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Temporomandibular Joint Ankylosis Pattern, Causes and Management at a Tertiary Hospital in Bangladesh: a 4 Year Retrospective Study

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Abstracts:
Background:
Temporomandibular joint (TMJ) ankylosis is defined as the stiffness of joint due to fusion between mandibular condyle and the glenoid fossa of the temporal bone. It has a social and psychological impact on the patient due to facial deformity. The functional disturbance is also occurred due to limited mouth opening. The purpose of this study is to determine the pattern, cause, and management of TMJ ankylosis in Dhaka Dental College Hospital, Bangladesh.
Materials and Methods:
A retrospective, cross-sectional, descriptive study was conducted for 31 patients (13 male, 18 female) aged 0 - 30 years old. Data collected from patient records from January 2016 to December 2019. Data were analyzed using SPSS (V - 22) software program.
Results:
*The 31 patient medical records were reviewed**.** Females were affected more than males (M: F = 1: 1.38), the most affected age group was 11 - 20 years (n = 15, 48.39%), bilateral ankylosis (n = 17, 54.84%) was more common than unilateral (n = 14, 45.16%), type III (n = 17, 35.42%) TMJ ankylosis (Sawhney classification) was the most common type. Trauma (n = 17, 54.84%) was the most common etiology of TMJ ankylosis. All patients were prescribed with surgical interventions. Gap arthroplasty (n = 14, 45.16%) was the most preferable treatment method followed by interpositional arthroplasty (n = 12, 38.71%) and condylectomy (n = 5, 16.13%).*
Conclusions: *The incidence of TMJ ankylosis among children (n = 18, 58.06%) was higher than the adult. The most common cause was trauma. Most of the patients came with type III ankylosis leads to facial deformities. Thus early management is required for TMJ ankylosis patient to aid in improving quality of life.*
Key word: *Temporomandibular joint (TMJ); Ankylosis; Arthroplasty.*

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I. Introduction

Temporomandibular joint (TMJ) is a diarthroidal, compound, synovial joint formed between the mandibular condyle and the glenoid fossa of the temporal bone, separated by articular disc [1]. TMJ ankylosis is a condition in which there is immobility of the joint due to adhesion between mandibular condyle and the glenoid fossa of the temporal bone [2]. The adhesion may be due to either with bony mass or fibrous tissue replacing the normal TMJ articulation [3]. It subsequently causes distressing conditions such as impaired speech, difficulty in chewing, poor oral hygiene, facial disfigurement, compromise of the airway, and psychological stress [4]. There are many etiological factors of TMJ ankylosis such as trauma, infection, inflammatory conditions, and neoplasm. Trauma is the commonest cause followed by infection [5]. Clinical presentation depends on the age of the patient, site, and duration of ankylosis. The clinical presentations of unilateral TMJ ankylosis reveal deviation and fullness of the chin to the affected side with flatness on the unaffected side. Bilateral ankylosis manifests with 'bird-face" deformity due to mandibular retrognathism [6]. The diagnosis of TMJ ankylosis is made through a combination of clinical and radiographic assessments. Clinically patients present with a limited mouth opening [7]. TMJ imaging includes; plain radiography, panoramic radiography, computed tomography, arthrography, cone beam computed tomography (CBCT),

magnetic resonance imaging (MRI), and ultrasonography [8- 9]. Sawhney classified TMJ ankylosis into four categories such as types I, II, III, and IV based on radiological findings [10].

Surgical management of TMJ has significance in the pediatric patient. The potential for growth impairment adds some problems. The treatment objective of TMJ ankylosis in children is to preserve the normal development of the mandible and the improvement of the face as well as to regain a palatable mouth opening [11]. Surgical interventions for TMJ ankylosis fall into three basic methods: condylectomy, gap arthroplasty, and interpositional arthroplasty with joint reconstruction. Condylectomy is indicated in the case of fibrous ankylosis where there is not much deformity of the condylar head. Gap arthroplasty involves resection of ankylosed material to create a space for joint mobilization. Interpositional arthroplasty refers to the insertion of an interpositional material within the joint space after resection of the ankylotic mass. Both autogenous and alloplastic materials have been reported to be utilized as interpositional materials [12-14]. Various autogenous and/or alloplastic materials can be used to reconstruct TMJ such as costochondral graft, temporalis muscle/fascia flap, skin, dermis, clavicular osteochondral graft, iliac crest graft, silicone, Teflon, alloplastic condylar implant [15-17]. There is no surgical treatment option to attain the best result. Gap arthroplasty has been customarily advocated for Sawhney type I and II, whereas interposition arthroplasty has been prescribed for type III and IV TMJ ankylosis. The foremost common postoperative complications are sub-normal mouth opening, facial nerve damage, and re-ankylosis [10].

There are very few studies to evaluate the importance of temporomandibular joint ankylosis in Bangladesh as well as other South Asian nations. This study analyzed patterns, cause, and management of TMJ ankylosis in patients attending the Department of Oral and Maxillofacial Surgery at Dhaka Dental College Hospital, Bangladesh. Determining the frequency of TMJ ankylosis and their patterns of incidence can improve early diagnosis and management, subsequently reducing consequences.

II. Material And Methods

This retrospective, cross-sectional, hospital-based study was conducted to determine the pattern of TMJ ankylosis among patients attending the Department of Oral and Maxillofacial Surgery of Dhaka Dental College Hospital, Bangladesh. Data were collected from the medical record book of the patient. No ethical committee approval was obtained as this was a retrospective study and data was taken from departmental medical records. Data collection contained the following variables as age, sex, side, type of ankylosis, mouth opening (Preoperative and Per-operative), and treatment modalities.

Study Design: Retrospective, cross-sectional, descriptive study.

Study Location: Department of Oral and Maxillofacial Surgery of Dhaka Dental College Hospital, Bangladesh.

Study Duration: From January 2016 to December 2019.

Sample size: 31 patients.

Inclusion criteria: Patients who were diagnosed with TMJ ankylosis (Clinically and radiologically) and experienced surgical treatment.

Exclusion criteria: Patients were excluded who had TMJ disorder other than ankylosis or deficient records.

Statistical analysis:

Data was analyzed using SPSS version 22 (SPSS Inc., Chicago, IL). Tables were used to show frequency distribution in the results. Chi-square test was performed in case of a categorical variable. The P-value is of < 0.05 refers to a statistically significant result.

III. Results

A total number of 31 patients included in this study, according to their gender, the result showed that 41.94% (n = 13) were males while 58.06% (n = 18) were female with a ratio of Male: Female = 1: 1.38. Pediatric patients were 58.06% (n = 18, under 18 years of age) among these patients. The age of the patients ranged from 3 to 30 years. The highest percentage group was from 11 -20 years (n = 15, 48.39%) shown in Table *1*.

Table 1: Shows the age distribution of patients.

Age (Years)	Number		Percentage	Mean ± SD	P value
	Male	Female			
0 – 10 years	3	8	35.48%	13.45± 6.87	0.411^{NS}
11- 20 years	7	8	48.39%		

21 – 30 years	3	2	16.13%		
>30	0	0	0		
Total = 31	13	18	100%		

SD & NS refer to standard deviation & non-significant respectively.

In this study, the most common etiology of TMJ ankylosis was trauma (n = 17, 54.84%) and the next one was infection (19.35%) shown in Table *2*.

Table 2: Shows the etiology of the study sample (n = 31)

Etiology	Number	Percentage
Trauma	17	54.84%
Infection	06	19.35 %
Bony pathology	01	3.23 %
Fever	02	6.45 %
Unknown etiology	05	16.13 %
Congenital	00	00
Total	31	100 %

Our study revealed that bilateral ankylosis was the predominant (n = 17, 54.84%). The left-sided unilateral ankylosis (n = 08, 25.81%) was more common than the right side (n = 06, 19.35%) shown in Table *3*.

Table 3: Shows the distribution of the affected side of TMJ ankylosis (n = 31)

Side of ankylosis	Number of patients	Frequency (%)
Bilateral	17	54.84%
Unilateral right	06	19.35%
Unilateral left	08	25.81%
Total	31	100%

According to Sawhney classification (1986) type- III (n = 17, 35.42%) TMJ ankylosis was present in the majority of patients, shown in Table *4*.

Table 4: Type of TMJ ankylosis

Type	Number	Percentage
Type - I	14	29.17%
Type - II	13	27.08%
Type - III	17	35.42%
Type - IV	4	8.33%
Total	48	100%

The pre-operative maximal inter-incisal opening was recorded ranging from 0 -5, 6-10, 11- 15, and >15 mm. The predominant reading was 0- 5 mm (n= 23 patients, 74.19%). The mean pre-operative maximum inter-incisal (MIO) opening was 3.68 mm ranging from 0 -15 mm as seen in Table *5*.

Table 5: Shows the pre operative maximal inter-incisal opening (MIO)

Preoperative maximum inter-incisal opening (millimeter)	Number of patients	Percentage (%)
0 - 5 mm	23	74.19
6 – 10 mm	06	19.35
11 – 15 mm	02	6.46
>15 mm	00	00
Total	31	100

The intra-operative maximal inter-incisal opening was recorded ranging from 0 mm to 50 mm. The predominant reading was from 31 to 40 mm (n= 20, 64.52%) as seen in Table 6.

Table 6: Shows the intra-operative maximal inter-incisal opening (MIO)

Per operative maximum interincisal opening (millimeter)	Number of patients	Percentage (%)
0 - 10 mm	00	00
11 – 20 mm	00	00
21 – 30 mm	03	9.68
31 – 40 mm	20	64.52
41 – 50 mm	08	25.80
Total	31	100

Surgical intervention was done in all patients. The most common treatment modality used was gap arthroplasty (n = 14, 45.16%) followed by interpositional arthroplasty (n = 12, 38.71%) and condylectomy (n = 05, 16.13%) as shown in Table 7.

Table 7: Shows the types of treatment modality (n = 31)

Treatment	Number	Percentage
Condylectomy	5	16.13%
Gap arthroplasty	14	45.16%
Interpositional arthroplasty	12	38.71%
Total	31	100%

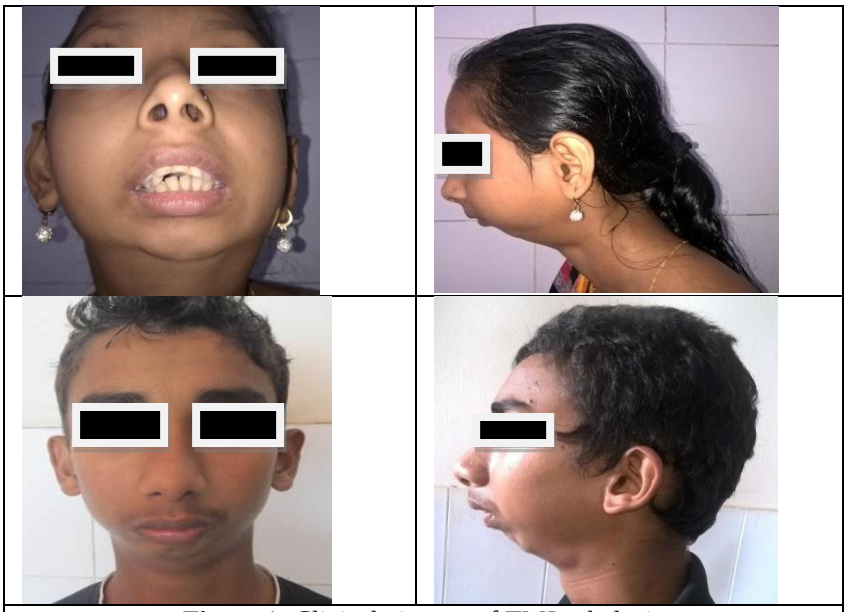

Figure 1: Clinical pictures of TMJ ankylosis

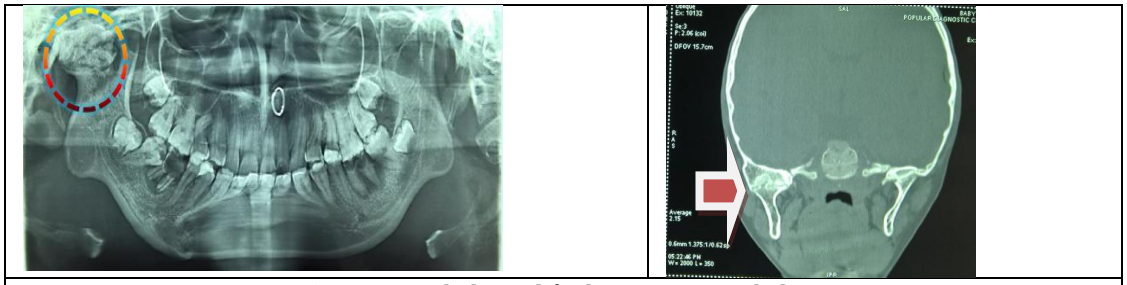

Figure 2: Radiological findings in TMJ ankylosis

IV. Discussion

The purpose of this study was to determine the frequency of TMJ ankylosis in Dhaka Dental College Hospital, Bangladesh. The outcome variables were age, sex, type, cause, treatment modality, and side of involvement. The mean age of the patients was 13.45 years. This result encompasses a similitude with the studies by Potdar and Eltohami [18- 19]. The result differs from Zakaria and Mekonnen's findings, where the mean age was 22.9 and 19.6 years respectively [20- 21]. In the present study, females (n = 18) were more predominant than males (n = 13) with a ratio of M: F = 1: 1.38, which is consistent with Mekonnen and Hossain study [21- 22] and in contrast with Guruprasad's study [23]. The majority of the patients were presented with bilateral ankylosis (54.84%) that coincides with Potdar and Zakaria findings [18, 20]. Trauma (n= 17, 54.84%) was the most common cause in the majority of patients in our study that coincides with other findings [11, 20 - 22]. The result is in contrast with Vasconcelos's findings [17] where infection is predominant. Type III (n = 17, 35.42%) ankylosis (Sawhney's classification) was the commonest type that coincides with Orhan and Vasconcelos's findings [11, 17]. In this study, the mean mouth opening was achieved intraoperatively 39.29 mm ranged from 32 - 52 mm and 3.68 mm (mean) pre-operatively. Our result is consistent with Elgazzar's findings [24]. In this study, the most used treatment method was gap arthroplasty (n= 14, 45.16%) followed by interpositional arthroplasty (n = 12, 38.71%) and condylectomy (n = 05, 16.13%) which coincide with Vasconcelos and Mekonnen's findings [17, 21].

V. Conclusions

TMJ ankylosis is one of the tough issues for maxillofacial surgeons to manage. It affects the mandible resulting in esthetic and functional distortion of the jaw. The most common etiology of TMJ ankylosis was trauma followed by infection. Females were affected more than males. Facial deformities are the main concern in pediatric TMJ ankylosis. Bilateral ankylosis was present in most of the patients. Type-III TMJ ankylosis (Sawhney classification) was more predominant. Gap arthroplasty and physiotherapy were used as a treatment protocol for the majority of the patient, which lead to an enhancement in mouth opening ranging from 31 to 40 mm (64.52%) during surgery. The mouth opening can be kept up and increased by practicing forceful physiotherapy.

VI. Recommendation

We suggest that enhancement of the awareness regarding mandibular condyle fracture, TMJ infection in pediatric patients to prevent TMJ ankylosis as well as its further consequences. Early management is required to treat the condylar fracture, TMJ infection to reduce the physical, psychological, and social impact of jaw deformities in patient. Post-injury physiotherapy and regular follow up is necessary to prevent TMJ ankylosis. Post-operative continuous follow up must be required to prevent re-ankylosis. Surgeons ought to learn around modern surgical aptitudes and techniques to diminish post-operative complications. Surgical intervention such as orthognathic surgery, distraction osteogenesis, dental implants should be implemented to correct the facial deformity as well as for functional restoration of the patient.

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