

# Subcondylar Fractures: Conservative Vs Operative Approach

Dr. Hiren Rana<sup>1</sup>, Dr. Nakka Anil Krishna<sup>2\*</sup>, Dr. Manav P. Suri<sup>3</sup>, Dr. Jayesh P. Sachde<sup>4</sup>,  
Dr. Nilesh Kachhadiya<sup>5</sup>, Dr. Kusal Mistry<sup>6</sup>, Dr. Nirmala Ganapathy<sup>7</sup>

<sup>1</sup>Assistant Professor, Department of Burns and Plastic Surgery, BJMC, Ahmedabad

<sup>2</sup>3<sup>rd</sup> year Resident, Department of Burns and Plastic Surgery, BJMC, Ahmedabad

<sup>3</sup>Associate professor, Department of Burns and Plastic Surgery, BJMC, Ahmedabad

<sup>4</sup>Professor & Head of Department of Burns and Plastic Surgery, BJMC, Ahmedabad

<sup>5</sup>3<sup>rd</sup> year Resident, Department of Burns and Plastic Surgery, BJMC, Ahmedabad

<sup>6</sup>3<sup>rd</sup> year Resident, Department of Burns and Plastic Surgery, BJMC, Ahmedabad

<sup>7</sup>3<sup>rd</sup> year Resident, Department of Burns and Plastic Surgery, BJMC, Ahmedabad

\*Correspondence: [anilmedic\[at\]gmail.com](mailto:anilmedic[at]gmail.com)

**Abstract:** *The management of condylar and sub-condylar fractures has been a subject of debate for many years. These fractures can be treated by conservative or operative methods. There is no general consensus about what the best treatment is for various fracture patterns. In the past most of these fractures were treated by conservative approach. Recently, the trend is shifting to the operative management of the sub-condylar fractures. A prospective study was done for conservative and operative treatment options in the management patients of mandibular sub-condylar fractures from December 2019 to December 2022 in the Department of Burns and Plastic Surgery, BJMC, Ahmedabad. A total of sixteen patients with unilateral sub-condylar fractures were included in this study. Eight patients underwent open reduction and internal fixation by retromandibular approach for subcondylar fracture and in other eight patients, the subcondylar fracture was treated conservatively. However, the associated fractures in addition to sub-condylar fractures in the study group were treated by open reduction and internal fixation. The patients were regularly followed and the results of conservative and operative treatment related to occlusion, mouth opening, pain, mouth deviation and the follow up period ranged from 0-6 months.*

**Keywords:** Subcondylar fracture, Closed versus Open treatment, Surgical treatment of subcondylar fractures, Conservative treatment of subcondylar fractures, Closed reduction, Open reduction, Internal fixation, Intermaxillary fixation

## 1. Introduction

Mandibular condylar process fractures account for 25 – 35% of all mandibular fractures in reported cases. The condyle is the weakest portion of the mandible and one of the commonest sites of fractures in the mandible which is a protective mechanism as well. Condylar process fractures occur by the impact of an indirect traumatic force on the chin and seldom arise from direct trauma unless accompanied by fracture of the zygoma. The commonly accepted, goal of treatment is the reestablishment of the preoperative function of the masticatory system. Unlike fractures of the other bones, however the exact anatomic re-approximation of the fracture segments may not be absolutely essential. The management of condylar and sub-condylar fractures has been a subject of debate for many years. These fractures can be treated by conservative or operative methods. There is no general consensus about what the best treatment is for various fracture patterns. In the past most of these fractures were treated by conservative approach. There is no universal gold standard classification system for mandibular condylar process fractures. It is

important to differentiate between condylar head, coronoid, condylar neck, sub-condylar, and ramus fractures, as treatment options depend on fracture location. There is no universal gold standard classification system for mandibular condylar process fractures. Lindahl defines the subcondylar fracture line as starting at the sigmoid notch and extending to the posterior border of the mandible. This region is clinically significant because of the presence of the facial nerve and the temporomandibular joint (TMJ), both of which may be functionally impaired by the fracture itself or the operative treatment. **Ellis and co-workers (1999)** described a more simplified classification system, which dealt with the location of the fracture and the degree of dislocation and/or displacement. **Condylar head fracture:** intracapsular fracture; **Condylar neck fracture:** fracture below the condylar head, but on or above the lowest point of the sigmoid notch; **Condylar base fracture:** fracture in which the fracture line is located below the lowest point of the sigmoid notch.

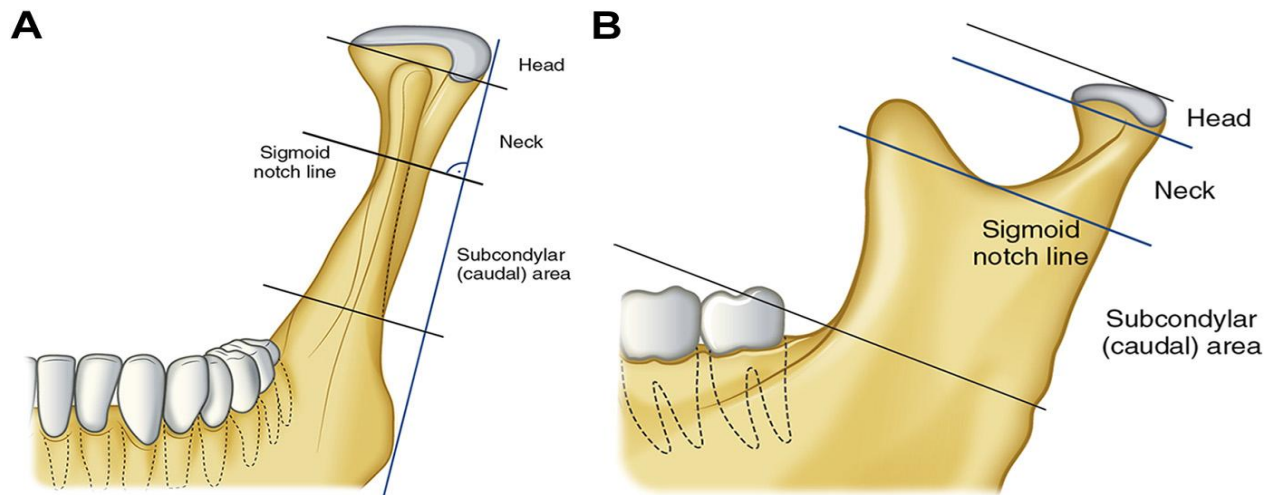


Figure 1: (A, B) Simplified classification system as described by Ellis

## 2. Materials and Methods

This clinical study was conducted on sixteen patients in the Department of Burns and Plastic Surgery, BJ Medical College from Dec 2019 to Dec 2021. In this study we compared the approaches of conservative treatment and operative treatment for the subcondylar fractures of the mandible and the results of conservative and operative treatment related to occlusion, mouth opening, pain, mouth deviation. The patients were grouped into two main categories, **Group I**: comprised of eight patients treated by conservative approach and **Group II**: comprised of eight patients treated by operative procedure. A specific patient selection criteria and protocol were followed. A proforma was created to record the history and events. Preoperative radiographs, patient photographs and clinical records were recorded. Patients were explained about the various treatment modalities and treatment that will be given to the patient. Informed consent was taken from all patients under study. All surgeries were done in the department of Burns and Plastic Surgery, BJMC, Ahmedabad. Choice of anaesthesia: patients who underwent surgical procedures were operated under general anaesthesia and patients treated by Erich Arch Bar wiring and intermaxillary fixation under local anaesthesia.

In conservative (closed reduction) treatment patient were treated with arch bar and intermaxillary fixation for 3 weeks. Then wires for intermaxillary fixation were removed and occlusion movements were induced by giving rubber intermaxillary fixation and soft diet for 3 weeks and was followed by functional therapy in the form of passive mandibular movement exercises and mouth opening exercise and clinical outcomes were noted. In operative approach (open reduction) patient were treated with open reduction and internal fixation. Subcondylar can be accessed through intraoral, periangular, and retromandibular incisions, however, in our study retromandibular approach was used and the fractures were fixed with 2-mm Titanium plates (single/dual/rhomboid/delta) and screws and Intermaxillary fixation was given for 3 weeks post operatively with wires and was followed by rubber/ elastics intermaxillary fixation for 3 weeks and then by functional therapy. Postoperative instructions regarding mouth opening exercises and physiotherapy were given to all the patients.

**Inclusion Criteria:** patients of all age groups, subcondylar fracture as classified by **Lindahl**, patient should consent to participate in the study, additional associated fractures of the mandible and maxilla were treated with open reduction.

**Exclusion Criteria:** previous history of temporomandibular joint dysfunction, severe pre-traumatic dysgnathia, mandibular condylar head or neck fractures. The **clinical parameters** for evaluation in the study were: mouth/maximum interincisal opening, excursion of mouth (right lateral excursion/left lateral excursion), occlusion and pain.

Restoration to the pretraumatic occlusion assessed as:

- 1) Identical to pretraumatic
- 2) Slight difference
- 3) Functional malocclusion
- 4) Requires orthodontics as occlusal adjustments
- 5) Gross malocclusion

Pain assessed as:

- 1) None
- 2) Occasional
- 3) Tolerable
- 4) Occasional limitation of daily activity
- 5) Limits daily function

Patients were then examined for:

- 1) Mouth opening: (mm)
- 2) Right lateral excursion: (mm)
- 3) Left lateral excursion: (mm)

Patients were followed after treatment at 2 weeks, 1 month, 3 months and 6 months. A master chart was prepared in which data related to the variables mentioned above was entered. All statistical analyses were done by statistician. Categorical variables were analyzed using the **chi-square** or **Fisher exact test**, and continuous variables were analyzed using the **Student t-test**. We considered P-values of less than 0.05 to be statistically significant. Data collected from case record form was entered in Microsoft excel worksheet & was analyzed in SSS (Master chart). Study ended after 6 months of follow up for each patient.

### 3. Results

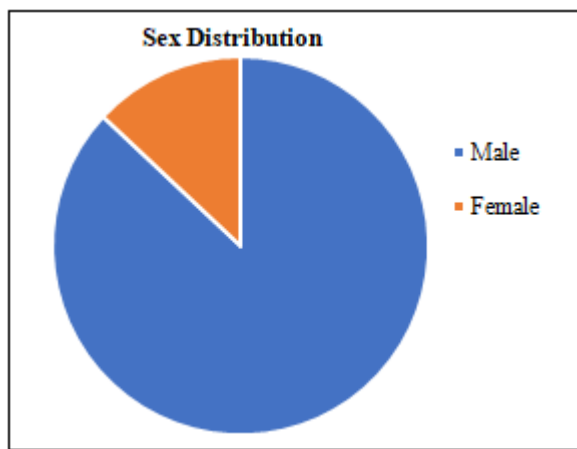
Sixteen patients with unilateral subcondylar fractures were included in this study. Eight patients were treated conservatively and eight patients underwent open reduction and rigid internal fixation. The patients were regularly followed for different clinical parameters and the follow up period ranged from 0-6 months.

#### Demographic Factors

##### Sex Distribution

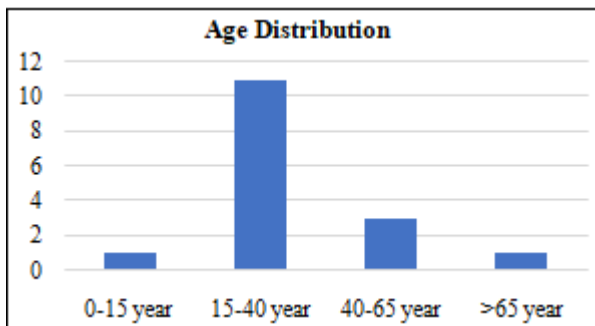
87% (14 patients) of them were males and 13% (2 patients) were female accounting to ratio of almost 7: 1

Male	Female
14	2
87%	13%



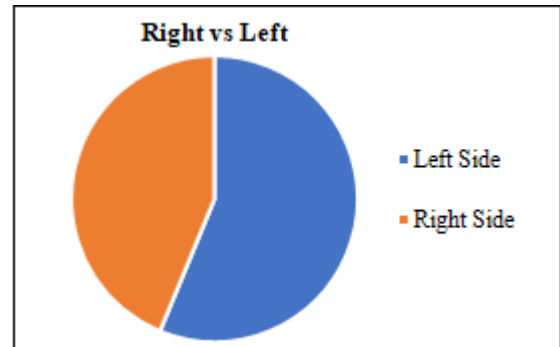
##### Age Distribution

7 % (1 patient) belonged to the age group of 0-15 years, followed by adults within age group 15-40 years which were 67% (11 patients). Patients between 40-65 years were 13% (3 patient) and patients above 65 years constituted 7% (1 patient) of the study model



##### Left Vs Right side

In our study out of the sixteen patients nine patients (56%) had left subcondylar fracture and seven patients (44%) had right subcondylar fracture.



**Table 1: Conservative Approach sample**

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Mouth opening (mm)	36	33	37	36	38	37	38	37
Right lateral excursion (mm)	6	7	4	6	5	6	5	4
Left lateral excursion (mm)	4	3	5	3	7	6	7	4
Occlusion	2	1	1	3	1	2	2	2
Pain	1	2	1	2	3	2	3	2

**Table 2: Operative approach sample**

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Mouth opening (mm)	42	40	39	37	34	39	40	38
Right lateral excursion (mm)	8	6	7	8	6	5	7	4
Left lateral excursion (mm)	4	5	5	4	8	7	6	7
Occlusion	1	1	1	1	1	1	1	2
Pain	1	1	1	1	2	1	1	2

**Table 3: Statistical Significance**

(Evaluated with Independent 't' test and p values at < 0.05 and < 0.01)

	Conservative sample Mean	Operative sample Mean	Conservative sample Standard Deviation	Operative sample Standard Deviation	T-value	P-value
Mouth opening	36.5	38.63	1.603	2.387	4.369	0.055
Right excursion	5.37	6.37	1.06	1.407	2.574	0.139
Left excursion	4.87	5.75	1.642	1.488	1.247	0.282
Occlusion	1.75	1.12	0.707	0.353	4.999	0.042
Pain	2	1.25	0.755	0.462	5.727	0.031

No statistical significant differences were noted between the two groups for the right and left lateral excursive movements and mouth opening. Statistically significant differences were noted in the perception of pain and occlusion ( $< 0.05$ ) with the patients in group I treated by

closed reduction. One patient treated by open reduction had an incidence of transient facial nerve weakness which returned to normal function over after 3 month period of follow-up.



Clinical photographs of patients treated by operative and conservative approach in the study; figure 1 showing the 3 CT of a patient with Subcondylar fracture; figure 2 showing the intra-op picture of delta plate fixation in a patient with right Subcondylar fracture; figure 3 showing the patient with arch bar fixation and elastics given over the archbars; figure 4, 5, 6 showing the mouth opening and occlusal relationship in follow-up period

#### 4. Discussion

Fixation is not necessary for healing. Unlike other parts of the mandible, fractures of the condyle rarely result in malunion even without treatment. There is a wide variety of treatment recommendations, including immediate mobilization with soft diet, IMF for 2 to 6 weeks, and immediate mobilization with soft diet. Early mobilization has equalocclusal results to those with periods of IMF and helps patients to return to normal function earlier.

The advantageous effects of low levels and frequent strain on bone and cartilage support physiotherapy methods such as immediate mobilization, liquid diet progressing to a soft diet, frequent stretch to improve opening, excursive and protrusive motion, and other techniques such as guiding elastics to help harmonize remodeling tissue and settle occlusion in contrast with the debilitating effect of IMF. Risks of open treatment in children outweigh the benefits. In patients less than 12 years old, regenerative capacity is optimized and closed treatment is indicated when possible. The condyle shows a remarkable ability to remodel and regenerate after cartilage and bone necrosis. At minimum,

all condylar fractures have a compromised medullary blood supply. Closed treatment does not further disturb supply. With any open approach it is important to consider the blood supply and avoid devascularization by unnecessarily removing muscle attachments and the TMJ capsule.

Over the last few decades, treatment of adult subcondylar fractures is shifting towards open treatment with minor advantage over closed reduction in terms of mouth opening and pain free period but the additional risks of open treatment must carefully be weighed.

#### 5. Conclusion

When clinically appropriate, closed treatment continues to be a viable, less risky modality with satisfactory results. Open treatment has significant risks, including injury to marginal mandibular or temporal branches of the facial nerve, scarring, infection, hematoma, and hardware failure, and it requires additional expense and the use of surgical center facilities. This study informs clinical decision making to undergo open or closed treatment on a case-by-case basis with either of the treatment modalities.

#### 6. Conflict of Interest

The author had no conflict of interest in the study and no financial aid was required from any source.

## References

- [1] Ellis E, Throckmorton G. Treatment of mandibular condylar process fractures, Ellis E. Condylar process fractures of the mandible. *Facial Plast Surg* 2000; 16: 193e205.
- [2] Lindahl L. Condylar fracture of the mandible. IV. Function of the masticatory system. *Int J Oral Surg* 1977; 6: 195e203
- [3] Rowe NL, Killey HC. Fractures of the facial skeleton. Edinburgh (United Kingdom): E & S Livingstone Ltd; 1955. p.102e204
- [4] Lindahl L. Condylar fractures of the mandible. I: classification and relation to age, occlusion and concomitant injuries of the teeth and teeth-supporting structures and fractures of the mandibular body. *Int J Oral Surg* 1977; 6 (1): 12e21
- [5] [www.oralmaxsurgeryatlas.theclinics.com](http://www.oralmaxsurgeryatlas.theclinics.com)
- [6] AO Foundation Website Available [https://www2.aofoundation.org/wps/portal/!ut/p/a1/04\\_Sj9CPykssy0xPLMnMz0vMAfGjzOKN\\_A0M3D2DDbz9\\_UMMDRyDXQ3dw9wMDAwCTYEKIvEocDQnTr8BDuBoQEi\\_135Uek5-EtCp4c76US6huYZ-6SBDHFOSjC3S9aOKUtNSi1KL9DLyi0v0I8rLy430EvPT8kvzUsBe1MsvStcvyA2NqPIsdgQA63nsuA!!/dl5/d5/L2dJQSEvUUt3QS80SmlFL1o2XzJPMDHBH SVMwS09PVDEwQVNFMUdWRjAwMFE1/?boneZCMF&segmentZMandible&showPageZdiagnosis](https://www2.aofoundation.org/wps/portal/!ut/p/a1/04_Sj9CPykssy0xPLMnMz0vMAfGjzOKN_A0M3D2DDbz9_UMMDRyDXQ3dw9wMDAwCTYEKIvEocDQnTr8BDuBoQEi_135Uek5-EtCp4c76US6huYZ-6SBDHFOSjC3S9aOKUtNSi1KL9DLyi0v0I8rLy430EvPT8kvzUsBe1MsvStcvyA2NqPIsdgQA63nsuA!!/dl5/d5/L2dJQSEvUUt3QS80SmlFL1o2XzJPMDHBH SVMwS09PVDEwQVNFMUdWRjAwMFE1/?boneZCMF&segmentZMandible&showPageZdiagnosis). Accessed September 19, 2016.
- [7] Atlas Oral Maxillofacial Surg Clin N Am 25 (2017) 35–461061-3315/17/ª 2017 Elsevier Inc. <http://dx.doi.org/10.1016/j.cxom.2016.10.006>.
- [8] Park J, Jang Y, Kim S, et al. Comparative study of the prognosis of an extracorporeal reduction and a closed treatment in mandibular condyle head and/or neck fractures. *J Oral Maxillofac Surg* 2010; 68: 2986e93.
- [9] Ellis E, Throckmorton GS. Treatment of mandibular condylar process fracture biological considerations. *J Oral Maxillofac Surg* 2005; 63: 115e34.
- [10] Al-Moraissi EA, Ellis E 3rd. Surgical treatment of adult mandibular condylar fractures provides better outcomes than closed treatment: a systematic review and meta-analysis. *J Oral Maxillofac Surg* 2015; 73 (3): 482e93.12p. CINAHL Complete. Web.22 May 2016.