

EVALUATION OF CONSERVATIVE TREATMENT OUTCOMES FOR TRAUMATIC CONDYLAR FRACTURES OF THE MANDIBLE USING FIXATION ANCHOR SCREWS AT MILITARY HOSPITAL 175

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ABSTRACT

Objective: To evaluate the outcomes of conservative treatment for traumatic fractures of the mandibular condyle using fixation anchor screws at Military Hospital 175.

Subjects and Methods: This study included 44 patients diagnosed with mandibular condyle fractures and indicated for conservative condyle treatment at the Maxillofacial Department of Military Hospital 175 from January 2022 to December 2023.

Results: Mandibular condyle fractures primarily occurred in males (68.2%), with the most common age group being 19 to 39 years old (72.7%), and an average age was 31.9 ± 12.9 . The rate of combined fractures was 65.5%. The typical clinical symptoms of condylar fractures included preauricular pain in 100% of cases, restricted mouth opening in 79.5%, malocclusion in 84.1%, and ear bleeding in 61.4% of cases. On CT scans, the rate of condylar head fractures was 70.4%, and condylar neck fractures were 29.6%. The number of fixation anchor screws used was mainly 6 screws (54.5%). After one month of conservative treatment, 70.5% of patients had good occlusion results, and 86.4% could open their mouths 3-4 cm. After six months, all patients could open their mouths more than 3 cm, with 95.4% having good occlusion.

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Receipt date: February 19, 2024

Review date: April 19, 2024

Accepted date: June 30, 2024

Conclusion: Conservative treatment of traumatic mandibular condyle fractures using fixation anchor screws had good results for patients with many advantages.

Keywords: Mandibular condyle fracture, conservative treatment, intermaxillary anchor screws.

1. INTRODUCTION

Condylar fractures of the mandible are common fractures in maxillofacial trauma. According to statistics, condylar fractures of the mandible account for about 14% of the total maxillofacial fractures at Hanoi Central Hospital of Odonto-Stomatology [1]. Untreated condylar fractures of the mandible can lead to severe complications in function and aesthetics. Currently, there are two treatment methods for condylar fractures of the mandible: conservative treatment and open surgical treatment. Conservative treatment is closed correction and intermaxillary fixation using methods such as the Tiguersted arch, steel wire ligatures, or chin straps. Currently, with the advent and development of screw fixation systems, fixation anchor screws are widely used to replace traditional fixation methods, offering many advantages such as reduced surgical time, ease of implementation, less pain, and easier oral hygiene maintenance. At the Maxillofacial Department of Military Hospital 175, fixation anchor screws with a diameter of 2.0 mm have been widely used in maxillofacial surgery for many years, especially in the conservative treatment of condylar fractures of the mandible. However, there are not many

reports on the outcomes of using fixation anchor screws to treat condylar fractures of the mandible; therefore, we conducted this study with the aim of “Evaluating the results of conservative treatment of traumatic mandibular condylar fractures using fixation anchor screws at Military Hospital 175”.

2. SUBJECTS AND METHODS

2.1. Subjects

44 patients were diagnosed with condylar fractures of the mandible and indicated for conservative treatment at the Maxillofacial Department of Military Hospital 175 from January 2021 to December 2023.

2.1.1. Inclusion criteria

- Patients with unilateral condylar fractures of the mandible due to trauma.
- Little or no displacement (According to the classification of Loukota-2004).

2.1.2. Exclusion criteria

- Patients with condylar fractures due to pathology.
- Patients presenting late for treatment (>2 weeks).

2.2. Methods

A prospective study, cross-sectional description.

2.2.1. Technical procedure

Using a 2.0 mm diameter, fixation anchor screws with a length of 9 mm.

* Patients with simple condylar fractures

Anesthesia was performed under local anesthesia. Patients were properly adjusted to achieve correct occlusal alignment, followed by fixation of four anchor screws at the position between the attached gums and free gums between two teeth 4-5 in each jaw segment. Patients were then intermaxillary elastics immediately after screw fixation. Jaw fixation time is two weeks.

* Patient has combined fractures

General anesthesia was performed. Patients were adjusted, and osteosutured at the combined fracture sites first, followed by fixation with 4-6 anchor screws. Normally, if there was only one fracture line in the lower jaw, four anchor screws

were used, and if there were more than two fracture lines, 6 anchor screws were used. However, in cases of fractures combined with a lot of displacement, where four screws could not achieve proper occlusal alignment, six screws were used. Screw placement was between the attached gums and free gums between two teeth one, and between teeth 5-6 on both sides. If the fracture line passes through the position of these teeth, the screws were placed slightly off-center to one tooth. Patients underwent intermaxillary fixation after 24-48 hours after surgery. Jaw fixation time was 3 weeks.

2.2.2. Data collection process

Data was collected using the E-hospital medical examination software recorded at the time of patient admission, at follow-up examination after one month, and after 6 months regarding epidemiology, clinical symptoms, x-ray results, surgical records, and follow-up results.

2.2.3. Data processing methods

Data was analyzed using SPSS 22.0 software.

3. RESULTS

3.1. General characteristics of the study subjects

Characteristic		Number of patients (n=44)	Percentage (%)
Gender	Male	30	68.2
	Female	14	31.8
Age	Under 18	4	9.1
	19 to 39	32	72.7
	40 to 59	5	11.4
	Over 60	3	6.8
	Average age	31.9 ± 12.9	
Cause	Traffic accidents	42	95.6
	Work accidents	1	2.2
	Activities accidents	1	2.2
Combined fractures of the lower jaw	Condylar fractures	15	34.1
	Combined fractures of the lower jaw	29	65.5

Comments: Males accounted for the majority at 68.2%, with the age group from 19 to 29 comprising the majority at 72.7%, and the average age was 31.9 years. Traffic accidents were the main cause at 95.6%. The majority had combined fractures of the lower jaw (65.5%).

3.2. Clinical symptoms

Symptom	Number of patients (n=44)	Percentage (%)
Pain in front of the ear	44	100
Mouth opening restriction	35	79.5
Ear bleeding	27	61.4
Malocclusion	37	84.1

Comments: All patients (100%) exhibited symptoms of pain in front of the

ear, with 79.5% experiencing mouth opening restriction and 84.1% presenting with malocclusion. Ear bleeding had the lowest incidence rate at 61.4%.

3.3. Image of the Mandibular condylar fractures on 3D reconstructed CT scans

Fracture location	Displacement degree	Number of patients (n=44)	Percentage (%)
Fracture of the head of condyle	Nondisplaced	4	9.1
	Slightly displaced	27	61.3
	Total	31	70.4
Fracture of the neck of condyle	Nondisplaced	2	4.6
	Slightly displaced	11	25
	Total	13	29.6
Total		44	100

Comments: Patients with fracture of the head of condyle accounted for the majority at 70.4%, while fracture of the neck of condyle accounted for 29.6%. Among these, minimal displacement was predominant with at 61.3% for condylar fractures and minimal displacement with at 25% for condylar cervical fractures.

3.4. Number of anchor screws used and intermaxillary fixation time

Criteria		Number (n=44)	Percentage (%)
Number of anchor screws	4 screws	20	45.5
	6 screws	24	54.5
Total		44	100

Comments: The number of patients using six screws was higher at 54.5%.

3.5. Treatment outcomes

Evaluation criteria		After anchor screw removal	6 months
Occlusal status	Good	31 (70.5%)	42 (95.4%)
	Gaps between 1-3 teeth	11 (25%)	2 (4.6%)
	Gaps over 3 teeth	2 (4.5%)	0

Total		44 (100%)	44 (100%)
Mouth opening	Over 4 cm	4 (9.1%)	38 (86.4%)
	from 3 to 4 cm	38 (86.4%)	6 (13.6%)
	Under 3 cm	2 (4.5%)	0
Total		44 (100%)	44 (100%)
Degree of jaw deviation during mouth opening	Nondisplaced	6 (13.6%)	30 (68.2%)
	Slightly displaced	30 (68.2%)	14 (31.8%)
Total		44 (100%)	44 (100%)

Comments: Immediately after anchor screw removal, 95.5% of patients had good occlusal status or slight gaps between one to three teeth. The majority of patients had a mouth opening from 3-4 cm (86.4%). Most patients (68.2%) had minimal deviation during mouth opening. After 6 months: the rate of good occlusal status was 95.4%. Only two patients had slight gaps between 1-3 teeth, all patients (100%) had a mouth opening of 3 cm or more, and 68.2% of patients had no jaw deviation during mouth opening.

4. DISCUSSION

4.1. General characteristics of the study subjects

In our study, the male proportion accounted for the majority at 68.2%. This ratio according to research by Le Thi Thu Hai [2] was male/female: 4.3/1. Regarding age, the most common age group in our study was 19 to 39 years old, accounting for 72.7% of cases, the average age was 31.9 ± 12.9 years. According to Smet's study [3], the average age of condylar fracture patients was 32.3 years.

Concerning the cause of accidents, in our study, traffic accidents were the predominant cause at 95.6%. This aligns with the findings of Dao Van Giang's

study [4], which reported a rate of 96%. The majority of patients had combined fractures, accounting for 65.5%.

4.2. Clinical characteristics and 3D reconstructed CT scans

The typical clinical symptoms of condylar fractures included pain in front of the ear (100%), mouth opening restriction (79.5%), malocclusion (84.1%), and the lowest being ear bleeding at 61.4%. These were indicative signs of condylar fractures, although examination via X-ray or 3D reconstructed CT scans was necessary.

When entering the hospital, all our patients underwent facial CT scans with 3D reconstruction. Condylar fractures were predominant, accounting for 70.4% of cases,

while condylar neck fractures accounted for 29.6%. Among these, minimal displacement condylar fractures were predominant at 61.3%. Minimal displacement, according to Loukota's classification [5], refers to displacements where the angle of deviation of the condylar head was less than ten degrees the overlap was less than 2mm, or a combination of both.

4.3. Characteristics of intermaxillary fixation

Regarding the number of 2.0 mm diameter, 9 mm long intermaxillary anchor screws used, we used from 4 to 6 screws, of which mainly 6 screws accounted for 54.5%. This rate was different from the findings of Le Thi Thu Hai's study [2], where 4 screws were predominantly used at 90.6%. This difference could be attributed to the higher proportion of patients with combined fractures and the degree of displacement of the combined fracture lines, leading to a higher utilization of 6 screws.

Regarding the duration of intermaxillary fixation, in our study, all patients were immobilized for 2 to 3 weeks. Patients with simple condylar fractures were immobilized for 2 weeks, while those with combined fractures were immobilized for 3 weeks. Regarding intermaxillary fixation time in current conservative treatment, there were many differences. According to Smet et al. [3], the immobilization period for mandibular fractures ranges from 1 to over 6 weeks,

with most cases being immobilized for 5 to 49 days, and occasional cases for over 6 weeks.

The difference in the duration of intermaxillary fixation depended on the condition of each patient. Patients with minimal or no displacement, correct or approximate occlusion, and proper occlusion were immobilized for a shorter duration, typically 2 weeks. Patients with multiple fracture lines, with large displacement, require longer immobilization (3 weeks). All our patients were re-examined weekly to assess occlusal status. If the occlusion was not satisfactory, additional fixation with elastic force or extension of the immobilization period was applied.

According to the study of Moshood F. et al. [7], comparing bone healing in patients with minimally displaced mandibular condylar fractures treated with two weeks versus 4-6 weeks of intermaxillary fixation showed that, there was no difference in the rate of malocclusion. The mean time to complete bone healing in the 2-week intermaxillary immobilization group was 7.2 weeks, and in the 4-6 weeks intermaxillary immobilization group was 5.4 weeks. Thus, two-three weeks were not enough time for bone healing, but at this stage, the occlusion was already in a stable stage. Patients could remove the fixed jaw and chew gently.

Prolonged immobilization of the jaw increases the risk of mandibular joint stiffness complications. Therefore, there were still many different views on choosing the time to remove fixed jaws. According to our experience, screw removal should not be predetermined at a specific time; rather, patients should be assessed at different time points, and screw removal should be performed when the occlusion was stable (with a gap of no more than 3 teeth).

4.4. Treatment outcomes

4.4.1. Near-term evaluation

Following the period of intermaxillary fixation, we removed the intermaxillary anchor screws and instructed patients to practice mouth-opening exercises and consume soft foods. Results were evaluated immediately after removing the anchor screw, we found that 70.5% of patients had good occlusion results, 25% of patients had a slight opening occlusion of 1 to 3 teeth, and only 4.5% of patients had an opening occlusion of more than 3 teeth. However, the patient's chewing function was still guaranteed, with no patients exhibiting an opening involving the third or sixth tooth. The occurrence of occlusal openings may be attributed to combined fractures, where the occlusion tends to deviate by one to two teeth. For patients without combined mandibular fractures, we observed that the correct occlusion rate was 100%.

Regarding the patient's mouth opening status, immediately after removing the anchor screw, 86.4% of patients had a mouth opening of 3-4 cm, with only 4.5% of patients experiencing restrictions below 3 cm. Patients with restricted mouth opening below 3 cm were mainly in the group with combined, complex fractures involving multiple sites. Regarding the degree of mouth deviation, one-month post-surgery, we found that 68.2% of patients exhibited slight jaw deviation during mouth opening. This rate was higher compared to Le Thi Thu Hai's findings [2], which reported a rate of 53.12%. This disparity could be due to differences in patient selection criteria.

4.4.2. Evaluate results after 6 months

We re-evaluated the occlusal status after 6 months and found improvement, the rate of good occlusion was 92.6%, and no patients exhibited an occlusal deviation involving more than three teeth. This outcome was consistent with Le Thi Thu Hai's study [2], which reported a rate of 93.7%. According to Smet's study [3], an acceptable occlusal rate was 92%, indicating that our results were comparable to other authors. According to Trinh Hong Ha's study [6], after three months, 94.54% of patients achieved occlusion with 100% of their teeth, while 5.46% had less than 50% of their teeth in occlusion, and no patients had more than 50% of

their teeth not in occlusion. Patients with occlusal deviations were advised on open surgical correction, monitoring of tooth compensation, or occlusal adjustment by grinding one to two teeth.

All patients achieved mouth opening more than 3 cm, no patient had restricted mouth opening. According to the assessment of Le Thi Thu Hai [2] 12.5% of patients had restricted mouth opening, and according to Smet's research [3], 5% of patients had restricted mouth opening. Our patients immediately after removing the anchor screw were instructed to eat and drink and practice opening their mouth gently, to prevent stiffness of the temporomandibular joint.

Regarding the degree of jaw deviation during mouth opening, the evaluation at 6 months showed a rate of

31.8%. According to Le Thi Thu Hai [2], this rate was 12.5%. Although our rate of jaw deviation was higher, it was generally acceptable, primarily involving deviations of less than 2 mm in the midline. This could be explained by our selection criteria, which included patients with overlapping displacements of no more than 2 mm and angulations of no more than 10 degrees.

5. CONCLUSION

Conservative treatment of mandibular condylar fractures using intermaxillary fixation with anchor screws, if appropriately indicated, yields favorable treatment outcomes for patients with many advantages such as quick screw insertion time, simplicity, ease of implementation, fewer complications, easy oral hygiene maintenance, etc.

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