

RECURRENCE OF TEMPOROMANDIBULAR JOINT ANKYLOSIS IN PEDIATRIC PATIENTS: A SINGLE-CENTER EXPERIENCE FROM PAKISTAN

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ABSTRACT

Objective: To determine the frequency of recurrence in Sawhney type 3 temporomandibular joint ankylosis treated with lateral gap arthroplasty in pediatric patients.

Methodology: A cross-sectional study was conducted at the Oral and Maxillofacial Surgery Department of Mardan Medical Complex from March to August 2022. A total of 238 patients diagnosed with Sawhney type III unilateral or bilateral temporomandibular joint (TMJ) ankylosis, aged 3–15 years and of either gender, were enrolled. All patients were treated using conservative lateral gap arthroplasty. The frequency of recurrence at 6 months, post-lateral gap arthroplasty in patients with Sawhney type III TMJ ankylosis was determined.

Results: Among 238 patients, there were 110 (46.1%) males and 128 (53.8%) females, with a mean age of 9.21 ± 3.58 years. The recurrence rate of Sawhney type III temporomandibular joint ankylosis was reported to be 16.8%, with 40 of 238 patients presenting with recurrence at 6-month follow-up.

Conclusion: There is a moderately high frequency of recurrence (16.8%) found in the local pediatric population in Pakistan at 6 months post-procedure. Appropriate measures are needed to prevent recurrence of Sawhney type III temporomandibular joint ankylosis after conventional gap arthroplasty and to improve health outcomes.

Keywords: Ankylosis, Temporomandibular Joint, Gap Arthroplasty, recurrence, pediatrics

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INTRODUCTION

Temporomandibular joint (TMJ) ankylosis is a pathological condition characterized by fibrous or bony fusion between the joint surfaces, resulting in restricted jaw movement.¹ It is particularly common in children

and may arise due to trauma, congenital anomalies, infections, or malignancies. Among these, trauma is the most frequently reported cause of TMJ ankylosis.² In pediatric patients, TMJ ankylosis can have serious consequences, including impaired mastication, poor oral hygiene, facial deformity, speech difficulties, and psychological distress. These functional limitations during the crucial stages of growth and development can significantly impact a child's quality of life.³⁻⁴

Various classification systems have been developed to categorize TMJ ankylosis. However, the most widely accepted system is Sawhney's classification, which divides TMJ ankylosis into four types based on radiographic and anatomical characteristics observed on computed tomography.⁵⁻⁶ In this classification, Type I involves fibrous adhesions between a deformed condyle and the glenoid fossa, representing pseudo-ankylosis. Type II is defined by bony fusion on the lateral aspect between the condyle and glenoid fossa. Type III features a lateral bony mass with a medially displaced, intact condylar head and disc. Type IV represents complete

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bony replacement of the joint, with total loss of normal TMJ architecture.⁷

Among these, Type III ankylosis has been reported as the most prevalent subtype in children.⁸ Surgical management of TMJ ankylosis in children prioritizes not only the release of the ankylotic mass but also the preservation or reconstruction of the condyle to support ongoing facial growth.⁵ The choice of procedure, gap arthroplasty, interpositional arthroplasty, lateral arthroplasty, or total joint reconstruction, depends on the patient's age, growth potential, and severity of ankylosis.⁹ In the pediatric population, complete resection may compromise the condyle's role as a growth center and hinder normal joint function. Therefore, a more conservative surgical approach is gaining favor, particularly for Type III cases. This involves resecting only the lateral bony mass while preserving the medially displaced condyle and disc, thereby maintaining joint integrity and reducing the risk of recurrence, facial asymmetry, and mandibular retrusion.¹⁰

However, recurrence remains a challenge in pediatric patients due to active skeletal growth and suboptimal compliance with postoperative physiotherapy.¹¹ Despite growing global evidence, there is limited data available from Pakistan, with limitations of sample size, different study population, and most of the studies did not report recurrence rates of TMJ ankylosis following lateral arthroplasty in Sawhney Type III ankylosis.¹² This study aims to add valuable insights to the existing literature pool reporting recurrence patterns and treatment outcomes in a pediatric population. This study will help support the need for CT-based classification of TMJ ankylosis, followed by individualized surgical planning to enhance patient outcomes and reduce future recurrence.

METHODOLOGY

This descriptive study was conducted in the Department of Oral and Maxillofacial Surgery at Mardan Medical Complex, Mardan, over a six-month period, from March to September 2022. Ethics approval was obtained from the Institutional Review Board of Medical Teaching Institute Bacha Kahn Medical College, Mardan (Approval no. 186/BKMC). The study was conducted in accordance with the principles of research ethics. The estimated sample size was 238 patients, calculated using the WHO sample size calculator, based on a recurrence rate of 19.1%,¹³ with an absolute precision of 5%, and a 95% confidence level. A non-probability consecutive sampling technique was employed for participant recruitment.

Patients were eligible for inclusion if they were between 3 and 15 years of age, of any gender, and diagnosed with Sawhney type III TMJ ankylosis, either unilateral or

bilateral. Only patients treated using conservative gap arthroplasty were included. Patients with recurrent ankylosis who had undergone prior surgical intervention, and those with ankylosis due to other etiologies, were excluded.

All consecutive patients who met the eligibility criteria and presented to the Oral and Maxillofacial Surgery Unit were enrolled. Written informed consent was obtained from the parents or guardians of all participants. All patients underwent lateral arthroplasty while preserving the medially displaced condylar head and disc. Preoperative and postoperative evaluations included clinical examination and computed tomography imaging, with particular focus on coronal and axial views. Mouth opening was assessed using a ruler, and an interincisal distance of less than 35 mm was considered indicative of limited opening (i.e., ankylosis). The occurrence of recurrence was determined at 6-month follow-up based on clinical limitation of mouth opening or radiographic evidence of joint-space irregularity or radiopacity at the surgical site on follow-up CT scans, compared with immediate postoperative imaging.

Data was entered and analyzed using IBM SPSS version 22.0. Descriptive statistics were used to summarize demographic variables, including means and standard deviations for continuous variables and frequency distributions for categorical variables. Outcome variables, recurrence, were reported in frequencies and percentages. To assess potential effect modifiers, including age, gender, degree of mouth opening, heterotopic ossification, and laterality, stratified analysis was performed. Post-stratification comparisons were made using the Chi-square test. A p-value of <0.05 was considered statistically significant.

RESULTS

There were 238 pediatric patients with Sawhney type III TMJ ankyloses treated with conventional surgical technique, included in the study. Out of 238, there were 110 (46.1%) males and 128 (53.8%) females. The mean age of the patients was 9.21±3.58 years. According to age distribution there are 95 (39.9%) patients in the age group of 3-8 years and 143 (60.1%) in the age group of 9-15 years. Table 1 gives a summary of baseline characteristics.

Frequency of recurrence at 6-months follow-up after conservative gap arthroplasty was reported among 40 out of 238 (16.8%) participants, as shown in Figure 1. Other related clinical characteristics are summarized in Table 2. Based on mouth opening, 211 (88.7%) patients had a normal mouth opening ≥35 mm, and 27 (11.3%) had a limited mouth opening <35 mm. In our study, heterotrophic mass was formed in 24 (10.1%) patients. According to the side of involvement, the left side was

TABLE 1: SUMMARY OF BASELINE CHARACTERISTICS (N=238)

	Frequency (%)
Age in years (mean±SD)	9.21±3.58
Age groups	
3-8 years	95 (39.9%)
9-15 years	143 (60.1%)
Gender	
Male	110 (46.1%)
Female	128 (53.8%)

TABLE 2: CLINICAL CHARACTERISTICS OF PARTICIPANTS

Characteristics	Frequency (%)
Characteristics	
Mouth opening	
Normal (≥35mm)	211 (88.7%)
Not normal (<35 mm)	27 (11.3%)
Heterotrophic mass formation	
Yes	24 (10.1%)
No	214 (89.9%)
Side involvement	
Unilateral	217 (91.1%)
Bilateral	21 (8.8%)
Unilateral side	
Right	101 (42.2%)
Left	116 (48.7%)

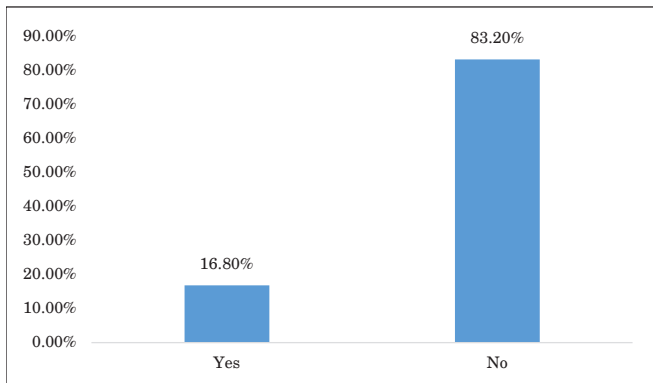


Fig 1: Recurrence rate (%) of TMJ ankylosis among pediatric patients who underwent conventional surgery (n=238)

involved in 116 (48.7%) patients, the right side was involved in 101 (42.4%) patients, and 21 (8.8%) were bilateral.

Stratification of recurrence with age, gender, mouth opening, heterotrophic mass formed, and side involved revealed no significant difference with outcomes as shown in Table 3.

DISCUSSION

Ankylosis of TMJ is a debilitating condition that restricts mouth opening and affects speech, chewing, and facial development in children, often leading to deformities and psychological distress. Trauma is the most common cause. Surgical options include gap arthroplasty, interpositional arthroplasty, and joint reconstruction, though outcomes vary and recurrence remains a major challenge. In the current study, 40 of 238 children (16.8%) with Sawhney type III ankylosis experienced recurrence after conservative gap arthroplasty, a finding comparable to previous studies reporting recurrence rates. Most patients achieved normal mouth opening postoperatively, indicating the procedure's effectiveness.

In a study conducted by Ramly et al, there were 44 children with bony ankylosis included in the study; the mean age was reported to be 13.7 years. The authors reported recurrence rate of 75% in patients with congenital TMJ ankylosis.¹⁴ The recurrence was found to be quite high as compared to results reported in the current study, the difference might be due to the fact that Ramly et al included patients with congenital TMJ, which is more difficult to treat, and recurrence is high in such cases naturally. A study from Bangladesh, conducted by Rahman et al., analyzed data of 18 patients, all belonging to the age group of 13-18 years, where the majority, 61.1%, had bilateral TMJ ankylosis. All patients were managed surgically where gap arthroplasty was performed in , with gap arthroplasty performed in the majority of participants. The authors concluded that least recurrence rates were noted on follow-ups in patients following the conventional surgery technique as compared to other methods and they preferred this technique in such patients.¹⁵

Zhang et al. reported a study exploring factors associated with recurrence of TMJ ankylosis in pediatric patients

TABLE 3: COMPARISON OF RECURRENCE RATE WITH AGE AND GENDER (N=238)

		Recurrence		p
		Present (n=40)	Absent (n=198)	
Age groups	3-8 years	17 (42.5%)	78 (39.3%)	0.71
	9-15 years	23 (57.5%)	120 (60.6%)	
Gender	Male	22 (55.0%)	88 (44.4%)	0.22
	Female	18 (45.0%)	110 (55.5%)	

in their growing years. The authors concluded that rate of recurrence was inversely related to the osteotomy gap while costochondral grafting was positively correlated with recurrence of TMJ ankylosis recurrence in the pediatric population. The recurrence rate was reported to be 40.5%, which is quite high compared to the current study results. This might be due to differences in the clinical characteristics of the study population.¹⁶ Another study by Yadav et al. reported research findings to suggest strategies that can reduce the recurrence of ankylosis in TMJ among pediatric population. The author analyzed data from 99 patients and reported a recurrence rate of 15.1%, which is quite similar to the current study. It is suggested that following best practices and personalized treatment modalities may help reduce the high recurrence of TMJ ankylosis among the pediatric population with strict follow-ups and timely management of presenting symptoms.¹⁷

CONCLUSION

The recurrence rate of TMJ ankylosis is moderately high (16.8%) in the local pediatric population in Pakistan. These findings highlight the importance of timely diagnosis and management, appropriate selection of treatment modalities, and regular postoperative follow-up to optimize patient outcomes and minimize the risk of recurrence.

REFERENCES

- Priyadarsani E. TMJ ankylosis: a reveiw. Indian Journal of Forensic Med Toxicol. 2020 Oct 29;14(4):9111-4.
- Garoma G, Dejene D, Uma G. Temporomandibular joint ankylosis; aetiology, pattern and treatment. J Dent Health Oral Disord Ther. 2022;13(2):33-7.
- Ukwes A, Elshik M, Elbialy M. TMJ ankylosis in children: a case report and literature review. Case Rep Dent. 2023;2023(1):6474478.
- Sharma VK, Rattan V, Rai S, Malhi P. Assessment of paediatric quality of life in temporomandibular joint ankylosis patients after interpositional arthroplasty: a pilot study. Int J Oral Maxillofac Surg. 2020 Feb 1;49(2):244-9.
- Upadya VH, Bhat HK, Rao BS, Reddy SG. Classification and surgical management of temporomandibular joint ankylosis: a review. J Korean Assoc Oral Maxillofac Surg. 2021 Aug 31;47(4):239-48.
- Imanimoghaddam M, Hoseini-Zarch SH, Rahpeyma A, Khaki N, Moeini S. CBCT Findings in Different Types of Temporomandibular Joint Ankylosis. J Kerman Univ Med Sci. 2020 Nov 1;27(6):65-72.
- Xia L, An J, He Y et al. Association between the clinical features of and types of temporomandibular joint ankylosis based on a modified classification system. Sci Rep. 2019 Jul 19;9(1):10493.
- Bordbar P, Heggie A, Boos□Lima FB, Peacock ZS. Pediatric Temporomandibular Joint Disorders. Oral Maxillofac Surg. 2025 Sep 4:1189-207.
- Shivakotee S, Menon CS, Sham ME, Kumar V, Archana S. TMJ ankylosis management: our experience. J Maxillofac Oral Surg. 2020 Dec;19:579-84.
- Visholm T, Saeed N. Current thinking in the management of temporomandibular disorders in children, a narrative review. Br J Oral Maxillofac Surg. 2024;62(10):929-36.
- Challita R, Bazzi N, Halabi S. Childhood TMJ ankylosis: A surgical challenge. J Long-Term Eff Med Implants. 2021;31(2):9-11.
- Mansoor N, Khan M, Mehboob B, DIN Q. Gap vs interpositional arthroplasty in the management of temporomandibular joint ankylosis. Pak Oral Dent J. 2013 Apr 1;33(1):45-55.
- Chen S, He Y, An JG, Zhang Y. Recurrence-related factors of temporomandibular joint ankylosis: a 10-year experience. J Oral Maxillofac Surg. 2019 Dec 1;77(12):2512-21.
- Ramly EP, Jason WY, Eisemann BS et al. Temporomandibular joint ankylosis in pediatric patients with craniofacial differences: causes, recurrence and clinical outcomes. J Craniofac Surg. 2020 Jul 1;31(5):1343-7.
- Rahman AS, Haider IA. Temporomandibular joint ankylosis pattern, causes, and management among pediatric patient attending a tertiary hospital in Bangladesh. J Oral Res Rev. 2021 Jul 1;13(2):115-20.
- Zhang X, Huang D, Lu C, Zhao J, Yang C, He D. Analysis of the effect on costochondral graft for TMJ ankylosis with jaw deformities in pediatrics. Clin Oral Investig. 2024 May 16;28(6):317-25.
- Yadav P, Roychoudhury A, Bhutia O. Strategies to reduce re-ankylosis in temporomandibular joint ankylosis patients. Br J Oral Maxillofac Surg. 2021 Sep 1;59(7):820-5.

CONTRIBUTIONS BY AUTHORS

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| 1. Alaf Khan: | Study conception, surgical procedures, and data collection. |
| 2. Abdul Rauf: | Statistical analysis and data interpretation. |
| 3. Omer Bashir: | Methodology design and patient follow-up. |
| 4. Syeda Rabia Rahat Geelani: | Literature review and manuscript preparation. |
| 5. Tariq Sardar: | Critical review and academic supervision. |
| 6. Kaleem Ullah: | Overall supervision, final manuscript approval, and correspondence with the journal. |