



## STUDYING RATE OF SAGGING IN THE CLOSE TREATMENT IN SUB CONDYLAR FRACTURE

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### ABSTRACT

**Background and aim:** Sub condylar fracture is one of the most common fractures of the mandibular condyle that a variety of methods were proposed to treat this kind of fracture. These methods have their own advantages and disadvantages. The aim of this study was to evaluate the rate of sagging by the close treatment in the sub condylar fractures.

**Method:** In this study, 20 patients who had suffered from Sub condylar fracture were selected and were treated with close treatment. After treatment, condyle process to gonial angle was measured on panoramic radiographs of patients and fractured site was compared with unfractured and healthy site. The data were analyzed by Mann-Whitney test.

**Results:** The average Sagging in the open group was  $3.3 \pm 0.98$  mm.

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### Introduction

Mandible is the largest and strongest bone of face. The facial bone has various parts including condylar process in the area below the condyle called sub condyl. The sub condylar part is weak and prone to fracture. Skull bone from anterior view is composed of four parts including frontal bone, zygomatic and nasal bone, maxilla and Mandible is the most inferior structure in the anterior view of skull[1]. Mandible consists of two parts: the body of mandibular anteriorly and the ramus of mandibular posteriorly. Mandible body is divided into 2 parts: 1. the lower part is the base of the mandible. 2. the upper part is the alveolar part. In the upper part, mandibular ramus has two processes called condylar and coronoid processes, which projects upward. Condylar process is the part of temporomandibular joint. Coronoid process is a part of temporomandibular joint. Condylar fractures account for 25-35% of mandibular fractures. Sub condyle and condyle sites in people with teeth are the most common site of fractures in the lower jaw bone and it has been reported that fractures of the mandible account for 36% of all maxillofacial fractures. Most of these fractures are exerted on the mandibular by these lateral forces. Two different treatment approaches including close treatment (no surgery) and open treatment (transmasseteric) are common in sub-condylar fractures. Closed treatment includes: maxilla mandibular fixation (MMF), Intermaxillary fixation (IMF), Ivy loops. Relative indications is observed in patients with seizure and epilepsy and fractures which its condylar angulation with ramus axis is greater than 45 degrees or over mm 2 and sagging by panoramic radiographs after trauma. Close treatment approach is more common than sub condyle fracture treatment. Close treatment method has some limitations, such as mouth opening and deviation to one side. When the patient is in need of aesthetic surgery, transmasseteric anterior posterior approach is proposed[2]. Diagnosis

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and treatment of condylar and sub condylar fractures are of great importance and lack of treatment or improper treatment can lead to disorders in imperfect alignment position of teeth (malocclusion), jaw and facial asymmetry (sagging), an immediate or late alteration in the position of the condylar and facial fixation, Temporomandibular joint (TMJ) ankylosis, disorder in mastication, , decreased range of jaw bone motion and orthographic disorders. In Oral and Maxillofacial Surgery, the majority of the condylar fractures are treated by closed reduction with generally satisfactory long term results. Conservative non-surgical treatment which is based on the immobilized jaw can cause treatment in fractured area. In the study conducted by Kang et al., (2012), it was concluded that open reduction and anatomic reduction can create better function for the temporomandibular joint, compared with closed treatment in mandible fracture surgery. Therefore, the double miniplate fixation technique via mini-retromandibular incision was used in order to make the most stable fixation when performing subcondylar fracture surgery. Those approaches provide good visualization of the subcondyle from the posterior edge of the ramus, allow the surgeon to work perpendicularly to the fracture, and enable direct fracture management[3]. Understanding the biomechanical load in the fixation of subcondylar fractures is also necessary in order to optimize fixation methods. Therefore, we measured the biomechanical loads of four different plate fixation techniques in the experimental model regarding mandibular subcondylar fractures. It was found that the loads measured in the two-plate fixation group with one dynamic compression plate (DCP) and one adaption plate showed the highest deformation and failure loads among the four fixation groups. The loads measured in the one DCP plate fixation group showed higher deformation and failure loads than the loads measured in the two adaption plate fixation group. Therefore, we conclude that the selection of the high profile plate (DCP) is also important in order to create a stable load in the sub condylar fracture. In addition, a study was conducted by Eroğlu et al. with the aim of to present the primary experience of one surgeon with a new surgical technique performed on the first 13 cases and to evaluate outcomes following an extraoral endoscopic approach to subcondylar fractures. Fifteen subcondylar fractures in 13 patients, who were treated at Ondokuz Mayıs University Hospital between January 2010 and June 2011, were included in this study. Patients were operated on using either endoscopic or open approach. Rigid plate fixation was completed endoscopically using extraoral approach in nine fractures, while six fractures were plated by conversion to a full-open approach. In all six fractures that could not be fixed endoscopically, the proximal fragments were medially displaced, whereas seven of nine fractures that were successfully fixed endoscopically were laterally displaced. An extraoral endoscopic approach for subcondylar fractures is feasible and can be carried out with decreased morbidity. This approach is recommended for those with limited experience in endoscopy to treat low laterally displaced subcondylar fractures as their initial cases. Moreover, another study was conducted by Leiser et al. (2013) with the aim of retrospective reviewing the treatment outcome of low subcondylar temporomandibular joint fractures. The retrospective analysis was performed on all patients treated for low subcondylar fractures (below the sigmoid notch) between 2004 and 2006. Patients were divided into two groups: the closed reduction group (maxillomandibular fixation, MMF) and the open reduction group (anteroparotid transmasseteric (APTM) approach). Out of 129 condylar fractures, a total of 37 patients met the inclusion criterion of a fracture below the sigmoid notch (low subcondylar). Ten patients (seven males and three females) were treated using the APTM approach, and 27 patients were treated conservatively by MMF. In the open reduction group, two patients (20%) had limited mouth opening that resolved following physiotherapy; the closed reduction group had a similar percentage (18.5%) of mouth opening limitation (below 35 mm). No facial nerve damage was noted. Adult patients suffering from low subcondylar fractures can be treated by open reduction and internal fixation using the APTM approach, which was found to be a safe and reproducible procedure with no facial nerve damage[4]. Haug et al., also carried out a study with the purpose of comparing the long-term treatment results of open reduction and rigid internal fixation (ORIF) with closed reduction and maxillomandibular fixation (CRMMF) for subcondylar fractures when guided by specific indications and contraindications. A protocol for the treatment of condylar process fractures was developed that included absolute and relative indications and contraindications as well as a technique regimen[4]. To evaluate the results of this protocol, 10 patients treated with CRMMF and 10 treated by ORIF were recalled after a minimum of 6 months and examined for gender, race, diagnosis, age at injury, time since operation, and cause of the fracture. Each group was assessed by 2 blinded investigators for maximum interincisal opening, right lateral excursion, left lateral excursion, protrusive movement, deviation on opening, scar perception, motor function, sensory perception, contour perception, occlusion, and perception of pain[5]. Nonparametric data were compared for statistical significance with a chi-square analysis and parametric data with an independent samples t-test ( $P < .05$ ). No statistically significant differences existed between the ORIF and CRMMF groups for gender, race, diagnosis, or cause. Moreover, no differences existed for age at injury, maximum interincisal opening, right lateral excursion, left lateral excursion, protrusive movement, deviation on opening, or occlusion. Differences were noted between groups for time since operation, scar perception, and perception of pain. Using the protocol outlined, there were no differences between the ORIF and CRMMF groups for ranges of motion, occlusion, contour, and motor or sensory function. The ORIF group was associated with perceptible scars. The CRMMF group was associated with chronic pain. Also, in the study conducted by Singh in 2012 entitled as A comparative clinical evaluation of the outcome of patients treated for bilateral fracture of the mandibular condyles, it was found that operative treatment was superior in all objective and subjective functional parameters[6]. It is concluded that if either of the condyles is displaced ORIF is the most satisfactory method of treatment. In addition, in a study conducted by Sforza et al., in 2011 entitled as three-dimensional mandibular motion after closed and open reduction of unilateral mandibular condylar process fracture, it was found that mandibular condylar fractures can recover good function; some kinematic variables of mandibular motion were

more similar to the norm in the open treatment patients than in closed treatment patients. Furthermore, in the study done by Halwitschka et al[7]. (2005) entitled as functional and radiological results of open and closed treatment of intracapsular (diacapitular) condylar fractures of the mandible , it was concluded that ORIF showed better clinical, radiographic and axiographic results in treatment of intracapsular (diacapitular) condylar fractures of the mandible compared with the close treatment and ORIF appears to improve the function of fractured condyles, when combined with a postoperative therapeutic exercise regime. The aim of this study was to evaluate the sagging or drooping in patients with sub condyle fractures by close treatment[8].

**Method**

This is a concurrent cohort study and convenience sampling method was used. Observations, information form tool, panoramic X-ray were used for collecting data. In this study, approximately 20 patients who had been referred to Zahedan Dental School undergoing subcondyl fracture surgery were selected[9]. Exclusion criteria included patients who had a fractured jaw in zones other than the sub condyle and patients who underwent expire surgery. Patients with fractures subcondyl were treated by transmasseteric by a maxillofacial surgeon. The patient’s mandible (lower jaw) is pulled to the initial position so that teeth are in occlusion and then we fixate the jaw with arch bar together until fracture healing[10]. Then, after a week of treatment, panoramic X-ray was prepared from the panoramic XMIND. From the top of the condyle to gonial angle was measured and then these measurements were compared together; if measurements were equal, the patient is not suffered from sagging or drooping jaw. However, the patient is suffering from sagging or drooping jaw if they were equal. Central and dispersion measures were used to describe the data. Independent t-test was used the average sagging and Mann-Whitney test was used for non-normal data.

**Findings**

In this study, 25 patients treated by close treatment method were investigated. The results in Table 1 show that 80 percent of the patients were male and 20% were female in the close group.

**Table 1: Frequency of male and female in the close group studied**

Gender		treatment method
		close
male	Number	20
	Percent	80%
female	Number	5
	Percent	20.2%

The mean age of patients was in the close treatment group  $30.3 \pm 10.2$  years (Table 2).

**Table 2: Mean age of patients**

Group	Number	Mean	Standard deviation	Lowest	Highest
close	25	30.3200	10.20098	14.00	51.00

The results in Table 3 show that a car or motorcycle accident has the highest frequency. Direct hit and falling from height are the next in rank.

**Table 3: Frequency for the cause of fracture in each of the groups under study**

Cause of fracture		treatment method
		close
Car or accident motorcycle	Number	6
	Percent	30%

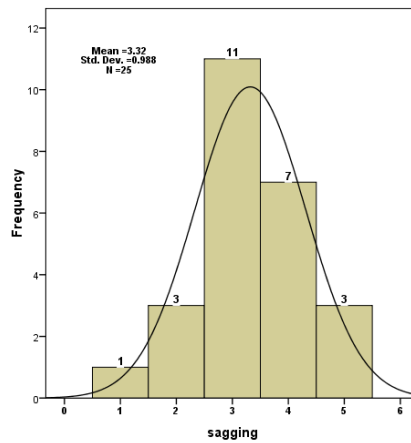
Direct hit	Number	5
	Percent	25%
falling from height	Number	4
	Percent	25%
Miscellaneous	Number	4
	Percent	20.0

Average sagging in patients undergoing close treatment in subcondyl fracture is equal to  $3.32 \pm 0.98$  mm that which was varied at least 1 up to 5 mm (Table 4).

**Table 4: Average sagging in the open treatment**

Group	Number	Mean	Standard deviation	Lowest	Highest
close	20	3.32	0.988	1	5

Figure 1 shows data distribution from sagging in 25 patients treated with the close technique.



**Figure 1. Distribution of data from sagging in 20 patients treated with the close method**

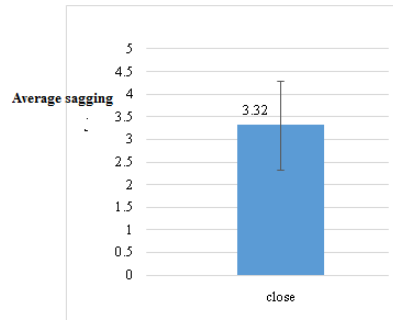
The results in Table 5 show that average sagging in the close treatment was  $3.3 \pm 0.98$  mm. The Mann-Whitney test shows significant difference in the amount of sagging in the close method.

**Table 5: Comparison of average sagging in close treatment**

treatment method	Number	Mean	Standard deviation	Mann-Whitney	
				P value	Z
close	25	3.3200	0.98826	0.028	-2.20

Figure 2 shows the average sagging in the close procedure.

**Figure 2. Average sagging in the close treatment**



## Discussion and conclusion

A unilateral or bilateral condylar fracture accounts for one third (33%) of fractures of the jaw[11]. Lack of treatment or improper treatment of condylar fractures can lead to disorders in imperfect alignment position of teeth (malocclusion), jaw and facial asymmetry (sagging), an immediate or late alteration in the position of the condylar and facial fixation, Temporomandibular joint (TMJ) ankylosis, disorder in mastication, decreased range of jaw bone motion and orthographic disorders. Therefore, diagnosis and treatment of condylar and sub condylar fractures are of great importance in terms of mandible (lower jaw) function as well as facial symmetry[12]. In this study, 25 patients were examined by close treatment (19 males and 6 females). Mean age of patients was in the close treatment group  $30.3 \pm 10.2$  years and the highest frequency of fracture was related with car accident. Also, average sagging in the close treatment was  $3.3 \pm 0.98$  mm. Kotrashetti et al in 2013 concluded in their study that open reduction and internal fixation of displaced subcondylar fractures showed better results clinically as well as radiographically compared with similar fractures treated by closed reduction. Furthermore, Ellis et al. found in their study that patients whose condylar process fractures were treated by closed methods had significantly shorter posterior facial and ramus heights on the side of injury, and more tilting of the occlusal and bigonial planes toward the fractured side, than patients whose fractures were treated by open methods. Kang and et al. (2012) in a study revealed that open reduction can restore the anatomic position of the subcondyle, thus yielding better function of the TMJ compared to closed reduction and the use of two correctly positioned plates for the stabilization of subcondylar fractures is currently the best solution in order to provide stable osteosynthesis in subcondylar fractures. Sforza et al. (2011) also showed in their study that some kinematic variables of mandibular motion were more similar to the norm in the open treatment patients than in closed treatment patients. Moreover, Halwitschka et al [13]. (2005) came to the conclusion that in cases of complex reconstruction of the mandibular condyle, ORIF appears to improve the function of fractured condyles, when combined with a postoperative therapeutic exercise regime. All these results are consistent with the results of the present study. In the surgery, there is a need for making incision in a sensitive zone that can be associated with a damage to the branch of facial nerve, damage to the parotid gland, bleeding, hematoma, infection and scar incision. However, these studies suggest better anatomical and clinical results using open treatment method. Additionally, a study was carried out by Haug et al. (2001) with the purpose of comparing the long-term treatment results of open reduction and rigid internal fixation (ORIF) with closed reduction and maxillomandibular fixation (CRMMF) for subcondylar fractures when guided by specific indications and contraindications[14]. A protocol for the treatment of condylar process fractures was developed that included absolute and relative indications and contraindications as well as a technique regimen. To evaluate the results of this protocol, 10 patients treated with CRMMF and 10 treated by ORIF were recalled after a minimum of 6 months and examined for gender, race, diagnosis, age at injury, time since operation, and cause of the fracture. Each group was assessed by 2 blinded investigators for maximum interincisal opening, right lateral excursion, left lateral excursion, protrusive movement, deviation on opening, scar perception, motor function, sensory perception, contour perception, occlusion, and perception of pain. Nonparametric data were compared for statistical significance with a chi-square analysis and parametric data with an independent samples t-test ( $P < .05$ )[15]. No statistically significant differences existed between the ORIF and CRMMF groups for gender, race, diagnosis, or cause. Moreover, no differences existed for age at injury, maximum interincisal opening, right lateral excursion, left lateral excursion, protrusive movement, deviation on opening, or occlusion. Differences were noted between groups for time since operation, scar perception, and perception of pain. Using the protocol outlined, there were no differences between the ORIF and CRMMF groups for ranges of motion, occlusion, contour, and motor or sensory function[16]. The ORIF group was associated with perceptible scars. The CRMMF group was associated with chronic pain. Using a treatment protocol, there were few differences in outcomes between patients treated with CRMMF and ORIF for subcondylar fractures. The results of the above studies are contrary to the study; this difference could be attributed to the conditions of the patients (age, gender, and race). The results of this study showed that average Sagging in the close treatment method was  $3.3 \pm 0.98$ [17].

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