

EVALUATION OF THE TREATMENT OF MANDIBULAR CONDYLE FRACTURES THROUGH 95 CASES

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ABSTRACT

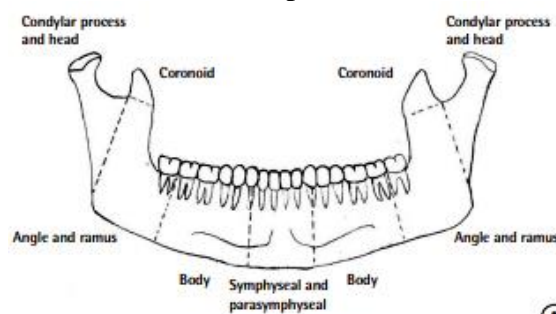
Objective: To evaluate the treatment results of mandibular condylar fractures for prescription of more appropriate treatment methods.

Methods: This is a retrospective and prospective cross-sectional study with follow-up on 95 patients treated for mandibular condylar fractures at 108 Central Military Hospital from January 2018 to October 2021. **Results:** A total of 95 condylar fractures were observed, including 75 unilateral fractures and 20 bilateral fractures. The most common fracture locations are: low condylar neck 53/115 (46.1%), condylar head 27/115 (23.5%), high condylar neck 22/115 (19.1%), subcondylar 13/115 (11.3%). Little deviation 13/115 (11.3), average deviation 79/115 (68.7%), high deviation 23/115 (20%). Conservative treatment for 18/115 condyle with good and satisfactory results accounted for 89.3%. Surgical removal of 33/115 condyles with good and satisfactory results accounted for 89.3%. Fracture osteosynthesis for 64/115 condyles with good and satisfactory results accounted for 96.2%. **Conclusion:** Conservative treatment should be indicated for cases with small or no displacement and condylar removal surgery for cases of condylar fractures or multi-fragment high condylar fractures with moderate and high displacement. The indication of osteosynthesis for low condylar neck and subcondylar fractures will have a high success rate.

Keywords: Mandibular condyle fracture; conservative treatment, osteosynthesis

I. INTRODUCTION

Mandibular condyle fractures are complex fractures in the maxillofacial region. Condylar fractures account for 30 to 53% of mandible fractures [1], [2], [3]. The mandibular condyle is an important structure in the temporomandibular joint and the only movable joint in the maxillofacial region. The condylar fracture is directly related to the occlusion, mouth opening or movement of the temporomandibular joint, thereby affecting chewing function and the growth of the mandible in immature people. The treatment of mandibular condyle fracture to restore function as well as facial aesthetics is therefore of crucial importance.



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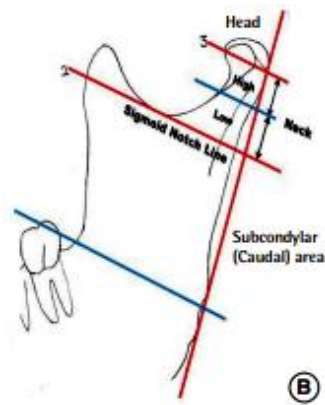


Fig 1: The anatomy of mandible. A: Anterior view of mandible. B: The subregions of the condylar process.

There are many fracture locations and different levels of condylar displacement. Each lesion characteristics will be treated with different appropriate methods. The choice of non-operative or operative technique depends on the patient's condition, the skill of the surgeon and the condition of the medical facility. In Vietnam, the conservative treatment of condylar fractures has been performed for a long time, but with the advent of osteogenesis devices and the higher requirements for treatment results, the method of orthopedic surgery with screws is increasingly popular [4], [5]. At 108 Military Central Hospital, both conservative treatment and surgical treatment have been applied to patients with condyle fractures and obtained very positive results. The authors carried out this study with the aim of evaluating the treatment results of condylar fractures, thereby giving experience in choosing treatment methods.

II. PATIENTS AND METHODS

2.1. Patients. The study included 95 cases of mandibular condylar fractures who were treated as inpatients at the Center for Craniofacial and Plastic Surgery - 108

Military Central Hospital from January 2018 to December 2021.

2.2. Research Methods. Cross-sectional, retrospective and prospective description.

Patients were examined clinically, paraclinical and treated. Research objectives were defined as followed:

- General condition, fracture status, accompanying injuries. Causes of fractures: Traffic accidents, other accidents (living, working, violence)

- Determination of the fracture locations including: condylar head, high condylar neck, low condylar neck, subcondylar.

- Determination of the level of displacement according to Bhagol[6]. Minimally displaced: the ramus height is decreased to less than 2mm and/or the angulation below 10^o. Moderately displaced: the ramus height is decreased by 2 - 15 mm and/or angulation from 10 to 35^o. Severely displaced: the ramus height is decreased to over 15 mm and/or angulation more than 35^o.

- Treatment methods: conservative treatment (external fixation), condylar removal surgery, osteotomy surgery (Internal fixation). The incision is applied

- The results after surgery at 6 months were evaluated according to the levels[7]:

Good: Meeting all criteria: Proper occlusion. Painless or occasional pain with pain intensity 1-2 points on the VAS scale. Maximum opening amplitude \geq 40mm. There were no complications/severe sequelae.

Pass: meeting one of the following criteria: A slightly malfunctional occlusion can be sharpened to be corrected Mild pain with pain intensity 3-5 points on the VAS scale. 40mm > Maximum opening range \geq

30mm. There are complications/sequels but no need for re-surgery.

Failed: meeting one of the following criteria: Severely malfunctional occlusion. Severe pain with pain intensity 6-10 points on the VAS scale. Maximum opening amplitude < 30mm. Having complications/sequels and needing re-surgery.

Data processing: by medical statistical software.

III. RESULTS AND DISCUSSION

Age, gender and cause of injury are shown in Table 1.

Patient age varied between 7 and 89 years (average age was 35.1 years old). In the research by Ho Nguyen Thanh Chon on 94 surgical patients, the age ranged from 19 to 62 years old [7]. The age range in our study was wider because our patients included the conservative treatment group. Adult patients accounted for the highest proportion, 67%. This figure is also consistent with domestic and international studies. This is the working

age group that frequently participates in traffic and therefore has a high rate of accidents [7], [8], [9]. Like other studies, the cause of traffic accidents accounted for the highest rate, at 85.9% with the male predominance rate being 77.9% [4], [5], [7], [9]

There were 75/95 patients of a unilateral condylar fracture (78.9%) and 20/95 (21.1%) of a bilateral condylar fracture. A total of 115 condylar fractures were observed. There were 21 cases (22.1%) of unilateral condylar fracture, 54 cases (56.8%) of condylar fracture associated with maxillofacial fracture, 20 cases (21.1%) of condylar fracture associated with other regional trauma. The rate of bilateral condylar fracture in the research of Ho Nguyen Thanh Chon was only 9.6% out of 94 patients and only 6/94 patients had unilateral condylar fracture, accounting for 6.3%. The reason for such difference is that Ho Nguyen Thanh Chon only conducted a study on the surgical treatment group.

Table 1

| Objectives | | | |
|-------------------|------------------------------|-----------------------------|--------------------------|
| Age | Youngest: 7y | Oldest: 89 y | Average: 35.1 y |
| Gender | Male: 74 (77.9%) | Female: 21 (22.1%) | Male/Female Ratio: 3.5/1 |
| Causes | Traffic accident: 85 (85.9%) | Other accidents: 15 (14.1%) | Total: 95 (100%) |

The treatment option for each age group, fracture location and level of displacement is shown in Table 2. The conservative treatment method is divided into 3 phases: correction - immobilization - exercise. Occlusal immobilization is made with Ivy loop fixation, arch - bar and Neo screw. After adjustment, immobilization was carried out for 4-6 weeks for early bone healing, then early exercise was performed to avoid ankylosis. In case of bilateral condylar

fracture, the occlusion will be immobilized longer.

Conservative treatment with external immobilization is mostly indicated for fractures with no or minimal displacement, condyle head fracture or high condyle where osteogenesis is difficult or in elderly patients whose health conditions do not fit for surgery. The number of cases of condylar conservative treatment was 18, accounting for 15.6% (Table 2). In patients with conservative treatment, only 2/14 cases had poor results,

accounting for 14.3% (Table 3). These were two elderly patients whose general condition was unfit for surgical procedure with poor pain tolerance, causing difficulty for osteogenesis and exercise. The rate of Good and Pass results accounted for 85.7%, equivalent to domestic studies [4], [10].

Surgical removal of condyle is indicated for cases of condylar head fracture and high condylar fracture but the condylar is split into pieces or oblique that causes difficulty for osteosynthesis. The rate of condylar removal was 33 condyles in 28 patients (table 2, table 3). In fact, surgical removal of the condyle is not a real treatment. However, in cases of condylar head fracture and high condylar fracture but the displacement greatly affects the movement of the temporomandibular joint and there is no possibility of osteogenesis or conservative treatment, we had to remove it. After the condyle was removed, the occlusion still needed to be immobilized from 1-2 weeks before early functional exercising. We performed the removal of 30 condyles through the anterior incision of the ear and the removal of the three condyles through the intraoral incision with the support of endoscopes.

Plate osteosynthesis is a method with high functional and aesthetic efficiency. The study included a total of 64/115 condylar surgeries (53/95 patients, accounting for 55.8%) associated with osteosynthesis plates (Table 2, Table 3). Plate osteosynthesis is indicated mainly for low and subcondylar condylar fractures with moderate and severe displacement. Surgery allowed restoration of anatomical shape, proper occlusion and early function. There were 59 condyles operated with external incision, 5 condyles with intraoral incision for osteosynthesis with the support of endoscope. Endoscopic surgery in maxillofacial trauma has just been deployed at our facility, so the number of cases adapting the treatment is still limited. However, through 5 cases of osteosynthesis and 3 cases of condylar removal with endoscopic assistance, we found that the surgical procedure has many advantages including leaving no scars and eliminating the risk of facial nerve damage. Comparison between condyle surgery with and without laparoscopic assistance performed by Ho Nguyen Thanh Chon showed no difference in functional outcome. Temporary facial nerve paralysis in the group without endoscopy was 48% while that in the group with endoscopy was 0%.



Fig. 2. Endoscopic-assisted condylar fracture osteosynthesis

After 6 months, the rate of cases undergoing condylar fracture osteosynthesis having good results was 35/53 (66%), pass results 16/53 (30.2%) and poor results 2/53 (3.8%). One case had the condition of malocclusion during the postoperative

period. This was a patient with a combined injury that was a complex mental fracture. One patient had a splint fractured after being examined six months after the surgery. The rate of good and successful in research was as high as that of domestic studies [5], [8]

Table 2. Relationship between data and treatment

| Objectives | | External fixation | Condylar removal | Internal fixation | Total |
|-------------------|--------------------|-------------------|------------------|-------------------|------------|
| Treatments | | 18 (15.6%) | 33 (28.7%) | 64 (55.7%) | 115 (100%) |
| Age | 6 -18 | 4 (36.4%) | 2 (18.2) | 5 (45.4%) | 11 (100%) |
| | 19 - 39 | 8 (11.9%) | 14 (20.9%) | 45 (67.2%) | 67 (100%) |
| | 40 - 59 | 3 (14.3%) | 13 (61.9%) | 5 (23.8%) | 21 (100%) |
| | ≥ 60 | 3 (18.75%) | 3 (18.75%) | 10 (62.5%) | 16 (100%) |
| Fracture location | Head | 2 (7.4%) | 25 (92.6%) | 0 (0%) | 27 (100%) |
| | High condylar neck | 9 (40.9%) | 8 (36.4%) | 5 (22.7%) | 22 (100%) |
| | Low condylar neck | 3 (5.7%) | 0 (0%) | 50 (94.3%) | 53 (100%) |
| | Subcondylar | 4 (30.8%) | 0 (0%) | 9 (69.2%) | 13 (100%) |
| Displacement | Minimal | 13 (100%) | 0 (0%) | 0 (0%) | 13 (100%) |
| | Moderate | 4 (5.1%) | 23 (29.1%) | 52 (65.8%) | 79 (100%) |
| | Severe | 1 (4.3%) | 10 (43.5%) | 12 (52.2%) | 23 (100%) |

Table 3. Evaluation of results after 6 months

| Evaluation of results (n=95) | | External fixation (n=14) | Condylar removal (n=28) | Internal fixation (n=53) | Total |
|------------------------------|----------------------------|--------------------------|-------------------------|--------------------------|-----------|
| Occlusion | Adequate | 10 (15.6%) | 15 (23.5%) | 40 (60.9%) | 64 (100%) |
| | Must be sharpened | 3 (12.5%) | 9 (37.5%) | 12 (50%) | 24 (100%) |
| | Inadequate | 1 (14.3%) | 4 (57.1%) | 1 (28.6%) | 7 (100%) |
| Visual Analogue Scale (VAS) | 0-2 | 13 (15.5%) | 22 (26.2%) | 49 (58.3%) | 84 (100%) |
| | 3-5 | 1 (9.1%) | 6 (54.5%) | 4 (36.4%) | 11 (100%) |
| | 6-10 | 0 | 0 | 0 | 0 (100%) |
| Mouth opening ≥ 40mm | | 10 (11.4%) | 28 (31.8%) | 50 (56.8%) | 88 (100%) |
| 40mm > Mouth opening ≥ 30mm | | 3 (50%) | 0 | 3 (50%) | 6 (100%) |
| Mouth opening < 30mm | | 1 (100%) | 0 | 0 | 1 (100%) |
| Results | Good | 5 (10.2%) | 9 (18.4%) | 35 (71.4%) | 49 (100%) |
| | Pass | 7 (17.9%) | 16 (41.05%) | 16 (41.05%) | 39 (100%) |
| | Fail | 2 (28.6%) | 3 (42.8%) | 2 (28.6) | 7 (100%) |
| Complication | Infection | 0 | 1 | 1 | 2 |
| | Temporary facial paralysis | 0 | 1 | 3 | 4 |
| | Broken splint | 0 | 0 | 1 | 1 |

IV. CONCLUSION

In 95 patients with mandibular condylar fractures treated at 108 Central Military Hospital, we found that: conservative treatment indicated for cases with minimal or no displacement with good and satisfactory results accounted for 85.7%. Surgical condyle removal indicated for cases of condylar head fracture or high condylar fracture with moderate and severe displacement and obtaining good and satisfactory results accounted for 89.3%. Surgical treatment indicated for low and subcondylar neck fractures with good and satisfactory results accounted for 96.2%. Proper option of treatment method will bring about good results for the treatments of the patients.

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