

Treatment of impacted teeth in orthodontic practice

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Abstract

Treatment of impacted teeth in orthodontics is crucially important, as clinician is supposed to manage such cases in his / her daily practice. However, impaction cases can be so complicated especially when other factors interfere within their treatments such as anatomical locations of the impacted teeth, surgical considerations and Orthodontic Traction difficulties. The management of impacted teeth in orthodontic practice varies widely from extraction of the impacted tooth to forced orthodontic eruption. Orthodontic eruption varies between closed or open techniques that must be determined for each case, per se. One hundred and fifty-one impacted teeth cases were followed up, classified by their techniques as to register the results statistically. The approaches for handling the impacted teeth were open forced eruption "as window or Apically Positioned Flap (APF)", closed forced eruption, negligence and extraction when indicated. Bonding with Light Cure orthodontic composite was used for all cases of forced eruption. The light cure device that was used for bonding was Mini LED, Acteron, Li-ION 3.7V, 2500mAh. Time of exposure being 20 second. The traction attachments had been either Titanium Button and Chain (Watted) Dentaurem, or conventional Buttons (with ligature wires or elastics). The clinical audit and outcome is presented here with recommendations. It is recommended that the decision regarding orthodontic forced eruption (closed or open), or extraction should be based on evaluation of each independent case on its own merit. 126 cases out of the 151 screened cases had been treated successfully by orthodontic forced eruption, but complications such ankylosis, resorption, eruption failure and periodontal pockets need to be taken into account. Another complication can often be encountered that is bonding failure, especially in closed force eruption. However, the new bonding materials and the improved techniques have helped overcome such a problem. Finally, the more precise the location and position of the impacted tooth is known, the easier the procedure becomes. This research discusses the prognosis of impacted teeth, the approaches of the orthodontic forced eruption and when to expose, extract or even "neglect". The article does not recommend one treatment plan for all cases, in contrary, it urges the reader to search more for innovative solutions whenever such cases come across.

Keywords: Impacted teeth; orthodontic forced eruption; open eruption; closed eruption; traction attachments

Introduction

It is paramount for an Orthodontist coming across impacted teeth to evaluate the viability of treatment outcome and methods of eruption of such teeth keeping in mind the benefits of such a prolonged treatment against extractions. These aforementioned queries probably determine the treatment plan of typical impacted cases. In case the treatment plan includes orthodontic forced eruption, clinician is encouraged to choose between open or closed forced eruption.¹

Open forced eruption is the technique that includes the exposure of the crown either completely or partially to insure the installment of the attachment. This approach might be accomplished by either creating a window or APF "apically positioned flap".

Closed forced eruption is the technique that includes the exposure of the crown completely by a flap, installing the attachment for orthodontically forced eruption, then closing that flap.

The biomechanics of the orthodontically forced eruption are almost the same, regardless of whether the eruption is open or closed, as the traction process of the impacted dental unit is simply a stimulation process of

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the eruption mechanism. Additionally, the used force is supposed to be close to 35-60 grams (optimum force).²

The decision of which technique is appropriate needs to be determined in consultation with the Oral surgeon and Periodontist as to evaluate how to gain access to impacted tooth, flap shape and depth and the attached gingival preservation.³

Extraction may be indicated when the impacted dental unit is Inaccessible, or gaining access is extremely difficult or

deleterious to the vicinities. (Figure 1). Secondly if the tooth is a supernumerary, dilacerated or mutilated (Figure 2) or when a large space deficit (> 6 mm) exists, what makes it far more profitable to the patient to salvage the impacted tooth rather than choosing a safe and sound tooth for extraction (Figure 3). Finally, a small group of impacted teeth are neither available for the orthodontic forced eruption, nor extraction because of specific circumstances (Figure 4).

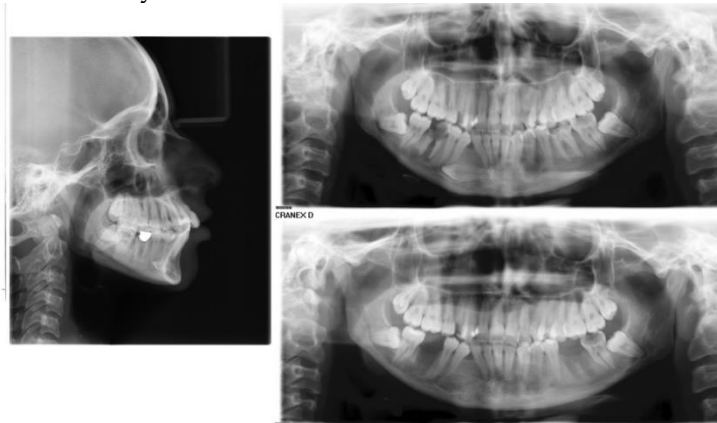
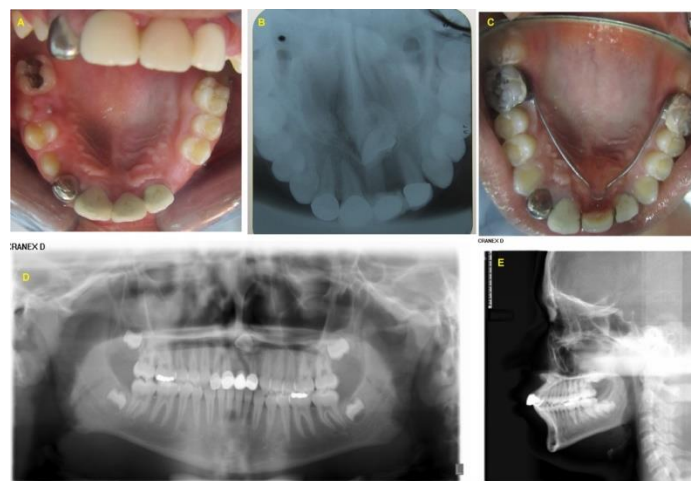


Figure 1 Impacted Mandibular Right Canine: The case is indicated for extraction as it is deep and unavailable for orthodontic eruption.



**Figure 2: Dilacerated Maxillary Left Central Incisor (A)
The patient had been treated at the age of 12 years by a bridge for the complaint of missing incisor (B) As a solution modified Nance Dummy tooth was installed (C)
Panorex X-Ray displays the dilaceration (D)
Cephalogram (E)**

The Nance modified appliance has to be removed at the age of 18, dilacerated tooth should be extracted and a proper bridge must be installed.

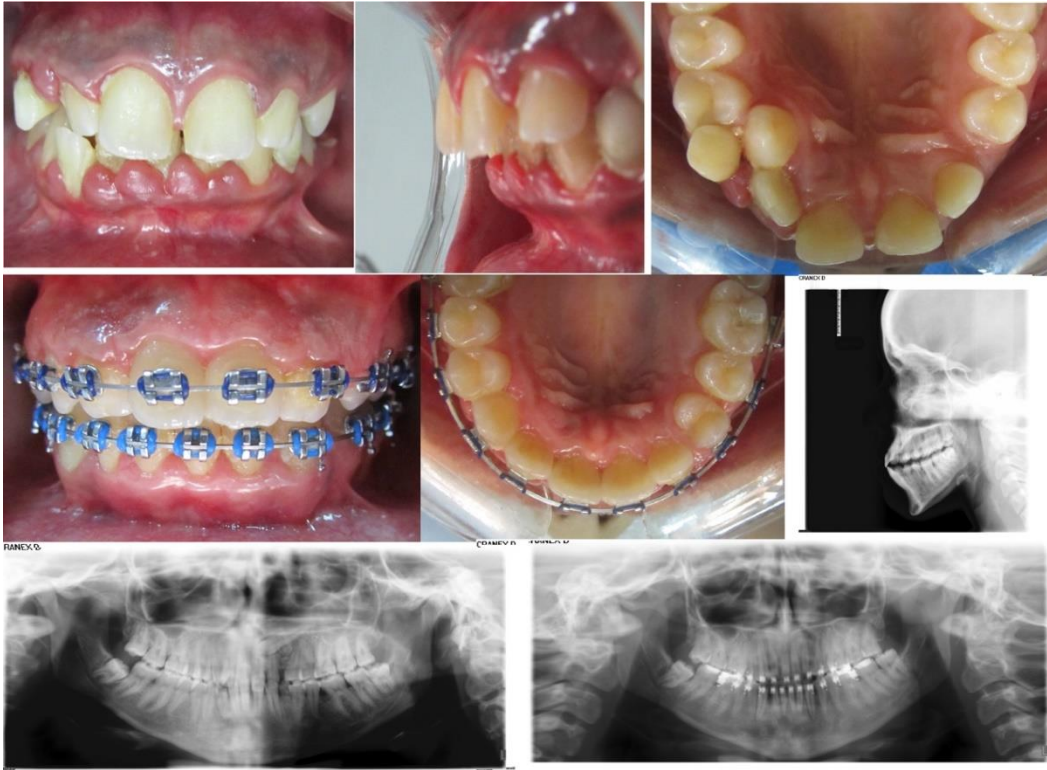


Figure 3: A Case of 20 Y.O. female with impacted maxillary left canine, protrusion and space deficit for more than 7 mm. Consequently, the impacted tooth had been extracted.

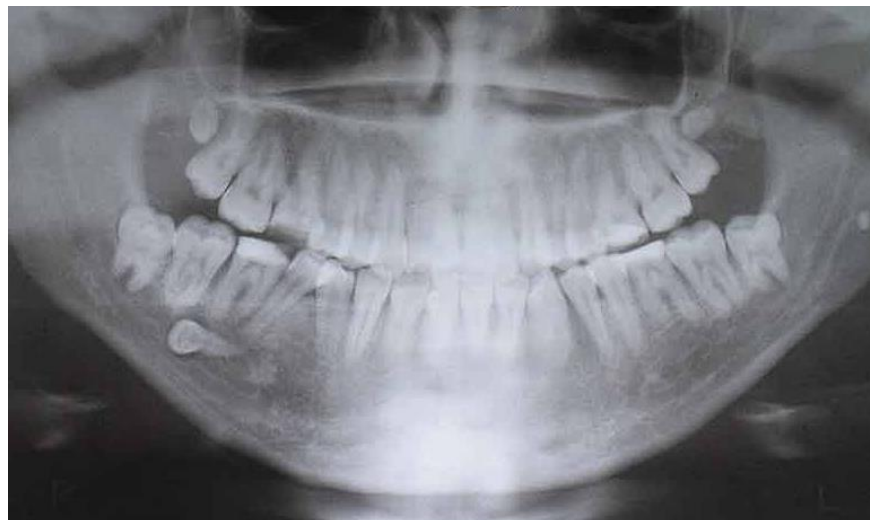


Figure 4: A horizontal asymptomatic supernumerary tooth close to the Inferior Mandibular Nerve. This impacted tooth has been neglected, and the patient has been treated. The impacted tooth needs to stay under observation

Material and Methods

The aim of this study was to illustrate the factors that need consideration in proper management of impacted teeth. Management of impacted teeth varies from extraction, open / closed exposure with tractions,⁴ or even disregarding the impacted tooth / teeth. One hundred fifty one impacted teeth treated were studied to identify the best management

practice and compare the orthodontic eruption techniques according to prognosis and location.⁵

The impactions were either resolved by open orthodontic forced eruption (Figure 5) or closed forced eruption (Figure 6). Extraction due to a number of factors is another option (Figure 7,8).

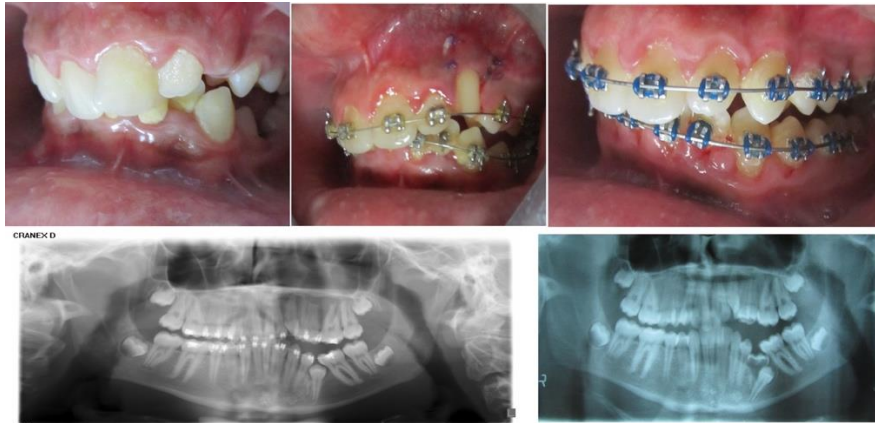


Figure 5: Apically Repositioned Flap, as to expose an impacted maxillary left canine. The canine is orthodontically erupted, Panorex displays that before and after



Figure 6: Impacted maxillary left canine, with retained deciduous c. The orthodontic eruption took place after exposure, attachment installed, flap sutured and traction.



Figure 7: A case with multiple impacted teeth among the roots of teeth. In this case extraction and enucleation of the impacted dental units is a must



Figure 8: A case of Impacted supernumerary maxillary canine on the borders of maxillary sinus and nasal floor. The Orthodontic Treatment had been completed despite the existence of the aforementioned tooth, which was left for observation

Out of the 151 impacted teeth, eighty-nine teeth were treated via open eruption technique with brackets “or buttons” bonded and traction applied. Six teeth were disregarded and orthodontic treatment took place despite the existence of an impacted tooth, because of the advices of the surgical team to protect the anatomical structures. Nineteen teeth were extracted after “space analysis” that indicated a severe lack of space

or dental units were malformed or supernumeraries. Thirty-seven impacted teeth were chosen for closed orthodontic forced eruption. The cases that had systemic diseases had been excluded from this study, in addition to the cases of cleft lip and palate and syndromes.⁶ Recommended etching and bonding protocols were used for bonding of attachments on the impacted teeth (Phosphoric Acid 35%, applied for 45 second,

Transbond XT "3M Unitek" light cure adhesive, with exposure time of 20 second, utilizing Mini LED, Acteron, Li-ION 3.7V, 2500mAh, Figure 10).

The traction attachments were bonded either after a few days in the open forced eruption cases, or in situ during the surgical procedure, before suturing for cases using closed forced eruption technique. The used

attachments had been either Titanium Button and Chain (Watted) Dentaurum, or conventional Buttons (with ligature wires or elastics).

The author used low traction forces, doing his best to be as close as possible to the optimum force values 35-60 g,² the utilized force gauge had been Dontrix Gauge (Figure 10).

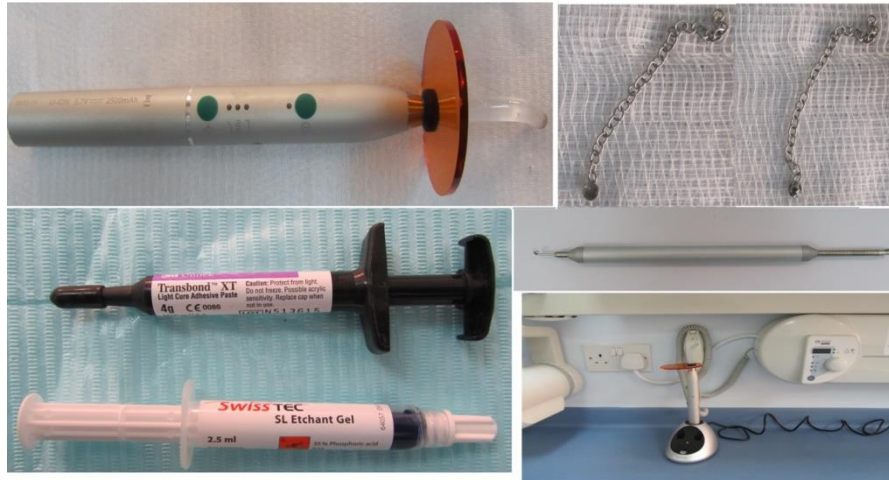


Figure 10 : The materials, instruments and devices

The traction of the Orthodontic Forced Eruption cases had been as direct "one step" or indirect "two-step" orthodontic forced eruption (Figure 11).⁷

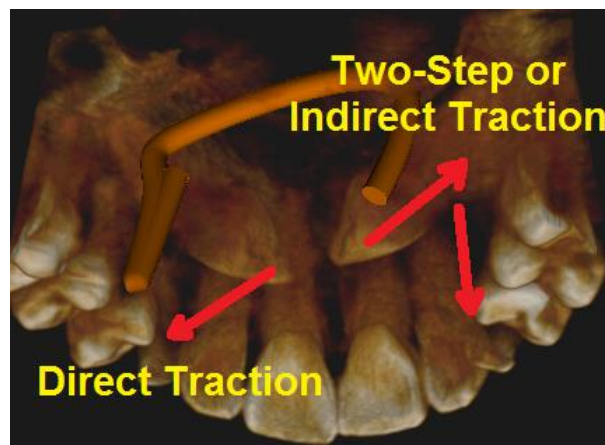


Figure 11: Figure displays the difference in traction between direct and indirect orthodontic eruption

All the cases of forced eruption had been treated by straight wire technique, using Roth prescription.

Results:

Considering the 151 impacted teeth, open eruption technique was used in 58.94 % of the cases, treated by either "window or APF", brackets "or buttons" bonded right after

exposure or even after 2-7 days of the surgical exposure and then active traction commenced in the next visit (Figure 12).

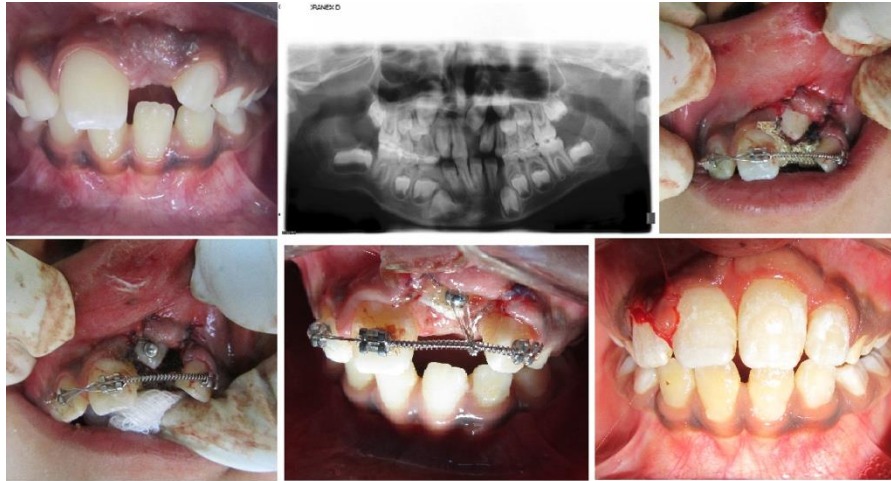


Figure 12 : Phases of Open Eruption technique in an impacted left central incisor

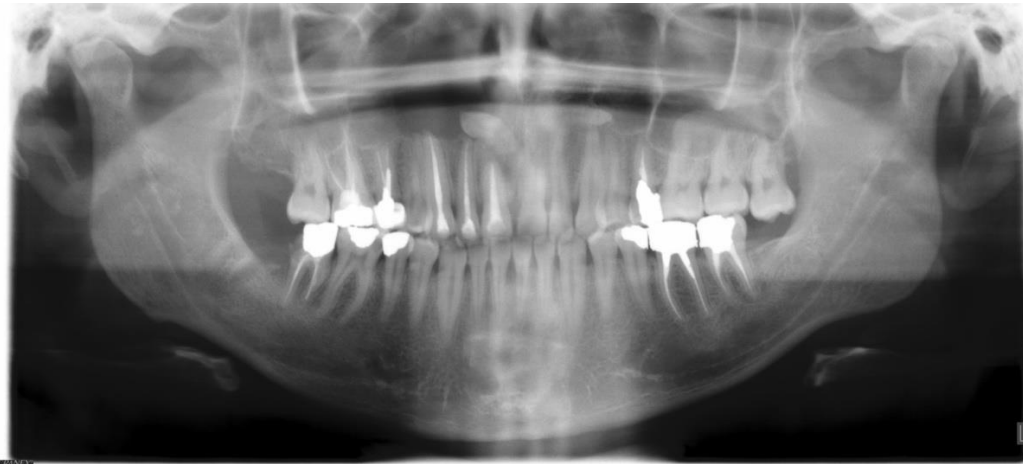


Figure 13: Treatment commenced despite the existence of 2 impacted supernumerary canines. Suspicion of more damage with extractions due to close proximity to adjacent structures

In 3.97% cases, orthodontic treatment took place, despite the existence of an impacted tooth. Such a decision can be taken after consultation by the surgical team and according to the ratio of losses to gains. As sometimes running the risk of extraction or forced eruption of an impacted dental entity in the vicinities of anatomical structures could

be extremely harmful to the patient (Figure 13).

In 12.58 % of the cases, impacted teeth were extracted either because of poor prognosis of impacted tooth, space deficit or in case of malformation, dilaceration, supernumerary teeth e.g. mesiodens, odontome etc (Figure 14).



Figure 14 : case of Mesiodens. Recommended for extraction before starting orthodontic treatment



Figure 15 : Closed eruption approach

24.5% of cases commenced with closed forced eruption methodology of treatment where attachment was bonded at visit of surgical exposure and before closure of the flap (Figure 15).

Regarding the time span between surgical exposure and tooth eruption, the open forced eruption rate has been 1.17 times more rapid than closed eruption technique $SD = 0.58$. however, this point could be attributed to the "cases triage". In other words, the cases of open forced eruption approach were more "superficial" in general, what makes this

difference in treatment time between those two techniques insignificant.

Discussion

Treatment of Impacted teeth depends thoroughly on the comprehensive diagnosis and treatment plan. Consequently, determining properly the location of impacted teeth guiding the clinician to conclude how to gain the access and start traction (Figure 16).

It is of paramount importance to include the desired approach in the treatment plan. As, to

decide whether the impacted unit is supposed to be extracted or subjected to forced eruption.

In case of forced eruption, the clinician must coordinate with the Surgeon and Periodontist to select whether the exposure is open window, Apically Positioned Flap or Closed Flap.

Should the orthodontist decide the techniques to get along with, the next step would be space creation in case of lack of the sufficient space, that fits with the impacted dental unit after traction into its proper planned position. Subsequently, the surgical step takes place,

where the orthodontist confirms the adequacy of exposure, when to install the attachment and start the traction. In summary, the steps of orthodontically assisted eruption are:

- 1- Creation of the due space for the impacted tooth to occupy, in case of any space insufficiency (Figure 17)
- 2- Gaining access to impacted tooth / teeth
- 3- Attachment bonding
- 4- Impacted tooth / teeth traction (Figure18)
- 5- Button to be replaced by a bracket in the later stages (Figure 19)
- 6- Finishing

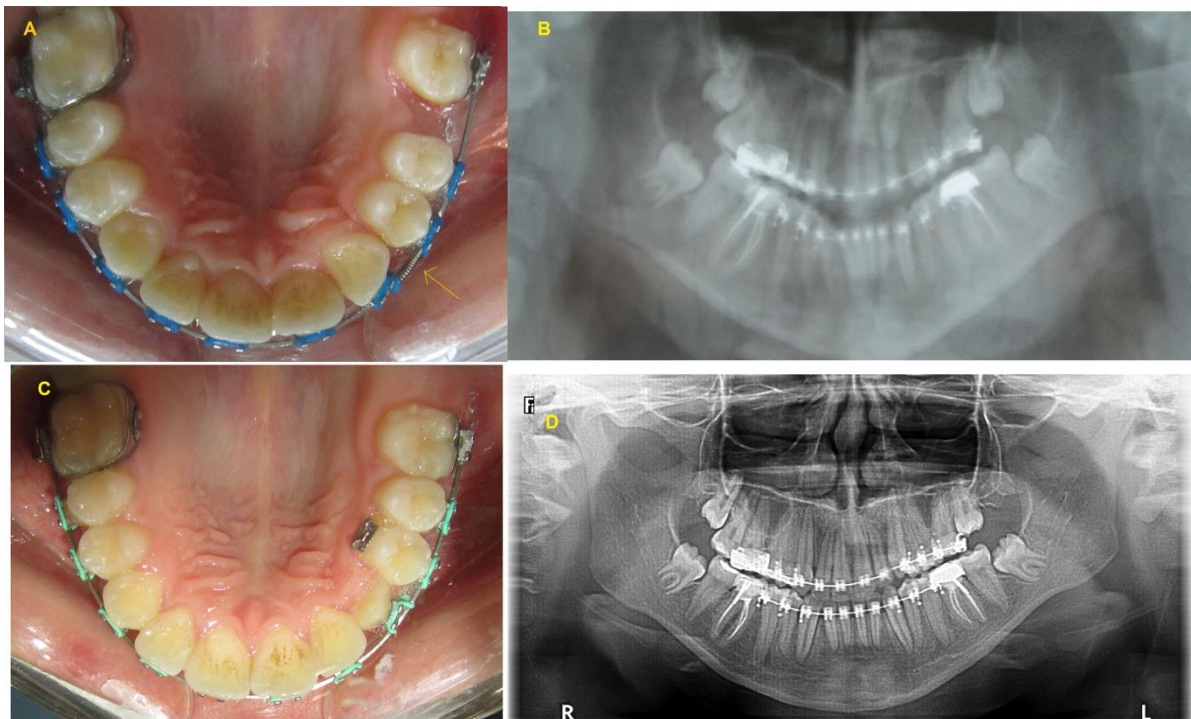


Figure 17: A Space had been created by open coil spring B Panorex before eruption C The impacted canine after eruption D Panorex after eruption.

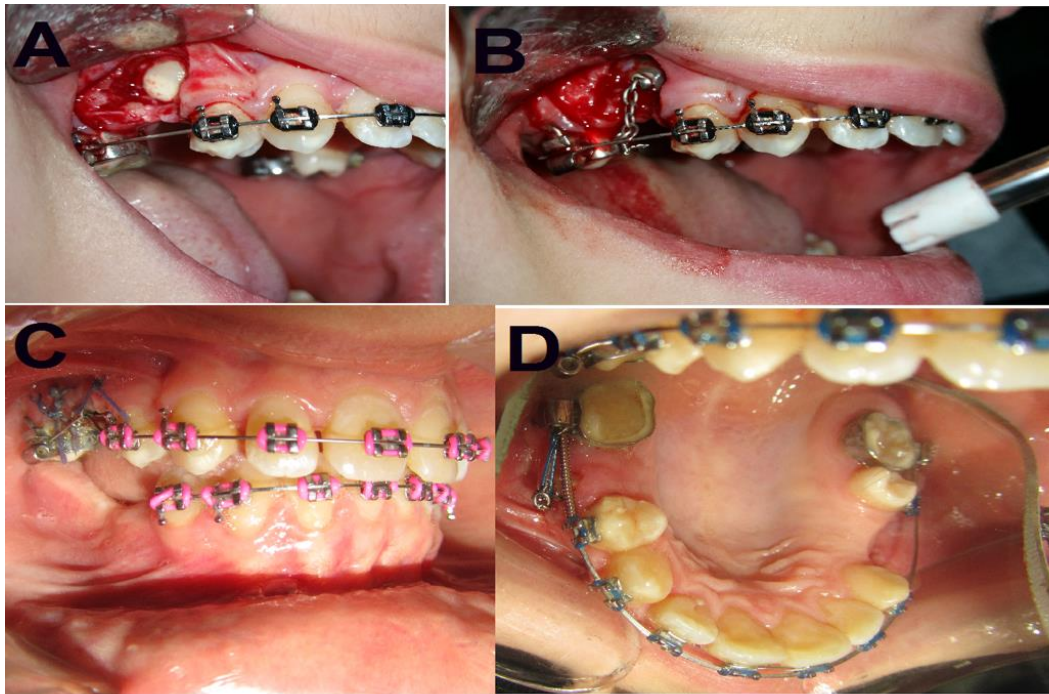


Figure 18 : A Gaining access B Attachment bonded C & D Suture and traction



Figure 19 : Impaction resolution and button replaced by a bracket after eruption

It is crucial that clinician takes into account complications when handling cases of impacted teeth. These are ankylosis, resorption⁸, impinging on nearby structures, collision with adjacent roots and impacted teeth in mandibular body potentially leading to fracture (Figure 21).



Figure 20: Multiple impacted teeth including mandibular left canine and supernumerary teeth involved in the inferior mandibular nerve canal.



Figure 21: The fracture line including impacted tooth

On the other hand, despite such hazards, clinical experience shows that occurrence of the aforementioned complications is avoidable if appropriate precautions are undertaken.

Conclusions

Treatment of impacted teeth varies widely from orthodontic eruption to extraction.

However, it is crucial that every case be studied, planned and treated independently; as there is no “cook book” approach for all cases. The clinician is encouraged to analyze each case thoroughly, to anticipate all potential consequences and consider all possibilities to develop the best available treatment plan. In summary the pillars of a successful treatment of impacted teeth are; comprehensive diagnosis, appropriate

orthodontic and surgical treatments. In other words, every impaction case has to be considered individually for choosing the best treatments for in the benefit of the patient.

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