

## MANAGEMENT OF TOOTH EXTRUSION AS A COMPLICATION DUE TO INTERMAXILLARY FIXATION: TWO CASE REPORTS

### İNTERMAKSİLLER FIKSASYONA BAĞLI BİR KOMPLİKASYON OLAN DIŞ EKSTRÜZYONUN TEDAVİSİ: İKİ VAKA RAPORU

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#### ABSTRACT

One of the most common and trusted methods for mandibular fracture management is the intermaxillary fixation (IMF) with Erich arch bar with the application of circumdental wiring. Twisting a wire around a tooth conveys little feel as to its tightness and it can lead to tooth extrusion or avulsion. Anterior teeth affected more frequently because of having single root and no occlusal contact with opposite teeth. The aim of this report to present two patients with a rarely seen complication of anterior tooth extrusion caused by loosening of circumdental wires of Erich arch bar during the IMF and its treatment with orthodontic button and elastics

**Keywords:** complication, intraoperative, jaw fixation technics; maxillomandibular fixation; orthodontic extrusion

#### ÖZ

Mandibula kırıklarının tedavisi için en yaygın ve güvenilir metotlardan biri sirkumdental telleme ile yapılan Erich ark barlar kullanılan intermaksiller fiksasyon(IMF) işlemidir. Dişin çevresinde teli sıkı şekilde sarmak hassas bir his gerektirir ve dişte ekstrüzyona ve avülsiyona neden olabilir. Anterior dişler, tek köklü olmaları ve karşıt diş ile okluzal kondağa sahip olmamaları sebebiyle daha sık etkilenirler. Bu raporun amacı; iki hastada IMF sırasında sirkumdental tellerin gevşemesi sebebiyle oluşan nadir olarak görülen bir komplikasyon olan anterior diş ekstrüzyonunun ortodontik buton ve elastikler ile tedavisini sunmaktır.

**Anahtar Kelimeler:** Komplikasyon, intraoperatif, çene sabitleme teknikleri, alt-üst çene sabitlemesi, ortodontik çekiş

#### INTRODUCTION

Mandibular fractures can be treated by two main treatment approach; open reduction-internal fixation(ORIF) with or without intermaxillary fixation or closed reduction-intermaxillary fixation(CR-IMF).<sup>1</sup> There are varieties of techniques mentioned in the literature for achieving the intermaxillary fixation (IMF), including arch bars, self-tapping or self-drilling screws, bonded brackets, cap splints, vacuum formed splints, wire suspension techniques and Barrel and Barton bondages.<sup>2</sup> Arch bars has been used widely.<sup>3</sup> There are various arch bar methods including; Erich arch bar, resin bonded arch bar, Groningen-type custom made arch bar, Schuchardt's wire, acrylic arch

bar, Dautrey arch bar, Bern's titanium arch bar and Baurmash's arch bar.<sup>4,5</sup>

One of the most common and trusted methods for mandibular fracture is the application of Erich arch bar for intermaxillary fixation with the help of circumdental wiring. Nevertheless, it has some disadvantages: loosening the wires, chances of gingival injury or inflammation, difficulty in maintaining oral hygiene and fetid breath.<sup>5</sup>

Clinicians should perform the circumdental wiring carefully. Twisting a wire around a tooth conveys little feel as to its tightness. It can get loose if it's not enough tight or can brake if it's too tight.<sup>4</sup> If one or more of circumdental wires loose or brake, the traction forces on other teeth can increases. This

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impact can lead to extrusion and insomuch as avulsion of this tooth; especially anterior teeth are affected more because of having single root and no occlusal contact with opposite teeth. This complication can be unfortunate, painful, and distressing for both of patient and clinician and must be solved.<sup>6</sup>

The aim of this report to present the treatment with orthodontic button and elastics of two patients have a rarely seen complication of anterior tooth extrusion caused by loosening of circumdental wires of Erich arch bar during the IMF.

## CASE REPORTS

### CASE-1

18-year-old male patient was referred to our department with left parasymphysis fracture. Pain on mandibular movements was showed in clinical examination findings. Also it was painful to palpation on area of lower left canine. Line of fracture on left parasymphysis has been determined on radiographic examination. The patient had a good cooperation and acceptable oral hygiene. (Fig-1)

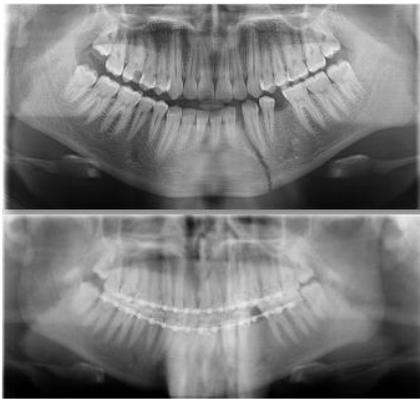


Fig-1. Radiographs of case-1

### CASE-2

32-year-old female patient was referred to our department with fracture on left angulus mandible. The patient reported pain on mandibular movements of laterality and swelling in the region of the mandibular angle on the left side. Clinical examination findings verified defect of occlusion and pain on mandibular movements. And line of fracture has been determined on radiographic examination on left angulus mandible that associated with 3th molar

tooth. Patient had a good cooperation and good oral hygiene. (Fig-2)



Fig-2. Radiography of case-2

Intermaxillary fixation was decided for both of two patients because the segments could be reduced with IMF, the occlusion was appropriate, there was no laceration or intraoral communication and patients had not any significant comorbidities. The following steps were performed for both of two patients.

The prefabricated arch bar was adjusted according to the patient's dental arch form. Then the arch bar was adapted dental arch with ligation wire. The wire was twisted appropriately in such a way that will not harm the neighbor soft tissues. We noticed that both bars were symmetrically positioned in the upper and lower arches because this symmetry was necessary for functional training with elastics. We used elastics for fixing arch bars and the occlusion was checked. It was verified that there was no skeletal or dental malformation such as deep bite deformity, and then the IMF was completed.

At one-week follow-up, it was seen that upper right central incisor tooth extruded because of loosening of wires on other upper anterior teeth. For overcoming this complication, we firstly adapted upper arch bar again and removed ligation wire on right central incisor teeth. Then a button was bonded to labial surface of this teeth and an orthodontic light elastic (Carlos-3M/Unitek, Monrovia, ABD) was placed between this button and hooks of arch bar with an intrusion force of 20 g. and arch bars fixed by orthodontic elastics again. (Fig-3)

At one-week follow-up it was seen that these teeth intruded as the normal position. When the required time for IMF was completed, arch bars and button were removed. For retention, an essix retainer was made. At six month follow up the teeth of both patients were vital and there was no accompanying complaint or problem. (Fig-4-5)



Fig-3. Tooth extrusion and application of orthodontic button and elastics



Fig-4. Photographs and radiography of the intraoral appearance after tooth intrusion of case-1



Fig-5. Photographs and radiography of the intraoral appearance after tooth intrusion of case-2

## DISCUSSION

Contemporarily, frequently used IMF screws are a quick method for achieving IMF and provided better oral hygiene but not suitable in patients who require long-term IMF, because the screws start to loosen after 5 to 6 weeks.<sup>7</sup> In these cases, IMF using arch bars should be preferred. Erich Arch bars are currently the most common methods of achieving intermaxillary fixation, but they have their own disadvantages and complications.<sup>4</sup> It was showed that oral hygiene management was more difficult when arch bars and eyelets were used for IMF.<sup>8</sup>Rai et al

<sup>7</sup>demonstrated that The most common complications of IMF with arch bars were glove perforation (36.66%), gingival papillary hyperplasia (36.36%), and trauma to the operators' fingers (18.18%) respectively. Besides these, tooth extrusion or avulsion and necrosis of interdental papilla could be seen in rare case.

There were various incisor intrusion techniques or appliances such as continuous intrusion arch, three-piece intrusive mechanism, 2x4 arch mechanism, utility arch, Connecticut intrusion arch, reverse-curved arch wires, microimplants and surgical assisted approach. The wire size, material, method of the attachment of the brackets and the application of torque in these techniques are diverse. However which one was the best appliance or technique for incisor intrusion was not yet clearly defined.<sup>9</sup>

On the other hand, it has become clear that doing this requires careful control of force magnitude so that very light forces are applied to the teeth. Light force is required for intrusion because the force will be concentrated in a small area at the tooth apex.<sup>10</sup> Considering the number and the surface area of posterior tooth roots, it is reasonable to apply intrusion forces 2 or 3 times greater than those applied on anterior teeth.<sup>11</sup> Regarding the optimum force for intrusion of anterior teeth, Gianelly and Goldman<sup>12</sup> recommended 15 to 50 g of force Burstone<sup>13</sup> suggested 20 g of force per tooth for intruding anterior tooth. In our study, we decided to apply 20g of force for intrusion.

Intrusion by conventional methods usually accompanies extrusion of the anchorage tooth. Preventing this side effect is the key of a successful intrusion.<sup>11</sup> Most of conventional techniques have tip back bends at the molars to provide an intrusive force at the incisor.<sup>14</sup> Mini-screws solve this problem and became much notable when absolute anchorage is needed.<sup>15</sup> In our study, it was important to choose a technique for tooth intrusion of central incisor that has not an adverse effect on other teeth. We preferred to use present arch bar for anchorage. So that, present arch bar was adapted more rigorously and the tooth intruded by orthodontic elastics. To our knowledge, there was no scientific manuscript presented solving the tooth extrusion complication of IMF with orthodontic elastic and button, which makes the present study unique.

## CONCLUSION

According to our experience, this technique has some advantages including relatively simple, easy to control the direction and amount of force and high patient tolerance for overcoming the complication of anterior tooth extrusion during the IMF.

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