

# Intra-Articular Condylar Fractures: Is Necessary Surgical Treatment?

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**Abstract:** The surgical treatment of mandibular condylar fractures represents one of the most discussed topics in maxillofacial trauma surgery. Over the years the literature has documented an increasing attitude towards open reduction and internal fixation (ORIF) of these fractures. Some authors have recently increased the indications for ORIF to include intra-articular fractures, which have historically been managed conservatively<sup>1,2,3</sup>. The authors present their experience in the surgical treatment of intra-articular condylar fractures over a period of five years, from 2009 to 2014. Surgical techniques, early and delayed complications, clinical and radiological outcomes and comparison with conservative treatment are discussed.

**Keywords:** Mandibular Fracture, Condylar Fracture, Trauma.

## INTRODUCTION

Despite being extremely common (around 30% of all mandibular fractures)<sup>4</sup> the treatment of condylar fractures is the most controversial topic in maxillofacial surgery. The literature now largely agrees that open reduction and internal fixation represents the gold standard for extracapsular fractures<sup>5,6,7</sup>.

The development of surgical techniques and materials together with the evidence of frequently unsatisfying outcomes after conservative treatments have led to an increased number of indications toward open surgical treatment even for intracapsular fractures<sup>1,8</sup>. Regarding the surgical treatment of condylar head fractures, however, the literature is farther from finding a general agreement<sup>6</sup>.

This study aims to critically analyze the outcomes of condylar head fractures surgically and non-surgically treated by the authors from 2009 to 2014.

## MATERIALS AND METHODS

Details of all mandibular fractures were retrospectively obtained from the operating theatre database. From this cohort only the patients with condylar head fractures were extrapolated. The pre-operative and post-operative x-rays and CT scans were then examined to divide the cohort into a surgical and a non-surgical group in accordance with the chosen technique to treat the condylar fracture.

All patients were then contacted by telephone and advised to organize a clinic appointment. During those appointments the below-mentioned data was collected for surgical and non surgical groups: occlusion, motility (in terms of mouth opening, protrusion and lateral excursion), presence of pain or TMJ click, complications (pathological scar, infections, Frey's syndrome, facial nerve deficit, need for further surgery, etc).

All data was analyzed and the outcome of the two treatments compared.

Due to the retrospective nature of the study, there is no need of ethical approval.

## RESULTS

170 patients with mandibular condylar fractures were treated by the Authors from January 2009 to December 2014. The analysis of x-rays and CT scan permitted to isolate 64 patients with intracapsular condylar head fractures. All 64 patients were contacted by telephone but only 29 attended the clinic appointment to be clinically assessed and were included in this study.

All the above-mentioned parameters were recorded and documented.

A total of 29 patients underwent treatment for condylar head fractures. 10 patients had bilateral condylar fractures for a total of 39.

6 patients with 7 fractures had the surgical removal of the fractured fragments (Group A – Table 1). 14 patients with 17 fractures had open reduction and internal fixation (Group B – Table 2).

9 patients with 15 fractures received a non surgical functional treatment (Group C – Table 3).

All patients in group A and B also received post-operative functional treatments.

Intermaxillary fixation (IMF) was utilized in all patients in Group C (non surgical) and occasionally in Groups A and B for a period of 7 to 40 days.

Post-treatment outcomes in terms of TMJ function were objectively measured by recording mouth opening, lateral excursion and protrusion and by investigating the patients on any subjective difficulty in eating and the presence of pain.

All patients in Group B and C had their occlusion restored with the treatment. Group A revealed less satisfactory outcomes in terms of occlusion, in one case further orthognathic surgery was required to correct anterior open bite. (Figure 1 and 2)

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**Figure 1:** Case of group B (A: pre-operative TC; B and C: post-operative TC; D, E, F,G: lateral excursion, occlusion and mouth opening at the end of the treatment).



**Figure 2:** Case of group C (A: preoperative TC; B: TC post intermaxillary fixation; C, D, E, F: lateral excursion, occlusion and mouth opening at the end of the treatment).

**Table 1:** Patients treated by surgical removal of fractured fragments (Group A).

Gender	Age (years)	Follow up (years)	Side	Surgical access	Duration of functional treatment (months)	Duration of IMF (days)	Occlusion
F	18	2	Right	Preauricular	5	21	Restored
M	19	5	Right	Preauricular	4	20	Restored
M	75	5	Right	Preauricular	12	0	Restored
F	22	2	Right	Preauricular	6	30	Premature contact on right
F	31	3	Bilateral	Retrotragal Rt, Preauricular Lt	4	30	Anterior open bite
M	19	4	Left	Preauricular	2	0	Restored

Continued Table 1

Mouth opening	Lateral excursion (Fractured side vs non-fractured side)	TMJ pain	Complications
28 mm	0 mm	No	Permanent deficit temporal branch
39 mm	4 mm	No	-
35 mm	0 mm	No	-
43 mm	0 mm	No	Frey's syndrome
33 mm	-	No	Need for BSSO
66 mm	7 mm	No	-

**Table 2:** Patients treated with open reduction and internal fixation of the fractures (Group B).

Gender	Age (years)	Follow up (years)	Side	Surgical access	Duration of functional treatment (months)	Duration of IMF (days)	Occlusion
M	41	3,0	Right	Retroauricular	0	15	Restored
M	20	4,0	Left	Retroauricular transparotid	3	20	Restored
M	21	3,0	Left	Retroauricular	2	20	Restored
M	75	1,0	Bilateral	Retrotragal Rt, not operated Lt	1	0	Restored *
F	54	0,5	Left	Retrotragal	3	15	Restored
M	30	2,0	Bilateral	Retrotragal	3	40	Restored
M	18	2,0	Left	Retrotragal	3	0	Restored
F	39	2,0	Left	Retrotragal	3	21	Restored *
M	18	0,5	Left	Preauricular	6	21	Restored
M	27	3,0	Right	Preauricular	3	30	Restored
F	24	4,0	Left	Retrotragal	1	15	Restored *
M	31	1,0	Bilateral	Retrotragal Rt and Lt	1	15	Restored
M	43	3,0	Left	Retrotragal	1	30	Restored *
F	16	2,0	Right	Retrotragal	6	30	Restored

Continued Table 2

Mouth opening	Lateral excursion (Fractured side vs non-fractured side)	TMJ pain	Complications
33 mm	4 mm	No	Deficit sensitivity left lobe and cheek
50 mm	0 mm	No	-
40 mm	-2 mm	No	Frey's syndrome
30 mm	-	No	-
36 mm	6 mm	No	Temporary deficit temporal branch

Continued Table 2

45 mm	-	Yes	Unsatisfying reduction: need for second surgery left side and removal of fractured fragment
42 mm	-1 mm	No	-
47 mm	4 mm	No	-
50 mm	4 mm	No	Hyperaemic scar, temporary deficit temporal branch
40 mm	5 mm	Yes	Temporary deficit temporal branch
40 mm	0 mm	No	Chronic pain and swelling of external ear
42 mm	-	No	-
-1 mm	No	-	-1 mm
0 mm	Yes	-	0 mm

\*Damage to teeth requiring endodontic treatment, extraction, rehabilitation on implants or denture

**Table 3:** Patients treated non-surgically (Group C).

Gender	Age (years)	Follow up (years)	Side	Surgical access	Duration of functional treatment (months)	Duration of IMF (days)	Occlusion
M	17	1,0	Right	-	6	21	Restored
F	42	5,0	Bilateral	-	12	0	Restored +
M	63	3,0	Bilateral	-	4	15	Restored
F	36	2,0	Bilateral	-	12	0	Restored
M	32	1,0	Left	-	6	21	Restored
M	45	3,0	Bilateral	-	0	50	Restored
M	25	0,5	Bilateral	-	6	18	Restored +
M	84	5,0	Bilateral	-	0	0	Restored +
M	28	5,0	Right	-	12	30	Restored

Continued Table 3

Mouth opening	Lateral excursion (Fractured side vs non-fractured side)	TMJ pain	Complications
41 mm	1 mm	No	-
24 mm	-	Yes	TMJ ankylosis
34 mm	-	Yes	-
42 mm	-	Yes	-
40 mm	4 mm	No	-
38 mm	-	No	-
50 mm	-	No	-
30 mm	-	No	-
43 mm	0 mm	No	-

\*Damage to teeth requiring endodontic treatment, extraction, rehabilitation on implants or denture

Normal mouth opening with no statistically significant difference was achieved in all groups except one patient in group C complicated by TMJ ankylosis. This latter patient had not received early functional treatment due to prolonged coma secondary to severe head injury.

The same satisfactory result was achieved on lateral excursion. Average mouth opening was 40.5mm in Group A, 42.5mm in Group B and 37.2mm in Group C (with an ideal average of 40.5mm when excluding the patient inappropriately treated due to coma and complicated by TMJ ankylosis).

The best result for pain control was achieved in Group A with no patient complaining of symptoms

versus 3 patients (21,4%) in Group B and 3 patients (33,3%) in Group C experiencing pain.

Surgical complications (obviously not present in Group C) were statistically significant in the other Groups. In 2 out of 6 patients in Group A permanent deficits directly induced by the surgical procedure were documented; in particular one patient with Frey's syndrome and one with permanent deficit of facial nerve temporal branch. In Group B, 14 patients one patient with Frey's syndrome and two with permanent deficit of facial nerve temporal branch.

## DISCUSSION

The authors present their experience in the treatment of mandibular condylar head fractures, one of the most discussed topics of our surgical discipline. Compared to the treatment of any other facial fractures and despite being extremely common there is no general agreement on whether surgery should be the gold standard for the treatment<sup>6,8</sup>.

In recent years the authors' unit has utilized a variety of treatments for condylar head fractures: from a conservative functional treatment<sup>9,10</sup> to open reduction and internal fixation<sup>1,2,6,7,8,11</sup> passing through surgical exploration and removal of fractured fragments<sup>12,13</sup>.

The aim of treatment is the restoration of occlusion and correct temporomandibular joint function. Correct occlusion is a simple and objective outcome even if occasionally, due to direct damage to teeth (crown fracture, teeth avulsion, etc), the patient may initially refer 'abnormal or difficult bite'. TMJ function can be more difficult to assess, as the surgeon does not usually have any documentation of the function prior to the trauma. The presence of a click may not be related to the trauma and the measurement of mouth opening, lateral excursion and protrusion can be affected by the pain experienced by the patient. On the other hand the history of trauma with a condylar fracture has been linked to the development of TMJ dysfunction in patients potentially affected prior to the injury or with other endogenous risk factors<sup>14</sup>.

A potential bias of this study is the data collection method. Retrospectively collecting data regarding the operation details of the patient resulted in occasionally needing interpretation by the collecting author, and in particular on the condylar fracture classification, especially when images were missing. A number of patients could not be included in this study, as too many details were not documented. Others did not attend the clinic appointment.

Five surgeons performed the procedures, everyone with specific competencies and experience influencing the surgical outcomes and the treatment plan. An important variable was the functional treatment tailored on the patient's compliance and ability to understand the given instructions, especially considering that even in the literature there is no general agreement or guidelines<sup>10</sup>. During the clinic appointment, not all the patients could give a detailed history of their functional treatment.

Despite the small number of patients (29 patients), the comparison of three different treatments carried out by the same surgical team in a relatively short period of time, allows for interesting conclusions.

Regarding the restoration of occlusion, this was always achieved in group B and C (despite occasionally with the damaged teeth needing repair. Group A presented more problems with one patient requiring orthognathic surgery.

Maximal mouth opening was satisfactory in all patients with no statistically significant difference in the three groups; the same applies for lateral excursion.

On pain control, the best outcomes were documented in group A with no pain experienced by the patients after the removal of the fractures fragments; interesting data considering that 6 to 12% of general population complains of TMJ pain<sup>14</sup>.

The incidence of surgical complications is the sore spot of this study. In a significant number of surgically treated patients (group A and B) complications were documented, usually temporary but nevertheless disturbing for the patients who tends to blame the surgeon rather than the trauma if he/she has undergone an operation. There are also other potential complications that the authors did not encounter but are documented in the literature like bleeding, infection or the complications due to general anaesthesia and hospitalization.

A larger prospective, and ideally randomised, study with better standardized and documented functional treatment and a single operator will potentially give more information on the treatment of these fractures.

In conclusion, this study can't be considered as definitive on this topic. Further studies with larger samples will be crucial if we want to propose a valid algorithm for the treatment of condylar head fractures and guarantee the patients the best possible treatment.

It appears obvious that surgery exposes the patient to complications. Functional treatment, on the other hand, seems to allow satisfactory results.

With this data and our experience conservative treatment is suggested. However in selective patient in accordance to the fracture position, degree of displacement, patient's occlusion and the presence of pre-trauma TMJ dysfunction surgery must be considered.

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