignment in dental would take much longer time and much more invasive surgery.

Several Authors reported that orthodontic canine alignment is very long and unpredictable therapy. Other Authors stressed that this handling failed in all patients over 30 years. Therefore, this unconventional therapy has been increasingly successful among dentists, in fact it might turn into one of the accepted care options on top of the invasive surgical procedure of tooth removal and further implant placement. So implant placement might be considered a valid alternative for IMC treatment. In fact implant dentistry has reached success rate of above 80%, but peri-implantitis is the most important delayed complication (17-26). In addition, the patient-related susceptibility is a critical factor for disease onset. So, every factor favouring oral biofilm formation (poor oral hygiene), host defence capability (smoking habit, excessive alcohol consumption, genetic traits, history of peri-

odontitis, use of bisphosphonates), might favour developing of peri-implantitis and periodontal disease, which diagnosis and treatment require dentist's engagement (27-32).

This new surgical procedure for IMC treatment has been created new interfaces with the implants: implant-periodontal ligament, implant-cement, implant-dentine, and an implant-pulp and implant-enamel interfaces (33).

Since this surgical approach is new, long-term data involve only a limited number of patients and implants. Further studies are needed to validate this procedure.

## Conclusion

There are some options in the management of IMC: extraction of an impacted tooth, extraction of an adjacent tooth or non-extraction treatment involving orthodontic space opening and surgical exposure, and finally inserting fixture into IMC.

When non-extraction treatment of IMC is performed, the orthodontic treatment is often initiated before the surgical exposure in order to align the teeth, to open the space for the impacted tooth and to enhance the natural eruption process. At the surgery, any hard or soft tissue obstruction is removed and the unerupted tooth is exposed. Then, an attachment is placed on the impacted tooth, either at surgery or shortly



thereafter.

Placing implants through IMC and generating interfaces other than the implant-bone interface led to uneventful healing; it did not interfere the clinical stability of these implants in the long-term, up to 3 years. More patients with IMC must be treated before this protocol can be used routinely, but it might open new treatment perspectives. Moreover, it might suggest that there is new knowledge to reevaluate well-anchored paradigms in dental implantology as published elsewhere.

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