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OPEN REDUCTION OF MANDIBULAR CONDYLE NECK FRACTURES: CASE REPORT AND LITERATURE REVIEW

Mandibular Kondil Boynu Kırıklarında Açık Redüksiyon: Olgu Raporu ve Kaynak Taraması

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ABSTRACT

Since cases of mandibular condyle fractures may result in difficulty of recovery of functional and aesthetic disorders, their immobilization and reduction are very important. It may cause long-term complications as well as limited mandibular movement, pain, malocclusion, pathological changes in the TMJ, osteonecrozis, facial asymmetry, ankylosis, functional and growth disorders. Appropriate treatment must enable the reconstruction of undamaged functional and natural form of mandibular condyle. For this purpose, an exact diagnosis, correct reduction and rigid fixation are required. In all types of condylar fractures, the presence of teeth, fracture level, the adaptation of the patient, masticatory system of the patient, as well as the presence of occlusal dysfunction and mandible deviation should be taken into consideration and then the appropriate treatment should be decided. In the past, mandibular condyle fractures were generally treated conservatively by intermaxillary fixation; however, recently, rigid internal fixation by open reduction became popular. Nevertheless, the treatment of mandibular condyle fractures is still controversial.

In this case report, the treatment of a mandibular condyle neck fracture by open reduction is presented and a literature review about the treatment protocol of condylar fractures is performed.

Keywords: *Open reduction, internal fixation, mandibular condyle neck fractures*

ÖZ

Mandibular kondil fraktürleri fonksiyonun ve estetiğin geri kazanımının zor olduğu bozukluklara yol açabileceğinden immobilizasyonu ve redüksiyonu oldukça önemlidir. Özellikle mandibulanın hareketlerinde kısıtlılık, ağrı, maloklüzyon, TME'de patolojik değişiklikler, osteonekrozis, fasial asimetri, ankiloz, fonksiyon ve büyüme bozuklukları gibi uzun dönem komplikasyonlara neden olabilirler. Uygun olan tedavi için, mandibular kondilin zarar görmemiş fonksiyon ve şeklinin rekonstrüksiyonu sağlanmalıdır. Bunun için; kesin diagnoz, doğru redüksiyon ve rijit fiksasyon gerekir. Kondil fraktürlerinin her tipinde dişlerin varlığı, fraktürün seviyesi, hasta adaptasyonu, hastanın çiğneme sistemi ve eğer varsa oklüzal fonksiyon bozuklukları ile mandibula deviasyonu değerlendirilerek tedavi metodu seçilmelidir. Geçmişte mandibular kondil fraktürleri genellikle konservatif olarak tedavi edilseler de, son yıllarda rijit internal fiksasyon ve açık redüksiyonla tedavi daha yaygın hale gelmiştir. Ancak mandibular kondil kırıklarının tedavisi günümüzde halen tartışmalı durumdadır.

Bu vaka raporunda açık redüksiyonla tedavi edilen mandibular kondil boynu kırığı olgusu anlatılmış ve kondil kırıklarının tedavisiyle ilgili literatür taraması yapılmıştır.

Anahtar kelimeler: *Açık redüksiyon, internal fiksasyon, mandibular kondil boynu kırıkları*

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Introduction

Maxillofacial region is anatomically vulnerable to trauma. Among facial bone fractures, the mandible fractures have the highest occurrence incidence following nasal bone fractures and condyle fractures (1). Condyle fractures are caused by indirect and direct forces. Mandibular condyle is rarely influenced by direct force due to the fact that condyle is surrounded with muscle attachments and arcus zygomaticus. Generally, indirect fracture is caused by a force delivered from mandibular symphysis or anterior corpus to the condyle.

Mandibular condyle fractures can generally be treated by open reduction or conservatively by closed reduction. The ideal treatment regarding the mandibular condyle fracture protocol is still a controversial issue (2, 3) . Although, closed reduction is a more conservative treatment. It can cause many problems which mostly occur as a result of intermaxillary fixation. Open reduction can provide stabilization and function immediately but some complications can be observed. At this point, determining and performing appropriate treatment is the key to obtain a successful treatment.

Case Report

A 27 year old female patient was referred to the oral and maxillofacial surgery department Faculty of Dentistry Istanbul University because of her complaint about the traumatized mandible. The extraorally examination revealed that the mandible was deviated to left side, the skin was lacerated on the symphysis region and the intraoral examination was revealed an occlusal disorder due to primary contact on the left side and, As a result, a posterior open bite on the right side was observed. Consequently, the clinical pre-diagnosis was confirmed by the radiographic examination and revealed a diagonal condylar fracture and condylar dislocation at the left side (Figure 1).

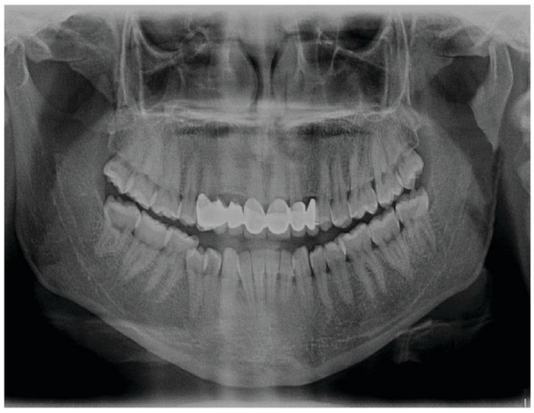

Figure 1. Preoperative panoramic radiography.

Open reduction and rigid internal fixation were planned for the treatment. The patient was operated under general anesthesia by nasotracheal intubation. At the beginning of the operation, a retromandibular incision at 2 cm below the inferior-posterior region of mandibular angulus by preserving the mandibular branch of facial nerve was performed. Than blunt dissection was made on the masseter muscle to detach the muscle attachments and it was reached to the lateral surface of the mandibular ramus (Figure 2).

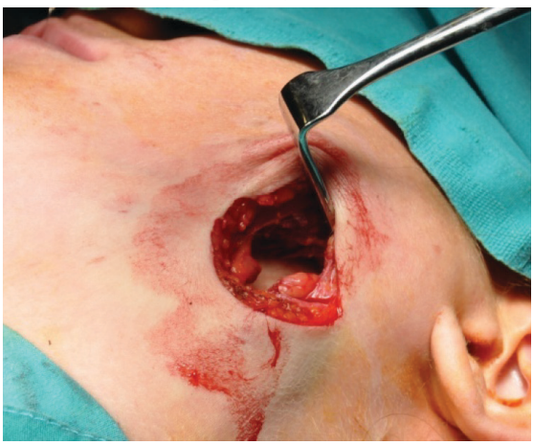

Figure 2. Incision and dissection of masseter muscle.

Fracture fragments were exposed by protecting the condylar head and articular capsule. Following the exposure of the condylar neck and fracture fragments, condylar head was reduced with ramus retractor (Figure 3).

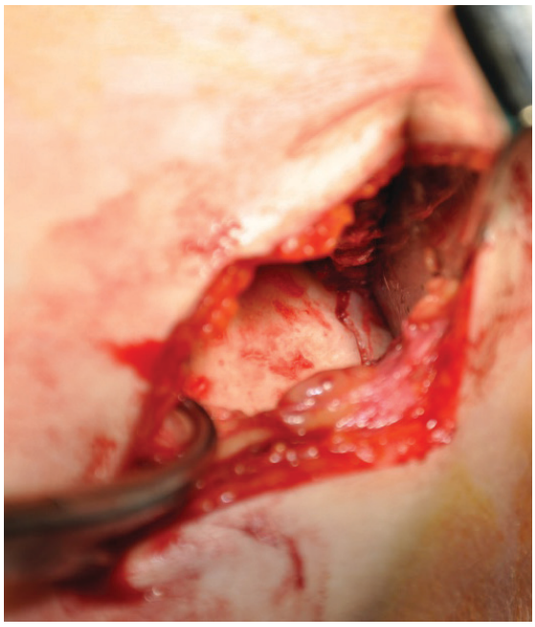

Figure 3. Reduced fracture fragments.

Fracture fragments were repositioned correctly and fixed by using 2-mm- diameter and 5mm long 7 titanium mini screws and 2 four-holes miniplates (Figure 4, Figure 5).

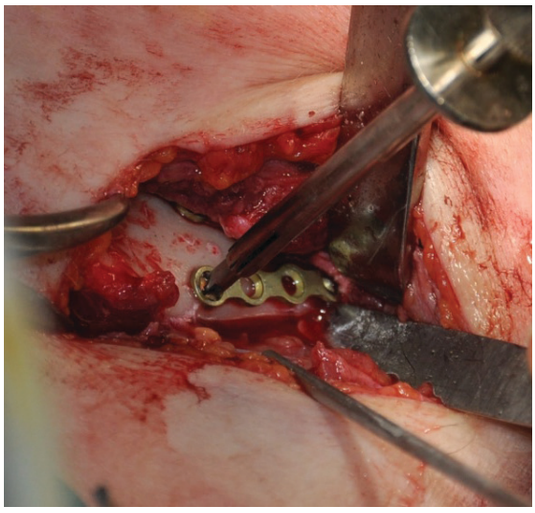

Figure 4. Placing miniplates and mini screws.

Figure 5. Completed fixation.

After the reduction and rigid fixation, the occlusion was checked. Following, the placement of a mini vacuum drain to prevent the post-operative hematoma formation. Muscle tissue was sutured with resorbable polyglactin 910 suture material (Figure 6, Figure 7).

Figure 6. Wound closure primary.

Figure 7. Positioned drain.

Than, the skin incision was sutured with non-resorbable polypropylene suture and adhesive strips were applied to the wound to reduce the scar formation due to healing contraction. Postoperatively, antibiotics, corticosteroid , and analgesics were prescribed to the patient.

Intermaxillary fixation was not applied and the patient was discharged after 24 hours of observation. Postoperative period was uneventful. Soft diet was recommended for 4 weeks. One week after the operation, it was observed that occlusion, mouth opening, mandible movements and functions were acceptable (Figure 8, Figure 9, Figure 10).

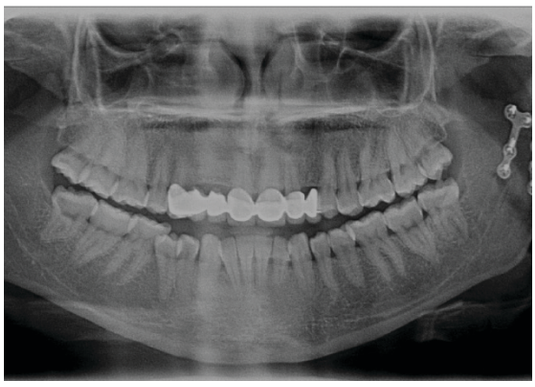

Figure 8. Postoperative radiography.

Figure 9. One week after operation, occlusion.

Figure 10. One week after operation, mouth opening.

Discussion

Among facial bone fractures, the mandible fractures have the highest occurrence incidence following nasal bone fractures and condyle fractures (1, 4). Condyle fracture accounts for approximately 30% and 37% of mandible fracture in dentulous mandible patients and edentulous mandible patients, respectively. Researchers were reported that condyle fracture accounts for 9-45% of all mandible fractures (5, 6). Generally, the reason of mandibular condyle fracture is attributable to the indirect force that is

delivered to the mandibular condyle head. The most common external factors are traffic accidents, physical trauma, violence, fall, sports and gunshot wounds. Internal factors include pathological factors such as osteomyelitis, benign or malignant tumors.There are a lot of different radiography techniques for the diagnosis of mandibular condyle fractures. Reversed Towne's view, oblique lateral radiographs and dental panoramic view (orthopantomogram) have proved essential to verify the diagnosis. Oblique lateral graphs can be used with multi-trauma patients when panoramic imaging is not suitable. Reversed Towne's view can be advantageous to monitor the mediolateral position of fracture which is not viewed on panoramic radiography. Modern diagnostic methods are also useful for diagnosis and treatment in addition to conventional radiography definition. Using CT is significant to evaluate the position of condylar fracture segments. CT is also helpful for the diagnosis of intracapsular fractures. MRI is used to detect soft tissue damage while CT is used to diagnose hard tissue pathology. MRI is convenient to monitor soft tissue variation, articular disc damage and position. However, panoramic radiography is sufficient in most cases, as a basic radiography technique.

Classification systems for condylar fractures can offer insight into determination of treatment options (7). Lindahl classification (1977) is the most commonly used system today. The Lindahl classification considers factors that include the level of fracture, 'dislocation' at the point of fracture and the relationship of the condylar head to the articular fossa. Fracture levels have been classified as condylar head, condylar neck and subcondylar fractures on the site (8). Subcondylar fracture refers to an area between the mandibular sigmoid notch and mandibular posterior aspect. Condyle neck fracture refers to an area that becomes narrow from the condyle head. Condyle head fracture refers to an area as joint capsule exists until the condyle neck. Nevertheless, intracapsular fractures occur on the articular surface or upper part of condylar neck, extracapsular fractures occur on the condylar neck and sub region. The complications of condylar fracture include restricted mandibular movement, deviation of mandible towards ipsilateral side (laterognathism), bleeding from acoustic meatus and cerebrospinal fluid otorrhea (9), pain on mandibular movement or pre-auricular palpation, disharmony of occlusion especially on patients with shortening of the ramus, leasing to gagging of the ipsilateral molar teeth, open bite on contralateral side, collapse or depression on pre-auricular side and failure on providing repeatable and stable occlusionTreatment depends on the patient's age, the co-existence of other mandibular or maxillary fractures, whether the condylar fracture is unilateral or bilateral, the level and displacement of the fracture, the state of dentition and dental occlusion.

Open and closed reduction are the two major methods used to treat condyle fractures. For closed reduction, intermaxillary fixation is conducted using arch bar and wires followed by maintaining of the fixation of the maxilla and mandible for 2 to 4 weeks. After achieving stable union of the fractured site, the wires are removed. Functional therapy consists which include passive mandibular movements and mouth opening exercises are conducted. The authors conduct initial intermaxillary fixation in intracapsular fracture patients aged less than 5 years for 2 weeks, in those aged 5 years or higher for 4 weeks and in extracapsular fracture patients aged less than 8 years for 2 weeks (10).Closed reduction in

adult patients is indicated for high condyle dislocation, intracapsular and extracapsular fractures without serious dislocation and patients who have serious systemic diseases. In pediatric patients, closed reduction is used for almost all condyle fractures.Closed reduction with functional therapy is a relatively safe treatment. Nerves and blood vessels are not injured during the treatment and postoperative complications such as infection or scar formation is not occured . In particular, complications such as fracture, loss or eruption delay of the growing teeth can be avoided in pediatric patients. On the other hand, long term intermaxillary fixation has disadvantages of the injury of periodontal tissue and buccal mucosa, poor oral hygiene, pronunciation disorder, imbalanced nutrition, mouth opening disorder and respiration disorder. In the case of conservative treatment using closed reduction, the growth disorder and excessive growth of the injured mandible may occur due to inappropriate reduction of the bone fragments and the right and left displacement of the mandibular ramus or mandibular deviation upon opening may occur after conservative treatment. Since closed reduction allows remodelling of the bone and conducting sufficient functional stimulation to condyle, it is considered to be the most preferred approach. Malocclusion, restricted mandibular movement, chronic pain, facial asymmetry at the injured site and shortness of mandibular ramus can be seen as a result of closed reduction (11-13).

According to Marker et al. (14) conservative treatment is a non traumatic, safer and more reliable method. Nevertheless, Ellis and Throckmorton (15) argue that in closed treatment the TMJ is subject to undergoing three types of transformation regeneration, changing in the temporal component of the TMJ and loss of posterior vertical dimension.

Fixation of fragments can be provided with surgical approach by open reduction. There are various operation methods of open reduction for mandibular condyle fracture depending on fracture site and degree of bone fragment displacement. In general, they include preauricular approach, postauricular approach, submandibular approach, Risdon approach, combined approach and retromandibular approach. Treatment types depend on age of patient, preference, fracture type, the state of dentition and the co-existence of other mandibular or maxillary fractures.

Open reduction has advantages of the reduction of displaced bony fragment to the most ideal anatomic site by a direct approach to fracture site. In addition, it can prevent complications such as respiration disorder, pronunciation disorder and severe nutritional imbalance by shortening intermaxillary fixation period via rigid fixation. But open reduction is an invasive treatment, which may cause injury of nerves or blood vessels, during operation and postoperative complications including infection, scar formation (16-18) and aseptic necrosis (19) of the condylar segment secondary to loss of the periosteal blood supply during dissection for exposure.In 1983, for indications of open reduction on mandibular condyle fracture, Zide and Kent suggested that absolute indications should include displacement into middle cranial fossa, inappropriate occlusial restoration by closed reduction, lateral extracapsular displacement and foreign material of the fracture site and relative indications should include bilateral mandibular condyle fracture of edentulous patients who can not have splint, impossible intermaxillary fixation and physical therapy due to internal diseases, bilateral mandibular condyle fracture with comminuted fracture of other facial bone and bilateral mandibular condyle fracture

with jaw deformities (20).In 2003, American Association of Oral and Maxillofacial Surgery suggested an internal guideline on the treatment of mandibular condyle fracture. According to the guideline, absolute indications include malocclusion, mandibular dysfunction, abnormal relation of jaws, presence of foreign bodies, lacerations or hemorrhage in external auditory canal, hemotympanum, effusion, hamarthrosis. Some researchers confirm that closed reduction is preferred for treatment of condylar fracture. However, some papers indicate that open reduction is more advantageous than closed reduction. Open reduction and internal fixation were found to provide better functional reconstruction of mandibular condyle fractures than closed reduction and intermaxillary fixation. Worsae and Thorn compared open versus closed reduction of unilaterally dislocated low subcondylar fractures in adults and reported 4% incidence of complications in open reduction and 39% incidence in close reduction (21). In some studies, the prognoses of open versus closed reduction were compared. Ellis et al reported that complications as restricted mandibular movement, facial asymmetry, malocclusion and chronic pain treated with closed reduction, facial nerve paralysis or scar formation were reported for open reduction (22, 23).

Conclusion

In mandibular condyle fractures, there are advantages and disadvantages of open and closed reductions. Recently, the incidence of using closed reduction is increased due to development of surgical techniques and equipment. Accordingly, all surgeons must consider open reduction as a treatment option in addition to the closed reduction method. The patient must be informed about open reduction as a treatment option.With correct indication, open reduction is a treatment of significance since it allows patients to get back to their social life in a very short time period. Nevertheless, the advantages and benefits of conventional treatment methods should not be ignored.

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