ORIGINAL ARTICLE POJ 2025:17(2) 86-96

Comparison of Success Rates between Cemented Molar Bands and Bondable Molar Tubes in Adult Patients Undergoing Fixed Appliances Treatment

Samia Rahman[a], Pir Jawad Ali Shah[b], Asma Javaid[c], Ali Hassan Qureshi[d], Muhammad Zaheen[e], Munir Ahmad[f]

Abstract

Introduction: One of the factor that affects drastically the the treatment outcome is stability of orthodontic attachments. One area of concern over the period of years has been molar banding vs molar bonding. Traditional molar bands provided superior stability and resistance to debonding while they are questioned for oral hygiene concerns and for their use in high risk patients. Molar bonding on the other hand has an additional limitation of difficulty at bonding especially in patients with limited mouth opening or excessive salivation. Aim of this study is to compare the success rates of cemented molar bands and bondable molar tubes in adult orthodontic patients keeping the operator experience and malocclusion type in consideration.

Methodology: This cross-sectional study was carried out at Saidu College of Dentistry on a sample of 280 orthodontic patients (age: 15-30 years) selected through convenience sampling between 2024 September and 2025 February.Participants were treated with fixed edgewise appliances. Molar bands were cemented using glass ionomer cement, while molar tubes were bonded using light-cured adhesive. Attachment failures were evaluated at immediate loading, 1 month, 3 months, and 6 months. Data were analyzed using SPSS version 24; chi-square tests assessed associations with failure timing, malocclusion, and education level of the clinician.

Results: Attachment stability was observed in 75% of cases. Molar tubes had slightly higher early failures, while molar bands showed more late failures. Differences between the two were not statistically significant ($p > 0.05$). Malocclusion type and clinician education level also showed no significant association with attachment failure.

Conclusions: Both molar bands and tubes are effective attachment methods. Case selection should consider patient comfort, hygiene, and treatment complexity.

Keywords: Orthodontic anchorage, molar band, molar tube, bond failure, fixed appliances, clinical success, adult orthodontics

Date of Submission: 30-Jun-2025 **Date of Final Revision:** 24-Dec-2025 **Date of Approval:** 29-Dec-2025

Introduction

Orthodontic treatments work on the basic principle of applying guided pressure to produce corrective movement of teeth. Molar bands have high grade retention capabilities and can resist debonding under orthodontic forces and are thus a preferred choice in the dental office.[1] Molar bands are made of stainless steel and fit around the entire tooth, offer dependable anchorage, particularly when there are enamel flaws, big restorations, or high anchorage requirements. The use of molar bands can be tedious as they can increase chair time for the patient, cause gingival discomfort, increase plaque accumulation and prove to be an obstacle in maintaining standard oral hygiene.[2]

Enamel acid etching ensures reliable bonding of bracket attachments to enamel surfaces, a landmark improvement in adhesive techniques introduced by Buonocore.[3]

[a] Corresponding Author: BDS, FCPS, Assistant professor, Saidu College of Dentistry Swat.
E-mail: samiarahman50@gmail.com
[b] Consultant, Dental unit PAF hospital E9, Islamabad.
[c] BDS, FCPS, Senior Registrar, Dr wafaa tulbah clinics
[d,e,f] BDS, Post Graduate Resident, Department of Orthodontics, Saidu College of Dentistry Swat

Posterior tooth bonding has significantly improved due to adhesive system advancements. These advancements have led to the development of bondable molar tubes which are now considered an improved substitute for conventional molar bands.[4]

The development of bondable molar tubes elevated patient care as they cause less gingival irritation, better dental hygiene, and less time spent in the dental chair. The trajectory followed by bonding technique innovations is synonymous to the popularity of bondable molar tubes. Some improvements in adhesive techniques include priming, surface cleaning, etching with 37% phosphoric acid, applying composite resin, and light curing.[5]

These things have some points but people are still talking about how well they work on molars in the long run. If the attachments are not good enough they can come off. Get loose. This can cause a lot of problems, like delaying the treatment taking up time in the chair needing emergency help and making the whole treatment cost more money.[6] To make sure the treatment works the attachments need to stay in shape throughout the whole process without needing to be fixed or put back on. The success of the treatment depends on this.

The failure rates of bondable molar tubes and cemented molar bands have been examined in a number of randomized controlled trials and systematic reviews, however the results are still unable to justify one treatment modality over the other. While some studies find no clinically meaningful difference between the two attachment techniques, others indicate higher failure rates with bonded molar tubes.[7-9]

Current literature on the topic is limited by short follow-up periods, a high proportion of adolescent samples, a lack of data relevant to adults, and a lack of attention to operator experience and clinical factors.[10,11] The relevance of these results to adult populations is still unclear as adult orthodontic treatment continues to expand globally.

Additionally, previous research has rarely evaluated failure rates in connection to several clinically significant variables, including gender, age demographics, type of malocclusion, arch involved (mandible or maxilla), and operator expertise. These restrictions highlight a clear information gap about the relative effectiveness of bondable molar tubes and molar bands in adult orthodontic patients under typical clinical settings.

Therefore, the goal of this study is to assess and contrast the failure rates of bondable molar tubes and cemented molar bands in adult patients receiving fixed orthodontic appliance therapy. Failure rates will be assessed in relation to gender, age demographics, kind of malocclusion, arch involved, operator experience, and the frequency of attachment loss requiring replacement during the course of therapy.

Methodology

A prospective observational cohort study was conducted in the Orthodontic Department of Saidu College of Dentistry over a six-month period from September 2024 to February 2025 after obtaining ethical approval from the Ethical Review Board of the institution (Reference No. 191-ERB/024). The study involved longitudinal follow-up of patients at predefined intervals, which justified classification as a prospective cohort study rather than a cross-sectional design. Convenience sampling was used to recruit participants who met the eligibility criteria.

The sample size was calculated using Open Epi (Open Source Epidemiologic Statistics for Public Health). A population size of approximately 1,000 orthodontic patients was assumed based on departmental records. An anticipated attachment failure rate of 50% was used, as no precise local data were available and this value yields the maximum sample size in proportion-based studies. With

a 95% confidence level, 5% margin of error, and 80% statistical power, the minimum required sample size was calculated to be 278 patients, which was rounded up to 280 patients to compensate for possible dropouts during follow-up.

Patients aged 15–30 years undergoing orthodontic treatment with upper and lower fixed appliances using the pre-adjusted edgewise system were included. Only patients with fully erupted first and second permanent molars, clinically healthy periodontal tissues, and acceptable oral hygiene were selected. Patients with systemic illnesses or cognitive conditions that could interfere with cooperation during orthodontic treatment were excluded, replacing the ambiguous term "stable mental health." Additional exclusion criteria included absence or planned extraction of first permanent molars, hypoplastic, demineralized, or heavily restored molars, severe skeletal Class III malocclusion, severe Class II malocclusion with deep overbite (replacing the non-standard term "cover bite"), cases requiring extra-oral or intra-oral anchorage reinforcement, and the use of posterior bite turbos. Patients with a history of parafunctional habits such as bruxism were clinically screened during history taking and excluded to minimize confounding effects on attachment failure.

Fixed orthodontic appliances were placed following standardized clinical protocols. Edgewise prescription brackets measuring 0.022 × 0.028 inches (Abzil-3M, São José do Rio Preto, Brazil) were bonded using 3M ESPE etchant and a light-curing adhesive (Light Bond, Reliance, Itasca, USA). Pre-welded molar bands (Abzil-3M) were cemented using self-curing glass ionomer cement (Precedent, Reliance, Itasca, USA), while 80-micron mesh base buccal tubes were bonded using the same adhesive system. All bonding and banding procedures were carried out by consultants and orthodontic residents under supervision to reduce operator-related variability.

Patients were reviewed at immediate loading, 1 month, 3 months, and 6 months following appliance placement. Molar band failure was defined as loosening or complete decementation of the band, whereas buccal tube failure was defined as detachment of the tube from the tooth surface. Failure were recorded during follow-up visits.

Statistical analysis:

Data was gathered by the principal investigator using a structured, pre-designed data collection proforma.The data was then analyzed using SPSS 24.0. Descriptive statistics analyzed categorical variables, while qualitative data was analyzed through Pearson's chi-square test. p-value < 0.05 Three-way cross-tabulations were performed to explore interactions between attachment type, malocclusion, and timing of failure. As the outcome variables were categorical, normality testing was not required.

Result

The study sample consisted of 280 patients, males (n=148, 52.86%), (n=132, 47.14%). Descriptive Statistics have been discussed in table 1.Molar bands were used in 152 patients (54.29%) and molar tubes in 128 (45.71%). The majority of attachments were placed on the first permanent molars (216,77.14%), with the remainder on second permanent molars (64,22.86%). The anatomical site of attachment was evenly distributed across the four quadrants—upper left, upper right, lower left, and lower right—each constituting 25% of cases as shown in fig II.

Regarding attachment failure, 210 cases (75.00%) remained stable through out study, while failures were recorded primarily after one month (23,8.21%),three months (18,6.43%) and six months (21,7.50%). While immediate loading failure were minimal (2.86%) as depicted in fig-II.

Regarding malocclusion classification, Class II division I was the most prevalent (40.00%),

followed by Class I (31.43%) as shown in Table-I.

Factor		N	%
Gender of Patient:	Female	132	47
	Male	148	53
Doctor's Level of Education	1st Year PG	48	17.143
	2nd Year PG	64	22.857
	3rd Year PG	124	44.286
	Final Year PG	16	5.714
	Consultant	20	7.143
	General Practitioner	8	2.857
Type of Malocclusion	Class I	88	31.429
	Class II division I	112	40.000
	Class II division II	52	18.571
	Class III	28	10.000
Type of Attachment used	Molar Band	152	54.286
	Molar Tube	128	45.714
Attachment on tooth	first permanent molar	216	77.143
	second permanent molar	64	22.857
Site of Attachment	lower left	70	25.000
	lower right	70	25.000
	upper left	70	25.000
	upper right	70	25.000
Attachment Failure	Immediate loading	8	2.857
	After 1 Month	23	8.214
	After 3 Months	18	6.429
	After 6 Months	21	7.500
	Stable	210	75.000

Table-I: Summary of demographic and clinical Characteristics with Frequency and Percentage

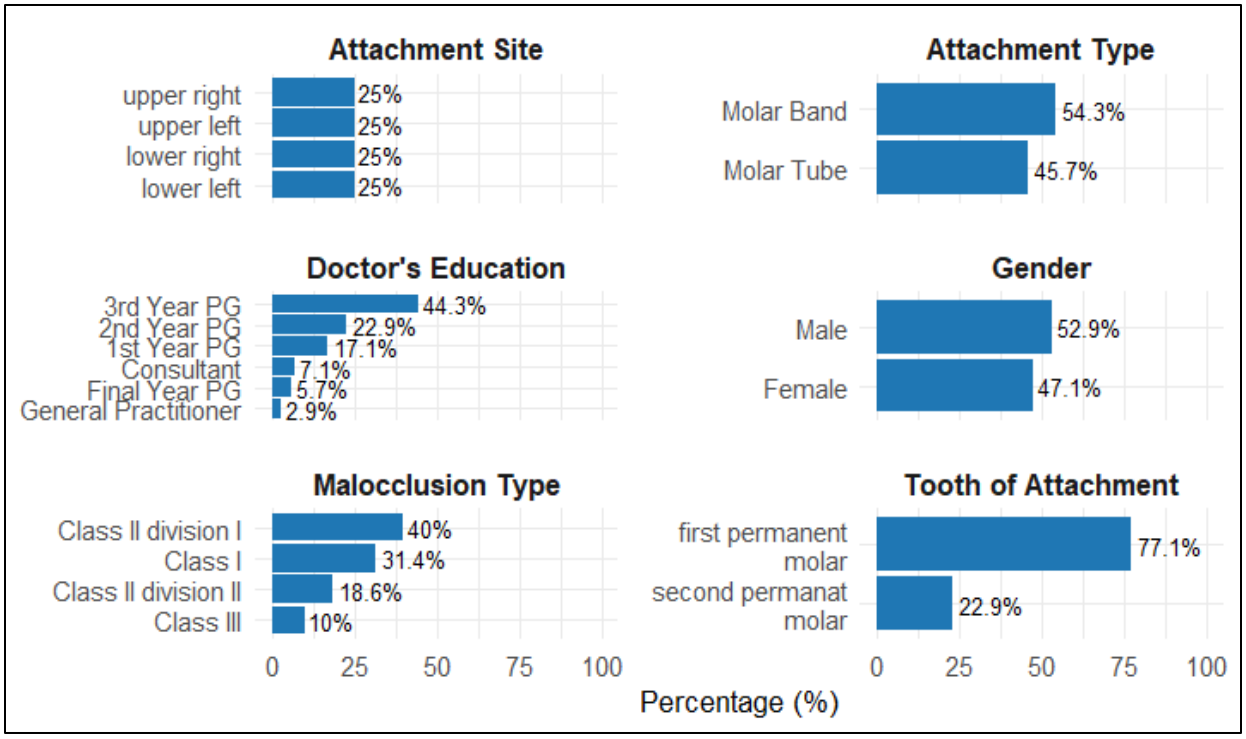

Fig. I: Demographic and clinical characteristics.

Type of Attachment	Immediate Loading	After 1 Month	After 3 Months	After 6 Months	Stable	Total (n)
Molar Band n = 152	2 (1.3%)	11 (7.2%)	9 (5.9%)	16 (10.5%)	114 (75.0%)	152 (100%)
Molar Tube n = 128	6 (4.7%)	12 (9.4%)	9 (7.0%)	5 (3.9%)	96 (75.0%)	128 (100%)

Table-II: comparison of failure of molar band vs molar tube in immediate loading, 1 month, 3 months and 6 months interval.

Attachment type showed some disparity: molar tubes were more prone to immediate loading failures (4.7%) compared to molar bands (1.3%), whereas failures after six months were more common with bands (10.5%). Despite these trends, the association was not statistically significant ($\chi^2 = 7.345$, $p = 0.119$ CI provided in table 2), indicating comparable performance between the two attachment types regarding stability.

Three-Way Association between malocclusion, type of attachment and Attachment Failure.

Attachment failure patterns were further explored across malocclusion classes for each type of attachment used, Table 3. Among Class I cases, Molar Tubes accounted for a higher proportion of stable attachments (51.1%) compared to Molar Bands (23.9%), while early failures (after 1 and 3 months) were more commonly associated with Molar Tubes. For Class II division I malocclusions, failure timing was more evenly distributed between the two attachment types, though Molar Bands contributed a larger proportion of stable outcomes (48.2% vs 26.8%).

In Class II division II cases, most attachments remained stable regardless of type, but Molar Bands again slightly outperformed Molar Tubes in terms of stability (51.9% vs 23.1%). For Class III cases, the trend continued with a higher proportion of stable attachments associated with Molar Bands (42.9%)

compared to Molar Tubes (32.1%), although the total number of cases was relatively small as evident in fig 2. None of these differences reached statistical significance (Class I: p = 0.087; Class II division I: p = 0.620; Class II division II: p = 0.955; Class III: p = 0.405; total sample: p = 0.119).

Chi-square tests for each malocclusion class did not show statistically significant associations between type of attachment failure and the type of attachment used. For instance, the Pearson chi-square p-value for Class I was 0.087, and for Class II division I, it was 0.620. Similarly, no significant differences were found for Class II division II (p = 0.955), Class III (p = 0.405), or for the total sample (p = 0.119). These findings indicate that although some variation exists in attachment failure across malocclusion classes and attachment types, these differences were not statistically significant.

Type of Malocclusion				Attachment Failure					Total
				Immediate loading	After 1 Months	After 3 Months	After 6 months	stable	
Class I	Type of Attachment used	Molar Band	N	1	1	2	3	21	28
			%	1.1%	1.1%	2.3%	3.4%	23.9%	31.8%
		Molar Tube	N	4	7	4	0	45	60
			%	4.5%	8.0%	4.5%	0.0%	51.1%	68.2%
Class II division I	Type of Attachment used	Molar Band	N	1	5	4	8	54	72
			%	0.9%	4.5%	3.6%	7.1%	48.2%	64.3%
		Molar Tube	N	2	4	2	2	30	40
			%	1.8%	3.6%	1.8%	1.8%	26.8%	35.7%
Class II division II	Type of Attachment used	Molar Band	N	0%	3	3	3	27	36
			%	0%	5.8%	5.8%	5.8%	51.9%	69.2%
		Molar Tube	N	1%	1	2	1	11	16
			%	0%	1.9%	3.8%	1.9%	35.4%	30.8%
Class III	Type of Attachment used	Molar Band	N	0%	2	0	2	12	16
			%	0%	7.1%	0.0%	7.1%	42.9%	57.1%
		Molar Tube	N	0%	0	1	2	9	12
			%	0%	0.0%	3.6%	7.1%	32.1%	42.9%
Total	Type of Attachment used	Molar Band	N	2	11	9	16	114	152
			%	0.7%	3.9%	3.2%	5.7%	40.7%	54.3%
		Molar Tube	N	6	12	9	5	96	128
			%	2.1%	4.3%	3.2%	1.8%	34.3%	45.7%

Table-III. Distribution of Attachment Failure Timings across Malocclusion Classes and Attachment Types

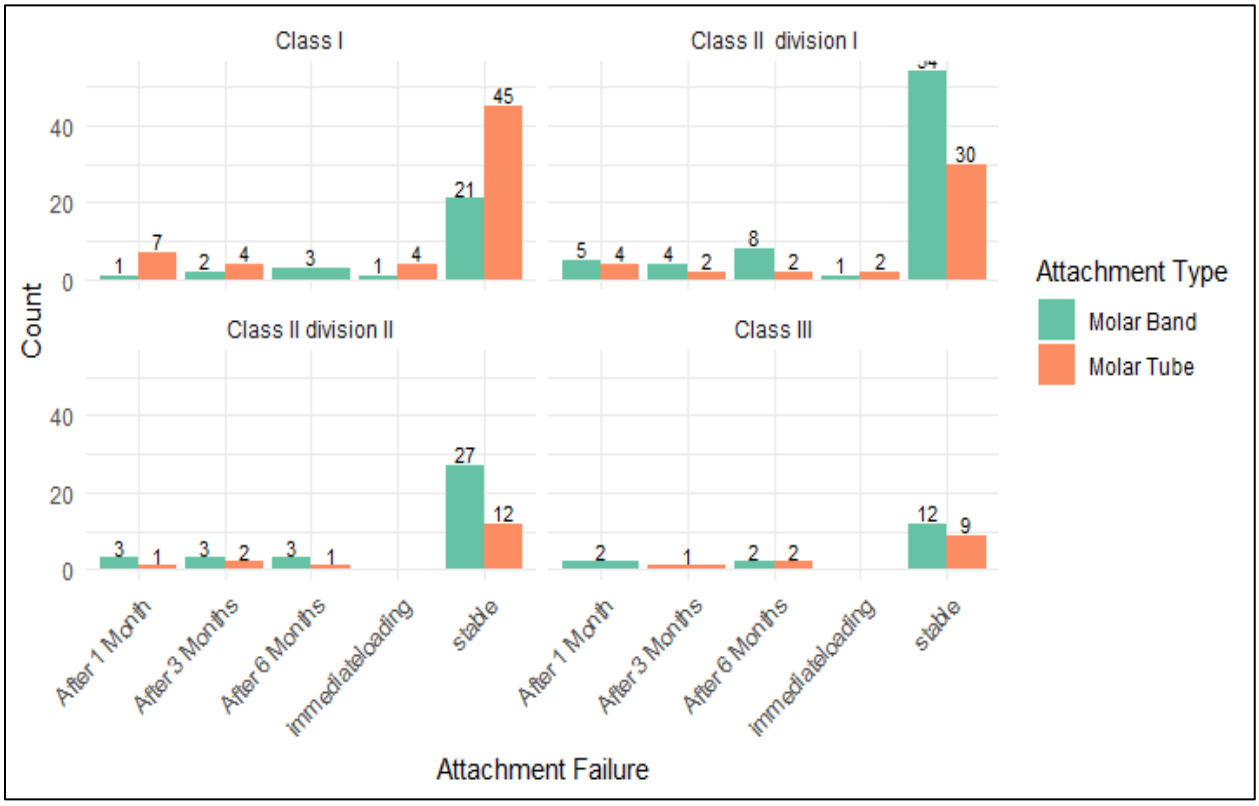

Fig. II: Attachment Failure Timings across Malocclusion and Attachment Types

Three-Way Association between Attachment Failure and Doctors' Level of Education across Types of Attachments:
The impact of operator education level on attachment stability was also examined using three-way crosstabulations. Among first-year PG doctors, stable outcomes were achieved more often with molar tubes (50.0%) than molar bands (25.0%). Second-year PGs demonstrated 42.2% stable attachments with molar bands and 32.8% with molar tubes. Third-year PGs showed the highest overall stability (75.0%), with 48.4% using molar bands. Consultants and final-year PGs also achieved 75.0% stable outcomes, with slight variation in attachment preference.

No statistically significant associations were observed within any subgroup (third-year PGs: $p = 0.265$; second-year PGs: $p = 0.126$; total sample: $p = 0.119$), indicating that operator education level did not independently influence attachment failure (Table 4, Figure 3).

Normality of continuous variables (age) was confirmed using the Shapiro-Wilk test ($p > 0.05$), justifying the use of descriptive statistics and chi-square tests for categorical outcomes. Although multiple comparisons were performed, a Bonferroni correction was applied to control for Type I error, and p-values are reported accordingly.

Future analyses may consider multiple regression models to assess the independent effects of variables such as attachment type, malocclusion, and operator level on failure risk.

Doctor's Level of Education				Attachment Failure					Total
				Immediate loading	After 1 Months	After 3 Months	After 6 months	stable	
1st Year PG	Type of Attachment used	Molar Band	n	0	3	0	1	12	16
			%	0.0%	6.2%	0.0%	2.1%	25.0%	33.3%
		Molar Tube	n	1	2	3	2	24	32
			%	2.1%	4.2%	6.2%	4.2%	50.0%	66.7%
2nd Year PG	Type of Attachment used	Molar Band	n	0	5	2	2	27	36
			%	0.0%	7.8%	3.1%	3.1%	42.2%	56.2%
		Molar Tube	n	2	1	4	0	21	28
			%	3.1%	1.6%	6.2%	0.0%	32.8%	43.8%
3rd Year PG	Type of Attachment used	Molar Band	n	2	2	7	9	60	80
			%	1.6%	1.6%	5.6%	7.3%	48.4%	64.5%
		Molar Tube	n	1	5	2	3	33	44
			%	0.8%	4.0%	1.6%	2.4%	26.6%	35.5%
Final Year PG	Type of Attachment used	Molar Band	n	0	0	0	3	9	12
			%	0.0%	0.0%	0.0%	18.8%	56.2%	75.0%
		Molar Tube	n	0	1	0	0	3	4
			%	0.0%	6.2%	0.0%	0.0%	18.8%	25.0%
Consultant	Type of Attachment used	Molar Band	n	0	1	0	1	6	8
			%	0.0%	5.0%	0.0%	5.0%	30.0%	40.0%
		Molar Tube	n	1	2	0	0	9	12
			%	5.0%	10.0%	0.0%	0.0%	45.0%	60.0%
General Practitioner	Type of Attachment used	Molar Tube	n		1	0	0	6	8
			%	12.5%	12.5%	0.0%	0.0%	75.0%	100.0%

Table-IV: Distribution of Attachment Failure Timings by Doctors' Level of Education and Type of Attachment Used

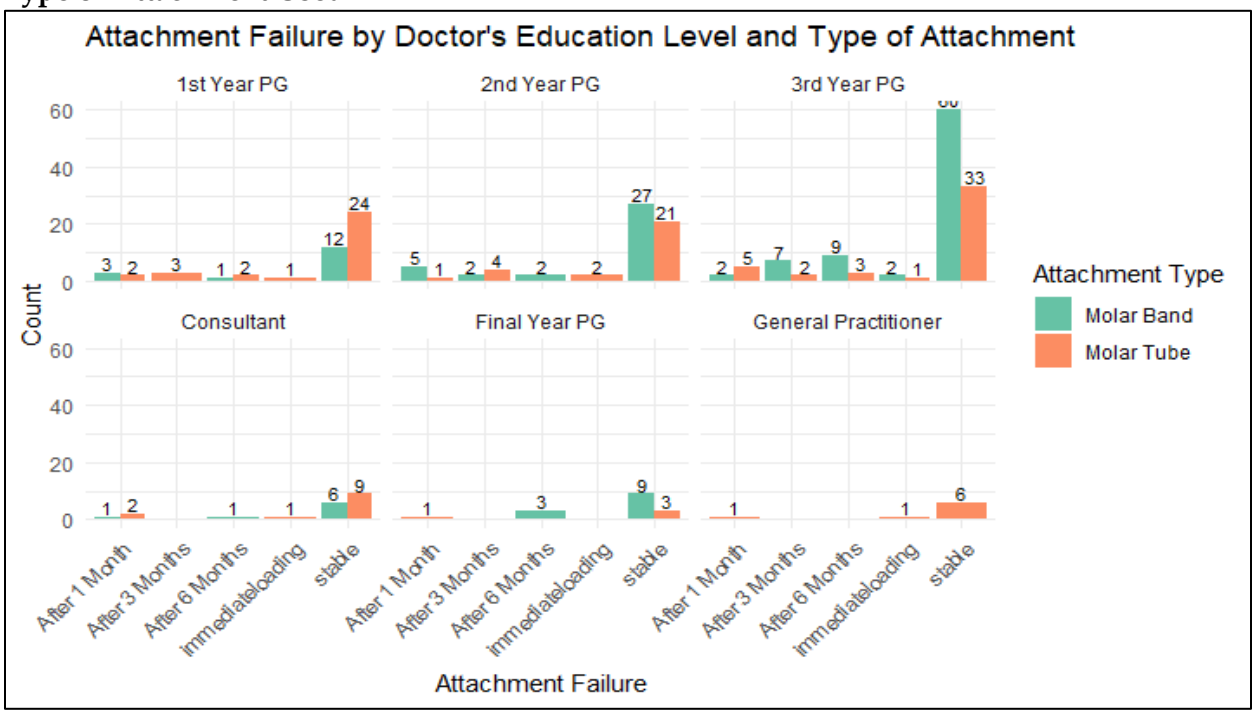

Fig. III: Attachment Failure by doctor's Education level and type of attachment

Discussion

This study compares cemented bands and bondable molar tubes in adult patients who are getting fixed orthodontic treatment. It gives us important information about what is currently happening in orthodontic practice.

Patient allocation was done on the basis of clinical need. Molar bands were used in extraction cases or those with high anchorage requirement because molar bands are better as per literature for providing required results in these cases.

On the other hand bondable tubes were used in non-extraction cases or with cases requiring minimal anchorage. They made it easier for patients to keep their teeth clean and it was less invasive.

Data depicts that more patients got molar bands, which is about fifty four point three percent, than patients who got molar tubes, which is about forty five point seven percent in the group of people we were studying.

Molar bands are still really useful in the clinic especially when we need to use a lot of force or complicated anchorage.[13] This is because they are very good at staying in place and can withstand a lot of wear and tear. In cases, though bondable molar tubes are a good option. They are less invasive, which means they do not bother the patient much.[14] We often use them for orthodontic work especially when we are not extracting any teeth. Patients who want to be comfortable during treatment in terms of dental hygiene also preferred molar tubes.[15]

The way we attach brackets to teeth changed a lot when Buonocore[3] introduced acid-etch bonding. This was a step forward for orthodontic practice because it allowed us to attach brackets securely without having to put bands all the way around the teeth. This made bondable molar tubes more popular over time. Molar bands and bondable molar tubes are both important, in care and we choose between them based on what the patient needs.

We did not collect information about how patients felt in this study like how comfortable they were or how easy it was for them to keep their teeth clean. Other studies have shown that using bonded molar tubes can make a big difference in these areas.[16] So when we talk about patient comfort and hygiene we need to look at what other studies have found not what we found in this study.

64.29 percent clinicians according to literature think that molar bands are better for finishing treatments and they are also more satisfied with the results (62.86 percent). This shows that molar bands are still very useful for treatments that need a lot of correction and anchorage.[17,18] Molar bands are important for these kinds of treatments. Bonded molar tubes are important, for patient comfort and oral hygiene.

We looked at how the attachments stayed in place. It worked out well for most people about 75% of the time. This was true no matter what kind of attachment they had. When things did go wrong it usually happened after one month this was true for 8.21% of the people. After six months this happened to 7.5% of the people. The attachment stability is what we were trying to achieve and attachment stability is important for the success of the attachments. Molar bands had problems that happened later on probably because the cement that holds them in place breaks down over time. On the hand molar tubes had a few more problems that happened early on which might be because of issues with how they are attached or because of the pressure, on the teeth due to occlusal loading.[19]

Chi-square analyses revealed no statistically significant associations between attachment type, malocclusion class, or operator education level and failure patterns ($p > 0.05$), emphasizing the multifactorial nature of attachment stability.[20]

We looked at how attachments fail. The people with Class II Division I malocclusion had the most attachment failures. We did not

find any real difference in how often attachments failed based on the type of attachment used in any of the malocclusion groups. The Class II Division I malocclusion cases had a lot of attachment failures. evaluation of failure rates across operator education levels indicated no significant differences, despite some trends, such as first-year postgraduate trainees achieving better stability with molar tubes (50%), and senior clinicians (final-year PGs and consultants) slightly favoring molar bands (56.2% and 30%, respectively).[21]

There are some things that could have affected the results that we did not measure directly. These things include habits like grinding your teeth, which is also known as bruxism the way your teeth come together when you bite what you eat and whether or not the patients did what they were supposed to do. The clinicians who did the cases had different levels of experience. Most of the work was done by trainees who were in their first year of residency training after they finished school. We did not find that the level of experience of the doctor doing the treatment had a big impact, on the number of failures. The dental work failure rates were not really affected by who did the case whether they were very experienced or not.

The study was limited by the duration of 6 months, longer studies covering the entire treatment span may further open additional venues to explore.

Conclusion

Both molar bands and bondable molar tubes demonstrate comparable success in adult fixed orthodontic treatment, with 75% of attachments remaining stable over six months. However bonadble tubes based upon their non-invasive advantage and comparable stability needs preferable usage; this however requires better operator training and moister control. Future research should focus on randomized controlled trials, longer follow-up periods, and inclusion of patient-reported outcomes to strengthen evidence on comparative performance.

Ethical Approval

The study was approved by the Ethical Review Board of Saidu College of Dentistry (No. 191-ERB/024)

Disclaimer

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Conflict of Interest

It is declared that the authors don't have any conflict of interest.

Authors' Contribution

SR: Conception and design of the study, supervised the research, data interpretation, critically revised manuscript, and approved the final version.

PJAS: Methodological planning, interpretation of results, critical review of the manuscript, expert input for analysis and discussion.

AJ: Literature review, initial drafting research data.

AHQ: Study design, data collection, statistical analysis, manuscript drafting and revisions.

MZ: Patient recruitment, clinical procedures, data acquisition, data entry and preliminary data analysis.

MA: Data collection, follow-up assessments, literature review and manuscript formatting

References

1. Gurel H, Keklik H, Sukurica Y, Caglaroglu M. A comparison of shear bond strengths of six orthodontic cements. J Orthod Res. 2014;2(1):17.
2. van Ommeren RM, van Riet TC, Ho JPT, Jonkman RE, Becking AG. A review and evaluation of orthodontic brackets, molar bands and orthodontic auxiliaries during orthognathic surgery: A prospective cohort study. J Orthod. 2024 Mar 18;51(1):79–86.
3. Buonocore MG. A simple method of increasing the adhesion of acrylic filling materials to enamel surfaces. J Dent Res. 1955 Dec;34(6):849–53.

4. Erbas S, Atik E. In vitro comparison of different composite resins for aligner attachment production. J Orofac Orthop. 2025 May 7.
5. dos Santos A, Wambier L, Wambier D, Moreira K, Imparato J, Chibinski A. Orthodontic bracket bonding techniques and adhesion failures: A systematic review and meta-analysis. J Clin Exp Dent. 2022;14:e746–55.
6. Banker A, Vala V, Desai BB. A novel technique for accuracy in horizontal, vertical, and axial bracket placement in orthodontic bonding. J Contemp Dent Pract. 2021 Sep 1;22(9):1076–8.
7. Jakavičė R, Kubiliūtė K, Smailienė D. Bracket bond failures: Incidence and association with different risk factors—A retrospective study. Int J Environ Res Public Health. 2023 Mar 2;20(5):4452.
8. Cronin M, GF. Molar banding or bonding? What do orthodontists prefer in routine clinical practice? Int J Sci Healthc Res. 2020 Sep;5(3).
9. Murray PG, Millett DT, Cronin M. Bonded molar tubes: A survey of their use by specialist orthodontists. J Orthod. 2012 Jun;39(2):129–35.
10. Banks P, Macfarlane TV. Bonded versus banded first molar attachments: A randomized controlled clinical trial. J Orthod. 2007 Jun;34(2):128–36.
11. Oeiras VJ, Silva VAA e, Azevedo LA, Lobato VS, Normando D. Survival analysis of banding and bonding molar tubes in adult patients over a 12-month period: A split-mouth randomized clinical trial. Braz Oral Res. 2016;30(1).
12. Nazir M, Walsh T, Mandall NA, Matthew S, Fox D. Banding versus bonding of first permanent molars: A multi-centre randomized controlled trial. J Orthod. 2011 Jun;38(2):81–9.
13. Talpur M, Cunningham SJ, Moles DR, Jones SP. The relationship between base dimensions, force to failure, and shear bond strengths of bondable molar tubes. Angle Orthod. 2012 May;82(3):536–40.
14. Mavropoulos A, Karamouzos A, Kolokithas G, Athanasiou AE. In vivo evaluation of two new moisture-resistant orthodontic adhesive systems: A comparative clinical trial. J Orthod. 2003 Jun;30(2):139–47.
15. Al Taweel SM, Zinelis S, Sofyan A, Al Jabbari YS. Does surface priming increase the bond strength of orthodontic brackets? An experimental study. Clin Exp Dent Res. 2024 Jun 7;10(3).
16. Hasan NM, Yassir YA. Evaluation of failure rate of molar tubes with a modified bonding technique: A randomized clinical trial. Eur J Orthod. 2023 Nov;45(6):764–72.
17. Littlewood SJ, Millett DT, Doubleday B, Bearn DR, Worthington HV. Orthodontic retention: A systematic review. J Orthod. 2006 Sep;33(3):205–12.
18. Pandis N, Polychronopoulou A, Makou M, Eliades T. Mandibular dental arch changes associated with treatment of crowding using self-ligating and conventional brackets. Eur J Orthod. 2010 Jun;32(3):248–53.
19. Oeiras VJ, Silva VAA e, Azevedo LA, Lobato VS, Normando D. Survival analysis of banding and bonding molar tubes in adult patients over a 12-month period: A split-mouth randomized clinical trial. Braz Oral Res. 2016;30(1).
20. Baheti MJ, Toshniwal NG, Tiwari H. Comparison of molar band and molar tube failure rates during orthodontics treatment: A clinical study. J Orthod Res. 2017;5(1):15–20.
21. Al-Moghrabi D, Salazar FC, Pandis N, Fleming PS. Effectiveness of bonded molar tubes versus bands: A systematic review and meta-analysis. Eur J Orthod Res. 2017;5(1):15–20.