

SURGICAL EXPOSURE AND ORTHODONTIC TRACTION OF UNERUPTED TEETH: A PRELIMINARY STUDY

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الأسنان المنطمرة تمثل ظاهرة لدى المرضى الذين يزورون طبيب الأسنان. ويمكن تعريف السن المنطمورة بأنها التي أعيقت عن الظهور في مكانها بسبب وضعها غير الصحيح، أو نقص الفراغات أو بسبب عوائق أخرى. ونسبة عالية من هذه الحالات تحتاج إلى التدخل الجراحي لأنها قد تسبب التهابات للأنسجة المحيطة أو الآم أو تكوين أكياس حول السن المنطمورة.

وقد سجلت عدة دراسات عن معدل شيوع الأسنان المنطمورة منذ عام ١٩٣٠م. وقد أوضحت هذه الدراسات أن الرحي الثالثة (ضرس العقل) هو أكثر الأسنان تعرضاً لهذه الظاهرة بنسبة حوالي ١٨٪. ويتبعها في الانتشار الناب العلوي بنسبة حوالي ٩,٠ إلى ٨,١٪. أما نسبة الانتشار في الضاحك العلوي والسفلي فإنها تلي الناب العلوي.

ولا تزال نسبة المرضى الذين يعانون من ظاهرة الأسنان المنطمرة تمثل شريحة كبيرة من المرضى الذين يعالجون بكلية طب الأسنان - جامعة الملك سعود. وبعض الحالات معقدة نسبياً مما يسبب صعوبة في تقويم الحالة واختيار الطريقة المثلى للعلاج.

وغالباً ما تحتاج الرحي الثالثة إلى إزالتها جراحياً فيما عدا الاستثناءات مثل الأرحاء التي يعاد زراعتها في مكان أحد الأرحاء المصابة بالنخر الشديد ولكن نسبة نجاح الزرع ضئيلة للغاية. إلا أن حالات الأنياب والأسنان الأخرى المنطمورة تشكل مشكلة من نوع آخر وكانت الطرق المتاحة لعلاج مثل هذه الحالات تشمل: التعرية الجراحية عن طريق عمل نافذة في الأغشية المخاطية سواء مع أو دون اللجوء إلى المعالجة التقويمية اللاحقة التي تسمح بزوغ الأسنان بتنشيطها، أو إعادة زرعها، أو إزالتها جراحياً مع استبدالها بالتركيبات الصناعية.

الغرض من هذه الدراسة هو تقديم عدد كبير نسبياً من حالات الأسنان المنطمورة عولجت بطريقة التعرية الجراحية والسحب التقويمي لإعادتها إلى التطابق السليم وتقويم نتائج هذه الطريقة.

اشتملت هذه الدراسة على عدد (٤٩) حالة (٤٤) إناث و (٥) ذكور) أعمارهم تتراوح بين ١٢ - ٢٤ عاماً، وعدد الأسنان المنطمورة التي عولجت هي ٩٨ سناً وتفصيل هذه الحالات يتضح من الجدول رقم (١). تم فحص جميع الحالات بواسطة جراح الفم وأخصائي تقويم الأسنان لتقويم احتمالات طرق العلاج الأخرى. كان من أهم عوامل اختيار المرضى هو الاهتمام باتباع طرق نظافة الفم والأسنان.

Received 18/08/91; revised 21/11/91 and 20/04/94; accepted 28/06/94

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تمت معظم العمليات الجراحية تحت التخدير الموضعي ما عدا بعض الحالات المعقدة أو نظراً لصغر سن المريض حيث استخدم التخدير العام. أهم خطوات العلاج كانت إزالة جزء صغير جداً من عظم السنخ بما يسمح بتعرية التاج وعزله من السوائل لتثبيت الصفيحة التقويمية بعد إضافة الرابط المعدني لها. وأما عن التقويم فقد تم باستخدام جهاز تقويم الأسنان الثابت بطريق محاذاة حدود الأسنان (Edgewise).

الاستنتاجات:

أولاً: طريقة التعرية الجراحية مع السحب التقويمي يمكن أن تؤدي إلى الحصول على نتائج جيدة بدون مضاعفات ملموسة.

ثانياً: تتميز هذه الطريقة بأنها تستخدم قطع جراحي يمتد على قمة عظم السنخ محافظاً على كل عرض الغشاء المخاطي ذو الكراتين، وهذا يمنع حدوث جيوب لثوية أو إطالة التاج الإكلينيكي كما يحدث عند استخدام طرق غير التي استخدمت في هذه الدراسة.

ثالثاً: لم يحدث في أي من الحالات امتصاص الجذور أو التصاق مباشر بين الجذور وعظام الفك وهذا ما يحدث عادة في إعادة زرع الأسنان المطمورة أو تحريكها جراحياً.

This study presents a retrospective analysis of patients treated for impacted unerupted teeth by a combined surgical and orthodontic approach. Teeth which were impacted included maxillary and mandibular canines, maxillary central incisors, and maxillary and mandibular bicuspid. Many treatment alternatives are available for these cases, but the one with the best long-term prognosis appears to be the surgical exposure and direct orthodontic traction rather than auto-transplantation, or excision of mucosa and packing of the defect.

Introduction

Impacted teeth are common findings among patients visiting the dental clinic. It could be defined as a tooth which is prevented from erupting into position because of malposition, lack of space, or other impediments. A substantial number of these teeth are indicated for surgical removal since they may be the cause of infection, pain or cyst formation.¹

A number of studies concerning the incidence of impactions were reported since 1930.²³ They showed that third molar is the most common tooth to be impacted with an incidence of 18%. This is followed in frequency by the maxillary cuspid with an incidence of 0.9 - 1.8%, with the upper and lower bicuspid and central incisor next in frequency.

Patients with impacted teeth continue to form a significant proportion of those attending the clinic of the College of Dentistry at King Saud University seeking advise and treatment. Some present with a relatively difficult problem, and careful assessment and selection of the most suitable method of treatment is not always easy.

Third molars are always removed surgically with few exceptions, where they are transplanted in place of badly decayed first molars with poor prognosis. The cases of impacted canine and other teeth always presented a different problem. Surgical exposure involving creating a window in the mucosal covering with or without subsequent orthodontic treatment, allowing the teeth to erupt utilizing it in active eruption, transplantation and surgical removal and prosthodontic replacement were the treatment options available.

The purpose of this paper was to present a relatively large number of impacted teeth treated by surgical exposure and orthodontic traction to bring them into occlusion and evaluate the result of such method in treating impacted teeth.

Materials and Methods

In this study, 49 patients (44 females and 5 males) in the age-group 12-24 years (mean age: 17 years) were involved. Table 1 shows 21 patients with bilaterally impacted canine, 18 in the upper jaw and 3 in the lower jaw; 7 had unilaterally impacted canine in the upper jaw and 5 in the

lower jaw. In 6 cases, the upper central incisors were all bilaterally impacted except for one case having an impacted upper right central. The premolar teeth were impacted in 4 patients, one patient had an upper and lower first premolar bilaterally impacted, and an impacted lower left second premolar. One patient had an impacted second molar and 5 had multiple impacted teeth including canine upper and lower, premolars upper and lower, and central incisor (Table 1).

Table 1. Number of cases with site distribution.

Impacted teeth	No. of patient	No. of teeth treated
Upper Canine:		
Bilateral	18	36
Unilateral	7	7
Lower Canine:		
Bilateral	3	6
Unilateral	5	5
Central Incisor:		
Upper bilateral	6	11
Premolars:		
Upper bilateral	1	2
Lower one with bilateral	3	5
Second molars:		
Lower	1	1
Multiple impaction:		
Upper and lower jaw	5	25
TOTAL	49	98

All patients were examined jointly by an oral surgeon and an orthodontist to assess the possibility of other treatment modalities. The clinical examination involved evaluation of the available space in the dental arch, and the need to preserve the impacted tooth. Cleidocranial dysplasia was excluded in patients with multiple impactions.

Oral hygiene motivation and cooperation of the patients were considered as important factors in patient selection. In adult patients, the need to wear an orthodontic appliance and their attitude toward these appliances were explained and discussed with them.

Radiographic examination included an orthopantomograph, periapical and occlusal intra-oral films [Figs. 1a and b]. The position of the impacted teeth in the arch was assessed carefully as

well as their relation to the neighboring teeth. The position of the apex in relation to some important anatomical structures, e.g. the inferior dental canal, mental foramen, and the maxillary sinus was also evaluated. With impacted upper teeth, when clinical palpation was not clear, parallax technique was employed to determine the position of the crown, labially or palatally.



Figure 1a. An orthopantomogram of one patient showing multiple impacted teeth 13, 14, 23, 24, 33, 34, 35, 43 and 45.



Figure 1b. An intraoral radiograph showing the relation of the impacted teeth to the neighboring teeth.

Surgical Technique

Most of the surgeries were carried out under local anesthesia using 2% lignocaine with 1:800 epinephrine. In some cases, and due to the complexity of the surgery or the age of the patient, the procedure was performed under general anesthesia although some local anesthetic with epinephrine was also infiltrated in the operative area for hemostasis.

A labial, buccal, or palatal flap was raised along the gingival margin and as far from the operative field as possible. The flap was retracted and the bone covering the crown was removed, either with a chisel or with a large round bur. Only sufficient

amount of bone was removed to expose the crown to allow isolation and bonding of the bracket [Figs. 2a and b].

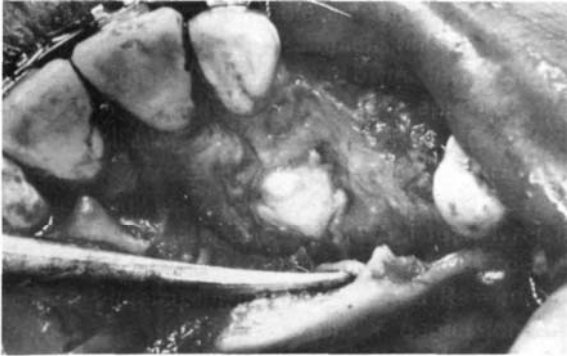


Figure 2a. A palatal flap is retracted and protected; minimal bone was removed to expose the palatal surface of the impacted canine.

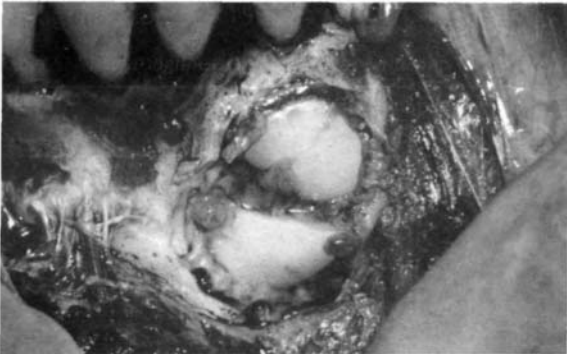


Figure 2b. Lower impacted canines were exposed from labial approach. The reduced enamel epithelium was incised and retracted away.

Since tags from the follicle might contaminate the etchant and nullify its effect, whenever isolation could not be insured, the tooth follicle, with reduced enamel epithelium, was incised and retracted gently to the side or removed. When a large bur was used to remove the bone from the crown surface, the engine was run at a low speed using effective coolant.

After a preligatured bracket was bonded to the crown surface, the mucoperiosteal flap was repositioned and sutured with 3–0 black silk [Fig. 3]. The wire, protruding through the mucosa, was cut to a suitable length and fashioned into a hook. The patients were placed on a suitable course of antibiotic and sutures were removed after one week and were followed-up by the orthodontist on a 4 to 6-week basis.

Orthodontic Treatment and Technique

Edgewise fixed appliances were used in all patients and the treatment was designed as follows.

1. Edgewise brackets and bands were fixed to all teeth in the upper and lower arches.
2. Preligated brackets were bonded to the unerupted teeth during the surgical procedure [Fig. 3].

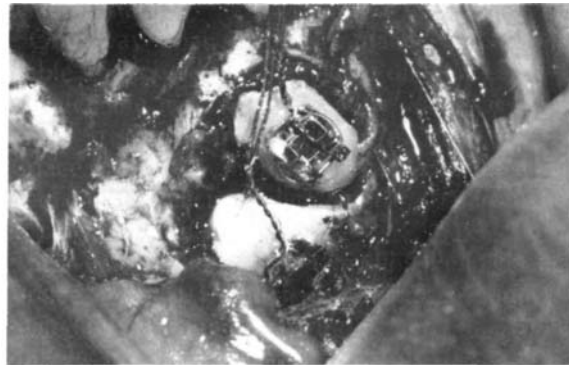


Figure 3. Brackets bonded to teeth with ligature wire tied to it. The wire is pulled up through the incision line.

3. Space was created for the impacted teeth by using coil spring and all the mesially drifted teeth to the space of the impacted teeth were aligned.
4. The ligature, tied up to the unerupted tooth, usually ligated with the arch wire, sometimes an elastic thread, was used to tract and pull the unerupted tooth [Fig. 4].



Figure 4. Healthy looking mucosa with wires extruding through the mucosa and elastic thread to pull the unerupted tooth.

5. After the unerupted tooth had fully erupted, fixation of the arch was performed by using a rectangular arch for at least six months and up to one year [Figs. 5a and b].

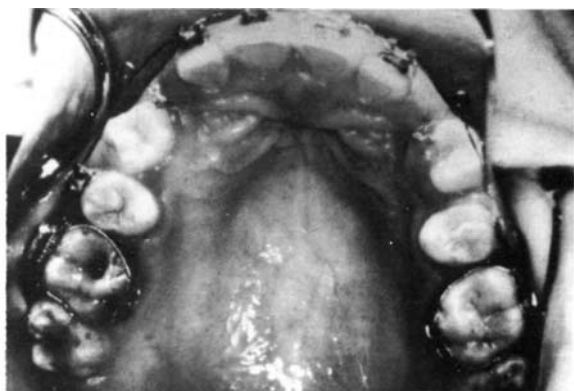


Figure 5a. The upper premolars are almost in position in the arch after two years of traction with rotation of the first molar.



Figure 5b. Lower premolar at the occlusal level with almost good space for the canines.

Results

All teeth were exposed and banded as planned. In some cases, a large amount of bone had to be removed. During this careful procedure, the bur may accidentally touched the surface of the crown but no serious lesion to the enamel or root cement was observed in all cases. All impacted central incisors were found to be due to the presence of a mesiodens which were always impacted in an inverted position with retained deciduous central incisors. The deciduous teeth were extracted and the impacted mesiodens were removed surgically, and the crowns of the impacted central incisors were exposed and a bracket was bonded on each incisor to effect orthodontic traction.

No post-operative complication, such as infection or severe pain, was observed. The orthodontic appliance was tolerated very well by

the patients and there was no problem with the orthodontic treatment or the fixation, except in five patients where the bracket became dislodged. This was managed effectively and all patients were able to maintain an adequate and acceptable oral hygiene.

The observation and follow-up period varied between 1.5-4 years with a mean of one year and eight months. Although some of these teeth were followed for more than two years, most of the teeth were still under active treatment. The teeth were firmly affixed in the new position and in occlusion 2-2.5 years post-operatively.

The gingiva and the mucosa were free from inflammation and did not differ from the surrounding tissue around the protruding wire or the positioned teeth. The width of attached gingiva with stippled surface was within normal. The depth of the pocket around the teeth was between 1-3 mm. Slight recession was observed in three cases.

Radiographic follow-up showed normal bone established in the alveolus with no complication even in cases with great loss of bone caused by severe malposition of the impacted teeth during the operative technique. No root resorption or ankylosis was observed in any of the cases. The patient's attitude toward the procedure was positive and none of them complained about the orthodontic appliances.

Discussion

Treatment of unerupted impacted teeth may utilize methods from both surgical and orthodontic specialties.⁴⁵ Teeth, other than the third molar, when impacted have different ways of treatment. These include either no treatment, exposure of the tooth and packing of the wound to prevent re-epithelialization, or removal when it is in a favorable position. When the tooth is high in the arch and causing some adjacent root resorption and other pathological changes, transplantation involving bodily removal from the site of impaction to the correct position within the line of the arch is performed. Another method is surgical repositioning which involves rotation of the upper tooth about its apex, without disturbing the neurovascular bundle on the assumption that tooth may erupt into occlusion.

One of the methods available for treating an impacted tooth is surgical exposure followed by orthodontic traction. Several approaches are described in the literature.⁶⁷ The procedure requires the presence of space within the arch or creation of space by moving all teeth orthodontically. The technique used in this series was surgical exposure and attachment of a preligatured bracket to forcefully move the tooth into occlusion simulating the force of eruption.

Two important factors were considered. Firstly, the width of the keratinized mucosa. During surgery, one incision extending at the crest of the ridge, involving all the width was used. This approach was preferred since prior experience showed that with limited keratinized mucosa, deep pocketing or elongation of the clinical crown results. In this series, all cases had a pocket depth of 1.5 - 2.5 mm with no elongation of the clinical crown. Secondly, the extent of bone removal was not considered as a critical factor since handling of the soft tissues and damage to the periosteum are deemed of more importance. The long-term status of the tooth appears better when minimal trauma and careful handling of the soft tissue is followed up. Surgical exposure and uncovering of impacted teeth is aimed at removing hard and soft tissue impeding the path of eruption and uncovering an area of enamel to which a preligatured bracket is bonded to start tooth movement. It is important, but not essential, to avoid unnecessary or excessive removal of bone. However, it is important that, as much as possible, a wide area of attached gingiva be preserved. The cusp of teeth ideally should emerge through the alveolar crest, simulating a normal path of eruption and, therefore, producing the correct gingival contour and morphology without loss of attachment.

In this series, surgical exposure and orthodontic traction have been performed without serious complications regarding the surgical procedure, orthodontic fixation, and post-operative control. The findings support the previous studies employing the close surgical method with good result concerning the periodontal tissue.⁸ Thus, a favorable prognosis of all teeth was always the case. Transplantation, a relatively quick procedure, has an uncertain long-term prognosis. However, there are specific indications for transplantation where ankylosis of teeth is likely. Removal of mucosa and packing the defect will result in a significant periodontal problem⁹ with loss of attachment.

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