Analysis of Temporomandibular Joint Dislocations in a Province of Türkiye

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Abstract

Aim: It is extremely important to analyse the etiology of Temporomandibular Joint (TMJ) dislocation, take the correct history, and diagnose the signs and symptoms correctly so that the treatment can be performed as soon as possible without delay. In this study, we aimed analysis of the patient's management and applicability to the emergency department due to temporomandibular joint displacement with the literature.

Methods: In our single-center retrospective study, all patients who applied to the emergency department of our hospital between January 2016 and April 2022 due to mandibular dislocation were initially included in the study.

Results: A total of 67 [n=67] patients who applied to our emergency clinic due to jaw dislocation were recorded. 31 [46.3%] of all patients were evaluated as first-time dislocations and 36 [53.7%] with recurrent dislocations. When we evaluated the jaw dislocations according to the gender of the patients, we observed that the female gender was more affected in both first-time and recurrent dislocation patients. Bilateral dislocations were the most common in patients with first-time jaw dislocation 29 [93.5%]] as well as in patients with recurrent dislocations 34 [94.4%]]. When we evaluated the groups, it was found that traumatic causes 19 [61.3%]] were more common in first-time jaw dislocations, and non-traumatic causes were more common in recurrent dislocations 27 [75%]].

Conclusion: Although emergency physicians rarely encounter TMJ dislocation, they need to know the treatment options and the importance of early reduction to ensure patient comfort and joint function.

***Keywords**: TMJ dislocations, manual reduction, emergency department*

1. Introduction

Temporomandibular joint (TMJ) dislocation; can be defined as bilateral or unilateral displacement of the mandibular condyle from the articular surface of the temporal bone (glenoid fossa).[1]

TMJ dislocation can occur as a result of trauma or without trauma. Yawning may occur because of the patient having a seizure or by the forceful excessive opening of the jaw. However, it can also occur iatrogenically as a result of pressure applied during dental treatments or during medical interventions such as endotracheal intubation, bronchoscopy, and laryngoscopy.[2,3-7]

Determining the risk factors for TMJ dislocation during the evaluation of the patients is important in determining the risk of recurrence that may occur after treatment. Among the risk factors; are previous dislocations, structural or anatomical disorders, connective tissue disorders affecting stability, neurodegenerative or neuro dysfunctional disorders, increasing age, and changes in the patient's tooth structure.[3,4,8,9]

TMJ dislocation has an incidence of approximately 3% of all dislocations in the body. Its annual incidence has been reported as 5.3 in 1,000,000 patients admitted to the emergency department [ED].[10,11] When the literature is examined, the predominance of the female gender is observed and it is thought that this situation may be related to hormonal imbalance.[12]

Anterior dislocations usually develop due to atraumatic causes. It is the most common type of mandibular dislocation. Posterior, lateral, and superior dislocations, which are less common, are usually associated with high-energy trauma. Bilateral TMJ dislocation was observed more frequently than unilateral dislocation.[13] TMJ dislocations; can be defined as acute or recurrent chronic. Chronic dislocations are defined as non-self-limiting and progressive dislocations.[14] Chronic dislocations are dislocations that generally last longer than 3 days. However, there is no definite consensus on this issue. Treatment of chronic recurrent dislocations usually requires open surgery. Acute dislocations: It is usually treated with closed reduction. Before the reduction procedure, sedation and muscle relaxant medication may be required.[15-17]

In the evaluation of the patient with TMJ dislocation at the emergency service application; Stabilizing the airway, respiration, and circulation without wasting time and intervention in life-threatening situations should be a priority.[18] If there is a fracture or chronic dislocation as a result of physical examination and imaging, consul-

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tation with the relevant clinics may be appropriate. Patients with serious injuries may require surgical reduction.[19,20]

On physical examination, there may be tenderness in the pre auricular region and deviation of the chin in the TMJ region. During a physical examination, the mandible should be examined for symmetry to determine whether the dislocation is unilateral or bilateral. It should be noted that bilateral dislocations will cause an open, fixed chin appearance in the midline. Physical examination of superior dislocations usually reveals a protrusion in the pre auricular and temporal regions of the face. It should be kept in mind that the trigeminal nerve [5th cranial nerve], facial nerve [7th cranial nerve], and vestibulocochlear nerve [8th cranial nerve] may be damaged in patients with superior dislocation.[2,21]

A patient with TMJ dislocation in the emergency department may require sedation to reduce pain and anxiety before reduction. Short-acting benzodiazepines [Midazolam] and opioid analgesics such as fentanyl can be used. The use of propofol for procedural sedation is beneficial for TME reduction due to its short half-life and antiemetic effect.[22] Local anesthetic application to create nerve block can also be considered as other options that can be used before reduction. Infiltration of the TMJ capsule with masseter peripheral nerve block and deep temporal nerve can be accomplished by reducing muscle spasm and pain and allowing minimal painful reduction.[23]

History and physical examination are usually sufficient for the diagnosis of TMJ dislocations. Therefore, radiological evaluation may not be necessary. Computed tomography [CT] scanning is the imaging modality of choice in the presence of an uncertain diagnosis or suspected fracture.[24] Imaging is absolutely necessary after reduction, as an iatrogenic fracture may occur following severe manipulation of the mandible during its reduction. For women of childbearing age, a pregnancy test should be performed prior to imaging.[2]

Patients can usually be discharged after successful reduction. After reduction, patients should be fitted with a head-chin bandage or a rigid neck brace to prevent re-dislocation. Patients who have undergone successful reduction should be advised not to open their mouths wide [greater than 2 cm] for 1-3 weeks. In patients who have undergone reduction, care should be taken to support the jaw while yawning.[2,25]

2. Materials and Methods

In our single-center retrospective study, all patients who applied to the emergency department of our hospital between January 2016 and April 2022 due to mandibular dislocation were initially included in the study. The analysis was performed using the S03.0 [Jaw dislocation] code, which is included in the ICD [International statistical classification of diseases and related health problems] coding system from the hospital computerized database. A total of 287,187 patients were admitted to the Emergency Department of our hospital between the dates of the study. Between the specified dates, a total of 139 patient applications due to mandibular dislocation were detected and evaluated. Patients who required open surgery were excluded from the study.

As a result of the evaluation, those who applied with the same name and ID number in different time periods were evaluated as recurrent dislocations, and a total of 67 patients were included in the study.

Descriptive statistical evaluation was performed. The age, gender, presence and number of previous jaw dislocations, the side of the jaw dislocation [right, left and bilateral], the method used in the reduction, the mechanism of the jaw dislocation [traumatic and non-traumatic], and whether drugs were used before reduction were recorded. Continuous variables were analyzed using mean±standard deviation, minimum and maximum values, while categorical data were analyzed using percentages and frequencies values. The association among categorical data was evaluated using the Chi-Square, Fisher's Exact test statistic.

The research protocol was reviewed and approved by Clinical Research Ethics Committee. The study was performed according to the Declaration of Helsinki.

3. Results

A total of (n=67) patients who applied to our emergency clinic due to jaw dislocation between January 2016 and April 2022 were recorded. 31 (46.3%) of all patients were evaluated as first-time dislocations and 36 (53.7%) recurrent dislocations.

The patients were divided into two groups, first dislocation (Group 1) and recurrent dislocation (Group 2). When we evaluated the jaw dislocations according to the gender of the patients, we observed that the female gender was more affected in both first-time and recurrent dislocation patients. When we evaluated the direction of the jaw dislocation, it could not be evaluated because the patients could not show the direction of the dislocation (superior, anterior, posterior or lateral). Since mandibular dislocations were recorded and questioned as right, left and bilateral in our records; Bilateral dislocations were the most common in patients with first-time jaw dislocation 29(93.5%)) as well as in patients with recurrent dislocations 34 (94.4%).

This study was conducted to determine the etiological causes of patients with jaw dislocation as evidenced by radiological evaluation. The cases that occurred as a result of the patients falling while walking, hitting their chin on a vehicle, being beaten by someone else, falling from a bicycle, and those that occurred due to trauma from an epileptic seizure were recorded as traumatic jaw dislocation. Patients with jaw dislocation that occurred spontaneously, i.e. without any identified traumatic event, were categorised as non-traumatic cases.

When we evaluated the groups, it was found that traumatic causes 19(61.3%) were more common in first-time jaw dislocations, and non-traumatic causes were more common in recurrent dislocations 27(75%). When we evaluate the causes of mandibular dislocation according to gender; It was seen that the most common cause in women was yawning 33(67.3%) and the most common cause in men was trauma. Data on first time or recurrent jaw dislocations are shown in **Table 1**, and data on the mechanism of chin dislocation according to the gender of the patients are shown in **Table 2**.

Our hospital provides service to all age groups who apply in the emergency department trauma department. The mean age of our patients in group 1 was 33.84±19.44 years old, mean age in group 2 was 33.94±18.05 years old, the youngest patient was 5 years old, and the oldest patient was 88 years old. The median age of the patients was 27.

Jaw reduction was performed using the Hippocratic method in all patients admitted to the study with mandibular dislocation. Midazolam was administered for sedation in 6 (9%) patients during chin reduction. Medication was not administered to the remaining 61 (91%) patients. After the reduction, the patients were discharged with a Barton bandage.

Table 1

Evaluation of demographic data of patients between groups

		First time dislocation [Group 1) n=31	Recurrent dislocation [Group2) n=36	Total n=69	p
Gender	Female	24(%77.4)	25(%69.4)	49(%73.1)	0.583^{x2}
	Male	7(%22.6)	11(%30.6)	18(%26.9)	
Direction of Jaw Dislocation	Right	2(%6.5)	1(%2.8)	3(%4.5)	0.505^{x2}
	Left	0	1(%2.8)	1(%1.5)	
	Bilateral	29(%93.5)	34(%94.4)	63(%94)	
Presence of trauma	Yes	19(%61.3)	9(%25)	28(%41.8)	0.003^{x2}
	No	12(%37.8)	27(%75)	39(%58.2)	
Cause of Jaw Dislocation	Simple Fall	2(%6.5)	2(%5.6)	4(%6)	0.003^{x2}
	Yawning	12(%37.8)	27(%75)	39(58.2)	
	Trauma	17(%54.8)	5(%13.9)	22(%32.8)	
	Epilepsy	0	2(%5.6)	2(%3)	
Presence of Pre-Reduction Drug Use	Yes	28(%90.3)	33(%91.7)	61(%91)	0.05 ^{x2}
	No	3(%9.7)	3(%8.3)	6(%9)	
Age		33.84±19.44	33.94±18.05	33.90±18.56 Min=5 Max=88	

^{x2} *Pearson Chi-square*

Table 2

Evaluation of the jaw dislocation mechanism according to the gender of the patients

	Female n=49(%73.1)	Male n=18(%26.9)	Total n=67	P
Simple Fall	4(%8.2)	0	4(%6)	0,04 ^{x2}
Yawning	33(%67.3)	6(%33.3)	39(%58.2)	
Trauma	12(%24.5)	10(%55.6)	22(%32.8)	
Epilepsy	0	2(%11.1)	2(%3)	

x2 Pearson Chi-square

4. Discussion

Temporomandibular joint (TMJ) dislocation is a rare condition of the facial skeleton. The incidence rate of TMJ dislocation among whole body dislocations is approximately 3%. The annual incidence rate associated with emergency service admissions was found to be between 25-53/100.000 in studies.[1,2] Our study revealed that TMJ dislocations constitute 48/100,000 of all emergency department trauma admissions. This rate was consistent with the literature.

It is extremely important to analyze the etiology of TMJ dislocation, to take the correct history, and to diagnose the signs and symptoms correctly so that the treatment can be performed as soon as possible without delay.[23] When we evaluated the etiology of TMJ dislocations of our patients, we observed that the most common non-traumatic causes were 39 (58.2%) both in first-time and recurrent dislocations. While trauma was less common in the development of recurrent dislocation with first-time dislocation, non-traumatic causes were more common and were statistically significant (P=0.003)

When we examine the formation mechanism of jaw dislocation according to the gender of the patients; we observed that both first-time and recurrent dislocations were more common in women 49 (73.1%)). Although there are different results in the literature regarding the distribution of TMJ dislocations by gender, it is understood that it is generally more common in women.[14,26]

However, when we look at the distribution of causes of TMJ dislocation by gender, we found that non-traumatic causes (such as yawning) were more common in females 33(67.3%)), while traumatic causes were more common in males 10 (55.6%)). The difference was statistically significant (p=0.04). When we analyzed the etiological cause of TMJ dislocations between the groups, it was found that the most common cause in group 1 with jaw dislocation was due to trauma with 17 (54.8%) in the group with recurrent dislocation. On the other hand, we observed that the most common cause was 27 (75%) non-traumatic stretching, which was statistically significant (p=0.003)

Babatunde O Akinbami stated in a systematic review of 128 articles that the most common etiological cause was trauma with 60%.[27] In a study by Giorgos Papoutsis et al. in Switzerland, they stated that although the etiopathogenesis of spontaneous dislocation is generally unknown, it often occurs in association with yawning and less frequently after mild facial trauma.[14] Prechel et al. an-

other review noted that the most common triggers of TMJ dislocation were daily activities associated with wide opening of the mouth, such as yawning, laughing, or biting.[13]

When we evaluate the direction of the dislocation in the TMJ dislocation; bilateral dislocations were more common in 29 (93.5%) patients in the first-time dislocation group and 34 (94.4%) in the recurrent dislocation group, which is consistent with the literature.[14,26,28]

When we scan the literature; the most commonly used technique for reduction in patients with TMJ dislocation is the Hippocratic reduction method.[13,27,29,30] In our study, all our patients were reduced by an emergency medicine specialist in the emergency room. All patients were reduced by the Hippocratic method. During the reduction, midazolam was given to 6 patients in total, 3 in each group, for sedation. When we look at the literature, we observed that the frequency of sedation and analgesia use is not high.[14,28] After the reduction, all patients were discharged with the Barton Bandage applied. Since the patients did not come to the emergency room for control after they were sent, long-term follow-up could not be done. It has been observed in the literature that there is no standard treatment method for TMJ dislocation, but early reduction is the most effective way.[28]

4.1. Limitations

The single-center retrospective nature of our study can be considered as a limitation. The fact that the pain levels of the patients were not questioned, the anatomical aspect of the joint dislocation could not be shown by the patients (anterior, posterior, superior or lateral), and the comparison of manual reduction methods can be considered as limitations. Since it is recommended that patients go to the relevant specialty for follow-up after treatment in the emergency department, the lack of long-term follow-up can also be considered as a limitation.

5. Conclusion

Although emergency physicians rarely encounter TMJ dislocations, they need to be familiar with TMJ dislocations and treatment options to ensure patient comfort and joint function. It is also supported by the literature that early reduction is effective as soon as possible. For this reason, it is thought that medical history and physical examination are essential in TMJ dislocations, and that early manual reduction will be successful after physicians receive adequate training. It should not be forgotten that patients with recurrent TMJ dislocations who apply to the emergency department should be referred to the relevant clinics for treatment after reduction.

In addition, the low need for sedation-analgesia and imaging, high reduction success, when performed with the appropriate technique, support that reduction applications can also be performed in primary health care institutions.

Statement of ethics

This study was approved by the Ethics Committee of Gazi Yaşargil Training and Research Hospital, University of Health Sciences (date: 07.04.2022 number: 61). The study was performed according to the Declaration of Helsinki.

Source of Finance

The authors declare that they have received no financial support for this study

Conflict of interest statement

The authors declare that they have no conflict of interest.

Availability of data and materials

The data supporting the conclusion of this article will be available by the authors without undue reservation.

Author contributions

All authors contributed to the article.

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