

Management of Impacted Teeth in Orthodontics

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ABSTRACT

Introduction and Purpose: 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.

Materials and Methods: One hundred 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 APF Apically Positioned Flap”, closed forced eruption, negligence and extraction when indicated.

Bonding with Light Cure orthodontic composite was used for all cases of forced eruption. The used Device had been Mini LED, Acteron, Li-ION 3.7V, 2500mAh.

Time of Exposure 20 Second. The traction attachments had been either Titanium Button and Chain (Watted) Dentaureum, or conventional Buttons (with ligature wires or elastics). 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.

Results and Conclusion: It is recommended that the decision regarding orthodontic forced eruption (closed or open), or extraction be based on evaluation of each independent case. In spite of the result of this research that 126 cases 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 failures, especially in closed force eruption. However, the new bonding materials and the improved techniques have helped to overcome such a problem. Finally, the more precise the location and position of the impacted tooth is known, the easier the procedure becomes.

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Introduction

When the clinician encounters impacted tooth/Teeth, the first question is whether such dental unit(s) is/are available to be beneficial!

How to handle such a dilemma?

Would force eruption be successful?

When to take the decision of extraction of an impacted dental unit?

These aforementioned questions are probably the preliminary criteria for starting the treatment plan of typical impacted teeth cases.

In case, the treatment plan includes orthodontic forced eruption, so the clinician is encouraged to choose in between open forced eruption technique or Closed forced eruption one [1]:

1. Open Forced Eruption is the technique that includes the exposure or 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”.
2. Closed Forced Eruption is the technique that includes the exposure or the crown completely by a flap, installing the attachment for orthodontic ally 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 the eruption mechanism. Additionally, the used force is supposed to be close to “Optimum Force 35-60 g” [2].

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

Extraction may be indicated when the impacted dental unit is:

1. Inaccessible, or gaining access is extremely difficult or deleterious to the vicinities. (Figure 1).
2. The tooth is a supernumerary, dilacerated or mutilated (Figure 2).
3. When a large space deficit (> 6 mm) exists, what makes it far more profitable to the patient to “Victimize” the impacted dental unit 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; such a dental unit could be left for observation according to strict criteria and conditions (Figure 4).

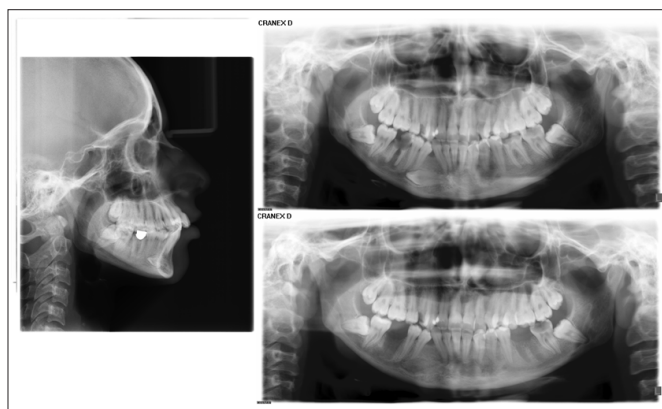


Figure 1: Impacted Mandibular Right Canine: The case is indicated for extraction as it is deep and unavailable for orthodontic eruption.

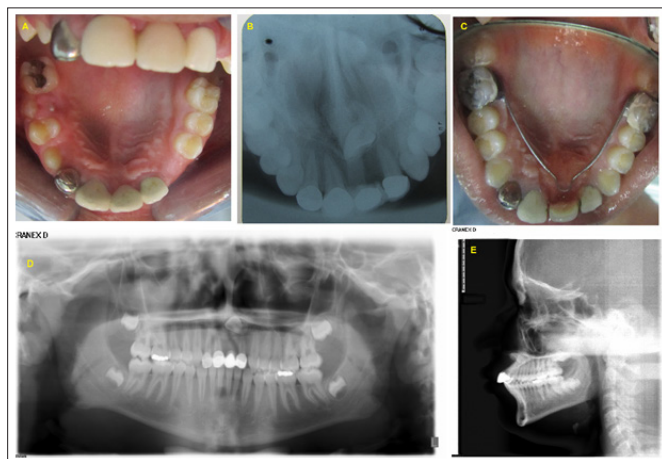


Figure 2: A Dilacerated Maxillary Left Central Incisor, the patient had been treated wrongly when he had been 12 Y.O. by a bad bridge “supposed to solve the problem of missing A, however he had dilacerated tooth B, to solve the problem of the bad bridge and the aesthetic appearance of the missing tooth a Nance modified appliance with Dummy tooth was installed C, the Panorex X-Ray

displays the dilaceration D, as well as the 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.

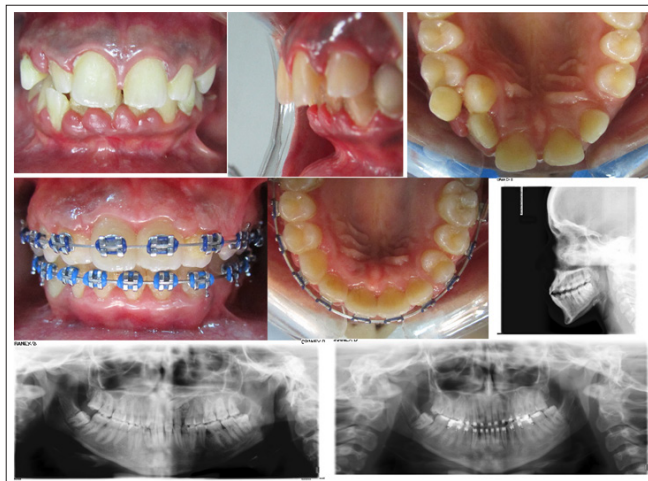


Figure 3: A Case of 20 Y.O. female with impacted maxillary left canine, protrusion and space deficit for more than 7 mm. Consequently, the impacted tooth had been extracted



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 once a year.

Materials and Methods

The aim of this study is to illustrate the factors about the proper management procedures of the impacted teeth. Management of impacted teeth varies from extraction, open exposure, closed orthodontic eruption or even “disregarding” the impacted tooth/teeth [4].

One hundred fifty one impacted teeth “treated under the supervision of the author” were studied to identify the best management practice and compare the orthodontic eruption techniques according to prognosis and location [5].

The potential treatments of the impacted teeth had been one of the following:

1. Open exposure “Window or APF” or Open Orthodontic Forced Eruption (Figure 5).

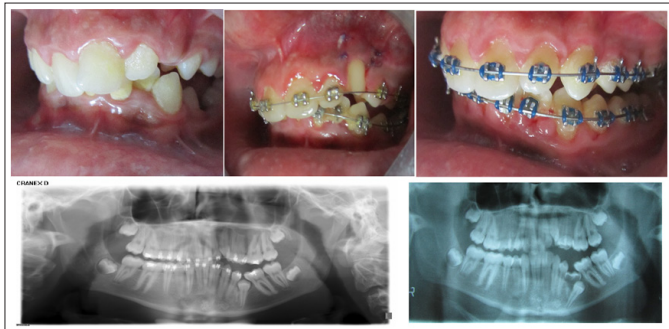


Figure 5: Apically Repositioned Flap, as to expose an impacted maxillary left canine. The canine is orthodontically erupted, Panorex displays that before and after

2. Closed Orthodontic Forced Eruption (Figure 6).



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

3. Extraction of the impacted tooth/teeth (Figure 7).

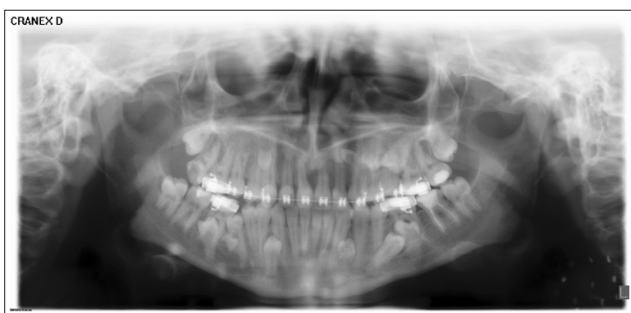


Figure 7: A case with multiple impacted teeth among the roots of teeth. In this case extraction and enucleation of the impacted dental units is a must.

4. Disregard when orthodontic eruption or extraction is either impossible or destructive to vicinity anatomical structures and when impacted tooth/teeth is/are asymptomatic, as well (Figure 8).



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 left for observation.

Looking at the 151 impacted teeth:

Eighty nine teeth were treated via the open eruption technique; a “Window or APF” was made, brackets “or buttons” bonded and traction placed.

Six teeth were disregarded; 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” indicated a severe lack of space, dental units were malformed or supernumeraries.

Thirty seven impacted teeth had been indicated 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 as such cases require more another detailed studies (Figure 9) [6].

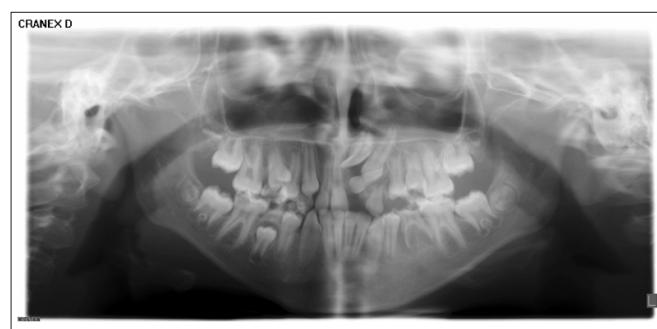


Figure 9: A case of cleft lip and palate with impacted, retained deciduous teeth and oronasal fistula. Such cases are more complicated with multidisciplinary treatments needed.

The Etchant used had been Phosphoric Acid 35%, applied for 45 second.

The bonding agent had been 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 had been installed either after a few days in the Open Forced Eruption cases, or in situ during the operation, before suturing; in the cases of Closed Forced Eruption.

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 the utilized force gauge had been Dontrix Gauge (Figure 10) [2].

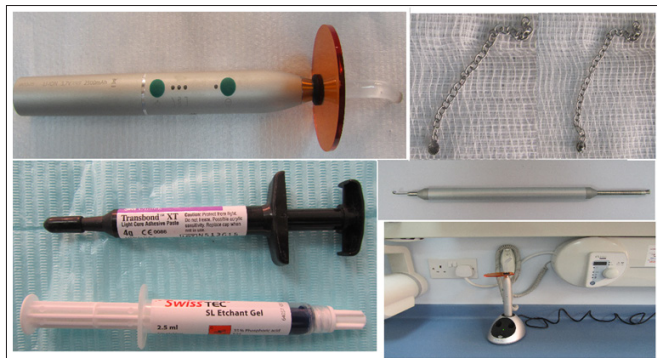


Figure 10: The materials, instruments and devices used in this studies.

The traction of the Orthodontic Forced Eruption cases had been as direct “One Step” or indirect “Two-Step” Orthodontic Forced Eruption (Figure 11) [7].

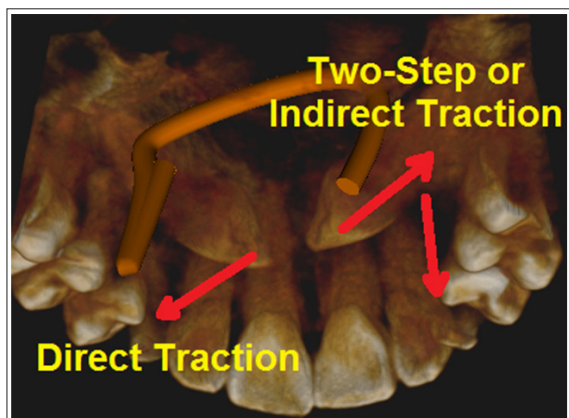


Figure 11: Figure displays the difference in traction between the indirect orthodontic eruption and direct one.

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

Results:

Regarding to the study on the 151 impacted teeth:

1. Open Eruption teeth have been 58.94 % of the studied cases, treated by either “Window or APF”, brackets “or buttons” bonded either sooner after exposure or even after 2-7 days of the surgery time then the active traction commenced the next visit. (Figure 12).

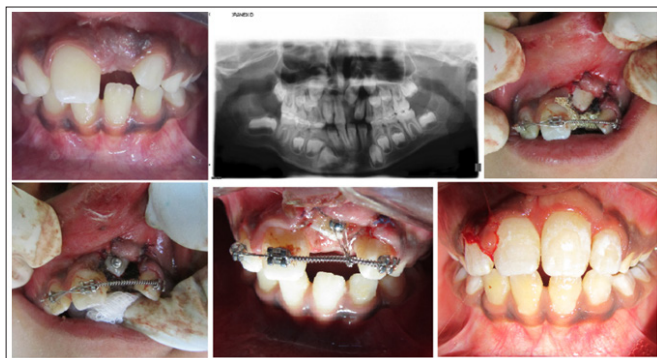


Figure 12: Phases of Open Eruption technique, in an impacted left central incisor, APF done, Button installed, Traction took

place and the Total Eruption.

2. About 3.97 % cases have been “disregarded”; in other words, the orthodontic treatment took place, despite the existence of an impacted tooth. Such a decision might be taken according to the consultation of 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 “Stuck” dental entity in the vicinities of anatomical structures could be extremely harmful to the patient. (Figure 13).



Figure 13: The case had been treated despite the existence of 2 impacted supernumerary canines, as the surgeon advised to not extract because these teeth were asymptomatic. On the other hand, extraction if happened could be deleterious to the adjacent structures.

3. Extraction cases have been 12.58 %, the extracted teeth are either because of poor prognosis of the impacted tooth, space deficit or in case of malformation “Dilaceration, Supernumerary, mesiodens, odontome ..etc”. (Figure 14).

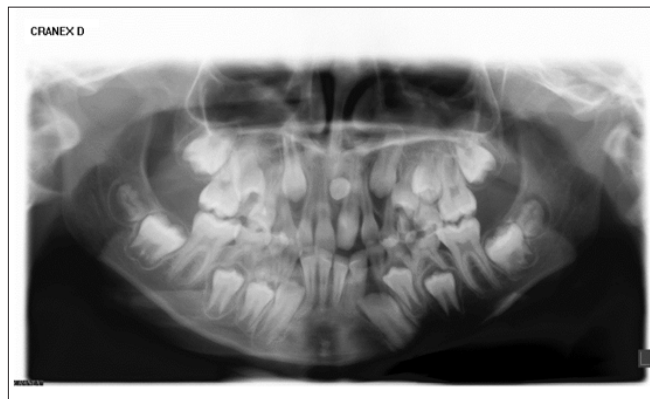


Figure 14: A case of Mesiodens existed. It is recommended that this tooth be extracted before starting orthodontic treatment.

4. Closed Forced Eruption formed 24.5 % of the screened cases, where the attachments had been installed at the same visit of surgery after flap formation, crown exposure and before closure of the flap. (Figure 15).



Figure 15: Three impacted teeth in 12 Y.O. female patient. The patient had been treated by orthodontic eruption, “Closed Approach”. The photos display before and after

Regarding time span between surgical exposure and tooth eruption, the open forced eruption has been 1.17 rapid than closed eruption with standard deviation $SD \approx 0.58$; 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 the impacted tooth guiding the clinician to conclude how to gain the access and start traction (Figure 16).

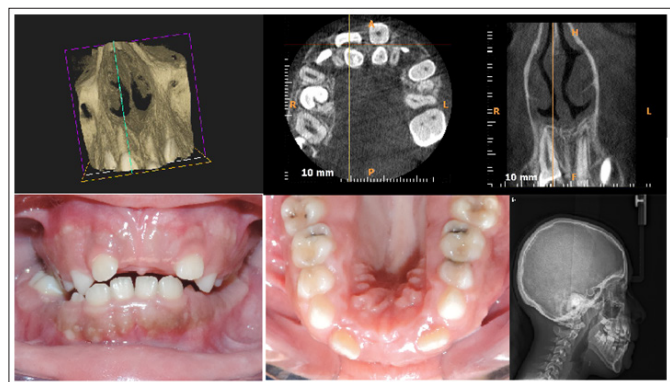


Figure 16: An example of a case of impacted maxillary central incisors in 10 Y.O. female patient. The CBCT, and Cephalogram help in deciding the location of the impacted teeth. What is the first step in making the appropriate diagnosis.

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 decides 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 locus.

Subsequently, the surgical step takes place, where the orthodontist is supposed to accompany, as to check the sufficiency of the exposure, when to install the attachment and start the traction. Traction is either “Direct, one-step traction”, or “Indirect, two-step traction” (Figure 11).

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 into Impacted Tooth/Teeth.
3. Attachment Installment.
4. Impacted tooth/teeth traction (Figure 18).
5. Button “if existed” is replaced by a Bracket (Figure 19).
6. Treatment Completion.

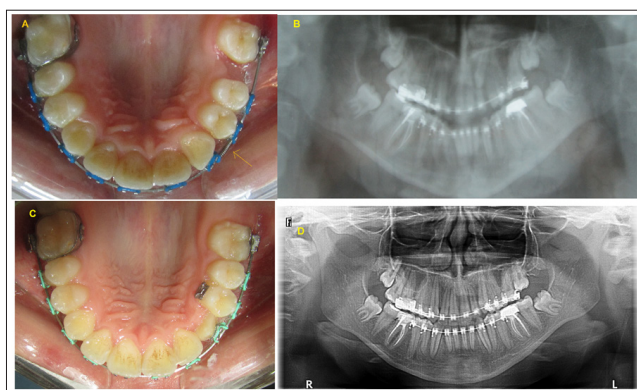


Figure 17: A case of 16 Y.O. female patient with impacted left canine. A Space had been created by open coil spring “arrow”, B Panorex before eruption, C The impacted canine after eruption, D Panorex after eruption.

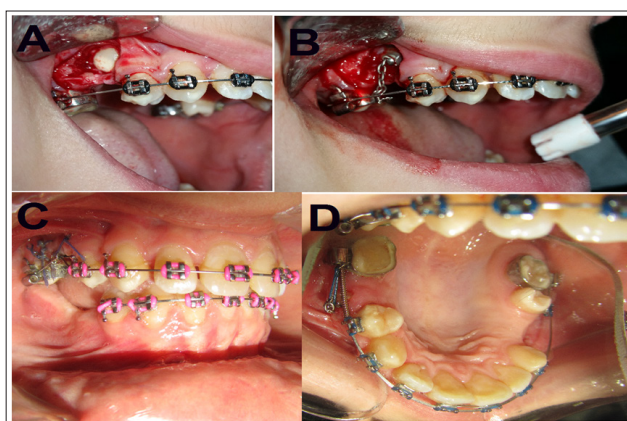


Figure 18: The steps after exposure of the impacted maxillary right second premolars, A Gaining access, B Attachment installed, C & D Suture and traction.



Figure 19: Impacted maxillary left canine, exposure, Button Installed, traction, Button was replace by a bracket after eruption. Complications of the impacted cases:

It is crucial that clinician take into account the following complications, when manipulating the cases of impacted teeth and enforced eruption:

1. Ankylosis.
2. Resorption [8].
3. Impinging on the nearby structures (Figure 20).
4. "Collision" with the adjacent roots.
5. The impacted teeth arenas are sometimes the "Achilles' heel" of the mandibular body; where fracture is more possible to take place after a serious trauma (Figure 21).



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



Figure 21: This patient had been exposed to severe trauma, directly on the mandible. Unfortunately, the fracture took place in the impacted teeth area. Looking at the fracture lines displays that clearly.

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

Conclusion

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, to chose the best treatments for, per se.

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