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STUDYING RATE OF SAGGING IN THE OPEN TREATMENT BY TRANSMASSETERIC METHOD 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 in the open treatment by transmasseteric method in with Sub condylar fractures.

Method: In this study, 20 patients who had suffered from Sub condylar fracture were selected and were treated with open treatment (transmasseteric). 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 2.7 ± 0.78 mm.

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Introduction

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. 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. 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. 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. As a result of lateral forces that exerted on the mandibular, the lower part of the sigmoid notch in the sub condyle may expose fracture. Diagnosis 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. There are two types of treatment for these fractures: 1- closed

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treatment. 2- open treatment. Open procedure includes: pre-auricular, Intraoral submandibular, retromandibular, face lift, endoscopically assisted, Transmasseteric and so on. Transmasseteric surgical treatment can be used in cases of severe displaced condylar fracture or heavy displacement of fractured fragment (sagging > 2 mm). This sub-condylar fracture surgery approach provides direct access to the fracture zone for the surgeon by making a *postaural* incision. Transmasseteric method can be used to reduce side effects and damage to the facial nerve and improves access to the fractured zone. Absolute indications for ORIF refer to laterally extra capsul fractures and are used for patients who occlusal adjustment treatment cannot be recommended for them. Relative indications is recommended 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 condylar sagging by panoramic radiographs after trauma. When the patient is in need of aesthetic surgery, transmasseteric anterior posterior approach is proposed. In this approach, the fracture site is directly exposed and will allow the surgeon to directly fixate the fractured area. This method involves hazards such as damage to nerve facial. Ebenezer et al. (2011) conducted a study with the objective of comparing the rate of complications encountered on using different incision to access the fracture site for the open reduction and internal fixation of isolated subcondylar fractures. The parameters evaluated are: the occurrence of salivary fistula, infection, and injuries to the seventh facial nerve. An assessment of the surgical scar was also undertaken. Pre injury status 20 patients who met the previous criteria and were willing to participate in the study were placed (five each) into the pre-auricular, submandibular, retromandibular transparotid or retromandibular transmasseteric group based on the incision scar they selected after a description of the operation and being explained about the possible complications. The results indicated that transmasseteric approach seems to be a safer approach since the nerves encountered can be visualized and avoided. In another study that was conducted in 2011 by Sugamata et al., many operative approaches have been described for the open reduction of subcondylar fractures and rigid fixation. However, fracture portions are deep and embedded among facial nerves so that visual surgery in this region is extremely limited. Once the operative field is exposed, the displacement of the condylar head is often dislocated by the anteromedial pull of the lateral pterygoid muscle and the fracture end of the condylar process is pulled up to the mandibular fossa by contraction of the masseter muscle. We made a new retractor to achieve a better field of view. It is possible to pull down the condyla process by opening the tips of the retractor using the specially made wrench system without special effort and keep the condylar process in the same position during

reduction. In using this retractor, the fracture stumps were clearly exposed and more easily repositioned. In addition, in a study that was carried out by Trost et al., in 2009, functional results Radiological fracture fixation Subcondylar Modostocplate were investigated by High Cervical Transmasseteric Particle. A prospective study was designed, enrolling all minimum-aged 15-year-old echomorphology patients presenting with displaced low subcondylar fracture with occlusion disturbances during a 41-month period. All fractures were fixed with modus TCP plates using high cervical transmasseteric anteroparotid approach. All patients underwent immediate physiotherapy and a 6-week liquid and semiliquid feeding period. Clinical and radiologic examinations were performed at 1 week and 1, 3, and 6 months. A total of 35 patients presenting with 38 fractures were enrolled with a mean follow-up of 17 months. All fractures had healed at 6 months in the correct anatomic position in 73.7%. Occlusion was deemed normal in 80% of the patients. The mandibular movement was normal in 97.1%, with the mouth opening up to 40 mm, mean lateral movement of 11 mm without a difference between the 2 sides, and a mean protrusion of 12 mm. Minimal asymmetry remained in 15.6%. No facial palsy occurred, including no transient facial palsy. Complications consisted of 1 infection and 1 plate fracture requiring surgical revision. Low subcondylar fracture fixation with modus TCP plates using a high cervical transmasseteric anteroparotid approach is a safe and reproducible procedure providing excellent functional results. This procedure has been routinely performed in our department. Moreover, in a study conducted by Kotrashetti et al in 2013 entitled as A Comparative Study of Closed Versus Open Reduction and Internal Fixation (Using Retromandibular Approach) in the Management of Subcondylar Fracture. The results showed 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. In another study carried out by Handschel in 2012 entitled as Comparison of Various Approaches for the Treatment of Fractures of the Mandibular Condylar Process, the results showed that inferior condylar neck fractures benefit from ORIF by an intraoral approach whereas in high condylar neck fractures the retromandibular/transparotid approach showed the best results. Fractures of the condylar head were almost all treated by CR and our results cannot contribute to the debate of CR vs. ORIF in this type of fracture. 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. It is concluded that if either of the condyles is displaced ORIF is the most satisfactory method of treatment. The aim of this study was to evaluate the sagging or drooping in patients with sub condyle fractures by treatment transmasseteric.

Method

In this study, approximately 20 patients who had been referred to Zahedan Dental School undergoing subcondyl fracture surgery were selected. This is a concurrent cohort study and convenience sampling method was used. Exclusion criteria included patients who had a fractured jaw in zones other than the sub condyle and patients who underwent expire surgery. Observations, information form tool, panoramic X-ray were used for collecting data. Patients with fractures subcondyl were

treated by transmasseteric by a maxillofacial surgeon; anterior border of the mouth and lateral lower lip and nose and cheeks and postural areas were exposed. For making an incision, a line from the bottom of the ear lobe to the posterior border of the ramus to gonial angle was drawn. The line was divided into three parts. Two anterior parts from the three parts of line were extended at *mandibular lower border in front of the gonial angle*. An incision is then made on the line connecting the last ramus posterior line and the first inferior border of the mandible. To access the masseter muscle, the muscle was exposed with a deep *incision* in the vertical plane. Incision should be placed parallel to the facial nerve. Periosteal elevator was used to strip the bone and masseter muscle. For bone transplantation, an inferior jaw must be displaced and was extended to its initial position so that the fractured site in the sub condylar fractures segments were brought together. Next, the fracture site was fixed with the plate. Finally, parotid and masseter fascia and subcutaneous tissue were sutured using absorbable suture and the skin with non-absorbable suture. 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, 20 patients treated by open treatment method were investigated. The results in Table 1 show that 75 percent of the patients were male and 25% were female in the group Open.

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

Gender		treatment method
		open
male	Number	15
	Percent	75%
female	Number	5
	Percent	25%

The results in Table 2 show that a car or motorcycle accident has the highest frequency. Direct hit and falling from height are the next in rank.

Table 2: Frequency for the cause of fracture in each of the groups under study

Cause of fracture		treatment method
		open
Car or accident motorcycle	Number	6
	Percent	30%
Direct hit	Number	5
	Percent	25%
falling from height	Number	5
	Percent	25%
Miscellaneous	Number	4
	Percent	20.0

The mean age of patients was in the open treatment group 28.5 ± 9.8 years (Table 3).

Table 3: Mean age of patients

Group	Number	Mean	Standard deviation	Lowest	Highest
Open	20	2.7000	0.80131	1	4

Average sagging in patients undergoing open treatment by transmasseteric techniques in subcondyl fracture is equal to 2.7 ± 0.8 mm that which was varied at least 1 up to 4 mm (Table 4).

Table 4: Average sagging in the open treatment by transmasseteric method

Group	Number	Mean	Standard deviation	Lowest	Highest
Open	20	2.70	8013	1	4

Figure 1 shows data distribution from sagging in 20 patients treated with the open technique.

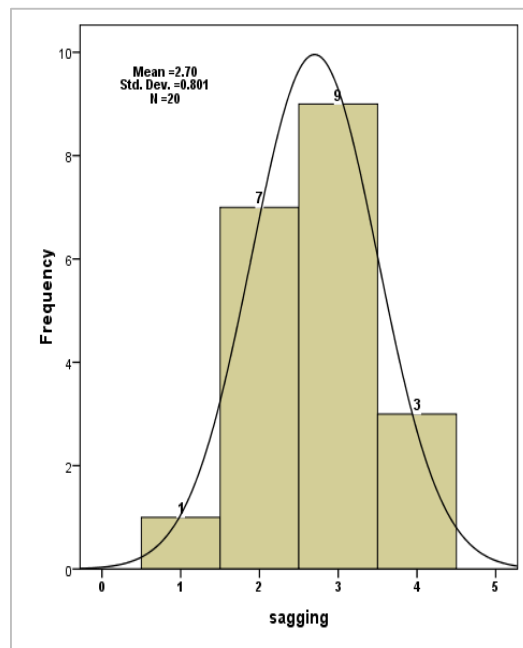


Figure 1. Distribution of data from sagging in 20 patients treated with the open technique.

The results in Table 5 show that average sagging in the open treatment was 3.3 ± 0.98 mm. The Mann-Whitney test shows no significant difference in the amount of sagging.

Table 5: Comparison of average sagging in open treatment

treatment method	Number	Mean	Standard deviation	Mann-Whitney	
				P value	Z
Open	20	2.7000	0.80131	0.028	-2.20

Figure 2 shows the average sagging in the open procedure.

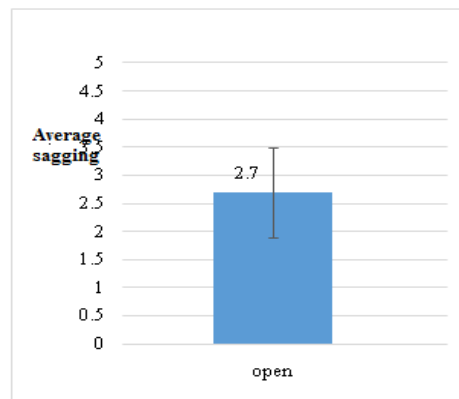


Figure 2. Average sagging in the open treatment procedure

Discussion and conclusion

A unilateral or bilateral condylar fracture accounts for one third (33%) of fractures of the jaw. 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. In this study, 20 patients were examined by open treatment (15 males and 5 females). Mean age of patients was in the open treatment group 28.5 ± 9.8 years and the highest frequency of fracture was related with car accident. Also, average sagging in the open treatment was 2.7 ± 0.80 mm. 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. In addition, the results of a study by Kotrashetti et al (2013) showed 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. Also Sforza et al. (2011) showed that some kinematic variables of mandibular motion were more similar to the norm in the open treatment patients than in closed treatment patients. Singh et al. (2012) demonstrated that ORIF is the most satisfactory method of treatment for displaced condyles; they also recognized all functional parameters were improved. 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. Moreover, Halwitschka et al. (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. This study also suggests the lowered sagging rate using this method. Therefore, in cases where the risk of sagging after treatment is more likely to be higher, open method is the most suitable. Handschel et al (2012) reached the conclusion in their study that inferior condylar neck fractures benefit from ORIF by an intraoral approach whereas in high condylar neck fractures the retromandibular/transparotid approach shows the best results. Fractures of the condylar head were almost all treated by CR and our results cannot contribute to the debate of CR vs. ORIF in this type of fracture. The results of the above studies are contrary to the study; this difference could be attributed to the conditions of the patients (age, gender, race). Additionally, in the study carried out in Haug et al. (2001) subjects of the study were examined six months after surgery. The results of this study showed that average Sagging in the open treatment method was 7.2 ± 0.80 .

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