Asian Journal of Dental Sciences

Volume 8, Issue 1, Page 22-30, 2025; Article no.AJDS.129748

Effect of Matrix Systems and Filling Materials on Proximal Contacts in Primary Molar Restorations: An *In vitro* Study

Ralitsa Bogovska-Gigova [a++*] and Krasimir Hristov [a#]

[a] *Department of Paediatric Dentistry, Faculty of Dental medicine, Medical University of Sofia, Bulgaria.*

Authors' contributions

This work was carried out in collaboration between both authors. Author RBG designed the study, wrote the methods and the protocols, and wrote the first draft of the manuscript. Author KH performed the statistical analysis, managed the study analyses. Both authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/ajds/2025/v8i1220

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/129748

Original Research Article

Received: 02/01/2025
Accepted: 09/01/2025
Published: 13/01/2025

ABSTRACT

Aim: This study evaluated the influence of the matrix system and filling material on the proximal wall morphology and contact tightness in Class II restorations of primary molars.
Place and Duration of Study: Department of Paediatric Dentistry, Faculty of Dental Medicine, Medical University of Sofia, Bulgaria, between September 2024 and December 2024.
Methodology: On 240-second primary molars, occlusal-medial and occlusal-distal class II cavities with dimensions of 3x4x2 mm (buccolingual, occlusal-gingivally, and mesiodistally) were prepared.

[++] *Chief Assistant Professor;*
[#] *Associate Professor;*
**Corresponding author: Email: r.bogovska@fdm.mu-sofia.bg;*

Cite as: *Bogovska-Gigova, Ralitsa, and Krasimir Hristov. 2025. "Effect of Matrix Systems and Filling Materials on Proximal Contacts in Primary Molar Restorations: An In Vitro Study". Asian Journal of Dental Sciences 8 (1):22-30. https://doi.org/10.9734/ajds/2025/v8i1220.*

The teeth were then divided into six groups (40 teeth each) and were restored with different filling materials (compomer or bulk fill composite) and different matrix systems (sectoral and circumferential). The contact tightness of the proximal restorations was examined by inserting a different number of metal flat matrices with a thickness of 0.05 mm. Visually, the surface profile of the contact morphology was assessed and classified as flat, convex, or concave. Their marginal adaptation was also evaluated according to the following criteria: presence of a step and/or voids. The examination was performed under a dental microscope.

Results: The palodent matrix system provided the tightest contacts to first primary molars when using compomer material, while the myJuniorKit system excelled with bulk-fill composites. For the first permanent molars 36 and 46, the junior matrix system consistently provided the tightest contacts, irrespective of the restorative material. A convex restoration profile is typically observed with the myJunior matrix system, while a flat profile is usually seen with the circumferential matrix system. There is a risk of void formation when using condensable filling materials but not when using bulk-fill material.

Conclusion: The effectiveness of the proximal contour of primary teeth restorations is influenced more by the type of matrix system used than by the filling material or filling technique. Using sectional matrix systems designed explicitly for primary teeth (MuJuniorKit) significantly improves the proximal contacts of Class II composite restorations in primary molars. Circumferential matrices have a higher risk of edge formation than sectional matrices, and a higher risk of void formation is seen with compomers and layering restoration techniques.

Keywords: Primary molars; proximal restorations; matrix systems; contact tightness.

1. INTRODUCTION

Creating tight, anatomical, and correct proximal contacts in the restoration of primary molars is a difficult task and often represents a challenge for clinicians (El-housseiny, et al., 2019, Chisini, et al., 2018, Peumans, et al., 2001). The reasons may be several – difficult reproduction of the anatomical shape of the tooth, poor marginal adaptation, problematic condensation of composite materials compared to amalgam, polymerization shrinkage of the material, incorrect adaptation of the matrix system, inappropriate choice of matrix system, etc. (Wirsching, et al, Burke, et al., 2001, Saber, et al., 2011).

The matrix as a device aims to create a temporary wall corresponding to the missing tooth structure, which will allow the application and adaptation of the restorative material to most accurately restore the anatomical and functional integrity of the tooth (Prakki, et al., 2004). Creating an adequately shaped proximal surface and, at the same time, a tight interdental contact is a difficult task, especially in the distal areas of the dentition (Prakki, et al., 2004). This reduces the risk of food retention, periodontal tissue damage, or the development of secondary carious lesions (Owens, at al., 2016).

Proximal contact plays an important role in the primary dentition. According to Raghu and Srinivasan, the ideal interdental contact has the following characteristics: (1) acts as a stabilizer of the dental arch by transmitting chewing forces along the axis of the tooth; (2) protects the interdental papilla; (3) does not affect speech in anterior teeth; (4) has good aesthetic characteristics (Raghu, et al., 2011). Incorrect proximal contact leads to clinical failure due to increased plaque accumulation and food retention, periodontal changes, tooth migration, development of secondary carious lesions, etc. (Chisini, et al., 2018, Finucane, et al., 2019, Pinto, et al., 2014, Cumerlato, et al. 2019).

Various studies have attempted to overcome the existing problems in the restoration of class II defects by improving the filling material's characteristics, using different restoration techniques, and properly selecting and applying the matrix system (Wirsching, et al., 2011).

There is lack of information in the literature on the tightness of the proximal contact and the morphology of proximal restorations in the primary dentition (Cerdán, et al., 2021). There is also a lack of studies comparing sectional and circumferential matrices for primary molar restorations. The anatomical characteristics of primary molars, such as their specific proximal morphology, flat proximal contacts with cervical constriction (Mathewson, et al., 2014, Walia et al., 2021, Kirthiga et al., 2018), warrant a detailed study to determine the most appropriate combination of filling material/matrix system for the restoration of proximal lesions in primary molars.

Aim: The aim of this study was to evaluate the influence of the matrix system and filling material on the proximal wall morphology and the contact tightness in Class II restorations of primary molars.

2. MATERIALS AND METHODS

Plastic primary and first permanent molars (Frasaco, Tettnang, Germany) were mounted on a lower Frasaco phantom model with mixed dentition. On the second primary molar, an occlusal-medial and occlusal-distal class II cavities with dimensions of 3x4x2 mm (buccolingualy, occlusal-gingivally, and mesiodistally) were prepared. In this way, 240 teeth were prepared - 120 from tooth 75 and 120 from tooth 85. The teeth were randomly divided into the following groups:

Group 1: 40 teeth - 20 teeth 75 and 20 teeth 85 - restored with Dyract Extra Universal Compomer (Dentsply Sirona, North Carolina, United States), layering restoration technique, and myJunior Kit sectional matrix system (Polydentia, Mezzovico-Vira, Switzerland). Light curing was performed with a photopolymerization lamp (Elipar, Dentsply) for 20 seconds for each layer. Appropriate-size wedges from the matrix system kit were used.

Group 2: 40 teeth - 20 teeth 75 and 20 teeth 85 - restored with Dyract Extra Universal Compomer, layering restoration technique, and Palodent® Plus sectional matrix system (Dentsply Sirona). Light curing was performed with a photopolymerization lamp (Elipar, Dentsply) for 20 seconds for each layer. Appropriate-size wedges from the matrix system kit were used.

Group 3: 40 teeth - 20 teeth 75 and 20 teeth 85 - restored with Dyract Extra Universal Compomer, layering restoration technique and myQuickmat All-round matrix system (Polydentia). Light curing was performed with a photopolymerization lamp (Elipar, Dentsply) for 20 seconds for each layer. Appropriate-size wooden wedges were used.

Group 4: 40 teeth - 20 teeth 75 and 20 teeth 85 - restored with flowable light-curing material Xtra base Bulk (Voco, Cuxhaven, Germany), bilk-fill restoration technique and myJunior Kit sectional matrix system. Light curing was performed with a photopolymerization lamp (Elipar, Dentsply) for 40 seconds. Appropriate-size wedges from the matrix system kit were used.

Group 5: 40 teeth - 20 teeth 75 and 20 teeth 85 - restored with flowable light-curing material Xtra base Bulk, bilk-fill restoration technique and Palodent® Plus sectional matrix system. Light curing was performed with a photopolymerization lamp (Elipar, Dentsply) for 40 seconds. Appropriate-size wedges from the matrix system kit were used.

Group 6: 40 teeth - 20 teeth 75 and 20 teeth 85 - restored with flowable light-curing material Xtra base Bulk, bilk-fill restoration technique and myQuickmat All-round matrix system. Light curing was performed with a photopolymerization lamp (Elipar, Dentsply) for 40 seconds. Appropriate-size wooden wedges were used.

Contact tightness assessment: The contact tightness of the proximal restorations was examined by inserting a different number of metal flat matrices (Microdont, Sao Paulo, Brazil) with a thickness of 0.05 mm. The metal matrices were placed in the interdental space one by one, and the contact tightness was determined by counting the maximum number of placed matrices. The measurement was made in the two proximal contacts – to the first primary molar and to the first permanent molar.

Microscopic observation and evaluation of the restorations: After the restorations were completed, the primary teeth were removed from the typodont. Visually, the surface profile of the contact morphology was assessed and classified as flat, convex, or concave. Their marginal adaptation was also assessed according to the following criteria: presence of a step and/or voids. The examination was performed under a dental microscope (Semorr 3000E, Semorr Medical Tech Co., Jiangsu, China).

Statistical analysis: Statistical analysis was conducted using the computer software SPSS v.19.0 (SPSS Inc., Chicago, IL, USA). The data were analyzed using a non-parametric test (Mann-Whitney U Test, chi-squared test) because the assumption of normality could not be met (Shapiro-Wilk test, $p<0.05$). The significance level was set at $p=0.05$.

3. RESULTS

The data on the contact tightness to the first primary molar after the completion of medial obturation of the second primary molar are presented in Table 1.

Results indicate that the Palodent matrix system provided the tightest contacts when using compomer material, while the myJuniorKit system exceled with bulk-fill composites. Different groups showed varying statistical differences, but generally had good contact tightness except for the cases where the myQuickmat matrix system was combined with XtraBase restorative material.

For the first permanent molars 36 and 46, the myJunior matrix system consistently provided the tightest contacts, irrespective of the restorative material. Conversely, the circumferential matrix system resulted in the loosest contact (Table 2). These findings are supported by statistically significant differences in the data.

The visual microscopic assessment of the contour of the restorations (flat, convex, concave) is presented in Tables 3 and 4.

A convex restoration profile is typically observed with the myJunior matrix system (groups 1 and 4), while a flat profile is usually seen with the circumferential matrix system (groups 3 and 6). This difference is statistically significant.

Table 1. Contact tightness to tooth 74/84

Groups	Mean +/- SD (number of matrices)	Mann-Whitney U test
Group 1 – Dyract - myJunior	1.5 ± 0.641	$p_{1,2}$=0.899, $p_{1,3}$=0.857, $p_{1,4}$=0.489,
Group 2 – Dyract -Palodent	1.48 ± 0.506	$p_{1,5}$=0.151, $p_{1,6}$=0.001, $p_{2,3}$=0.773,
Group 3 – Dyract - myQuickamat	1.60 ± 0.928	$p_{2,4}$=0.528, $p_{2,5}$=0.147, $p_{2,6}$<0.001,
Group 4 – XtraBase- myJunior	1.60 ± 0.672	$p_{3,4}$=0.482, $p_{3,5}$=0.209, $p_{3,6}$=0.006,
Group 5 – XtraBase-Palodent	1.75 ± 0.776	$p_{4,5}$=0.424, $p_{4,6}$=0.004, $p_{5,6}$=0.041
Group 6 – XtraBase-myQuickmat	2.13 ± 0.822	

Table 2. Contact tightness to tooth 36/46

Groups	Mean +/- SD (number of matrices)	Mann-Whitney U test
Group 1 – Dyract - myJunior	2.0 ± 1.109	$p_{1,2}$=0.051, $p_{1,3}$<0.001, $p_{1,4}$=0.147,
Group 2 – Dyract -Palodent	2.40 ± 0.672	$p_{1,5}$<0.001, $p_{1,6}$<0.001, $p_{2,3}$<0.001,
Group 3 – Dyract - myQuickamat	3.40 ± 0.496	$p_{2,4}$=0.457, $p_{2,5}$=0.001, $p_{2,6}$<0.001,
Group 4 – XtraBase- myJunior	2.30 ± 0.911	$p_{3,4}$<0.001, $p_{3,5}$<0.001, $p_{3,6}$=0.075,
Group 5 – XtraBase-Palodent	2.90 ± 0.545	$p_{4,5}$=0.001, $p_{4,6}$<0.001. $p_{5,6}$<0.001
Group 6 – XtraBase-myQuickmat	3.60 ± 0.496	

Table 3. Microscopic assessment of the contour of the proximal wall to teeth 74/84

Countour	Convex		Flat		Concave		Chi-square
Groups	N	%	N	%	N	%	
Group 1 – Dyract - myJunior	32	80%	8	20%	0	0%	$p_{1,2}$<0.001, $p_{1,3}$<0.001,
Group 2 – Dyract -Palodent	3	77.5%	8	20%	1	2.5%	$p_{1,4}$=0.118, $p_{1,5}$=0.001,
Group 3 – Dyract - myQuickamat	12	30%	28	70%	0	0%	$p_{1,6}$=0.002, $p_{2,3}$<0.001, $p_{2,4}$<0.001, $p_{2,5}$<0.001,
Group 4 – XtraBase- myJunior	32	80%	8	20%	0	0%	$p_{2,6}$=0.001, $p_{3,4}$<0.001, $p_{3,5}$=0.116, $p_{3,6}$=0.009,
Group 5 – XtraBase- Palodent	16	40%	24	60%	0	0%	$p_{4,5}$<0.001, $p_{4,6}$<0.001, $p_{5,6}$=0.428
Group 6 – XtraBase- myQuickmat	15	37.5%	20	32.5%	5	12.5%	

Table 4. Microscopic assessment of the contour of the proximal wall to teeth 36/46

Countour Groups	Convex		Flat		Concave		Chi-square
	N	%	N	%	N	%	
Group 1 – Dyract - myJunior	36	90%	4	10%	0	0%	$p_{1,2}$<0.001, $p_{1,3}$<0.001, $p_{1,4}$=0.644, $p_{1,5}$=0.002,
Group 2 – Dyract -Palodent	19	47.5%	20	50%	1	2.5%	$p_{1,6}$<0.001, $p_{2,3}$=0.052,
Group 3 – Dyract - myQuickamat	12	30%	28	70%	0	0%	$p_{2,4}$<0.001, $p_{2,5}$=0.049, $p_{2,6}$=0.009, $p_{3,4}$<0.001,
Group 4 – XtraBase- myJunior	36	90%	4	10%	0	0%	$p_{3,5}$=0.007, $p_{3,6}$=0.003, $p_{4,5}$=0.002, $p_{4,6}$<0.001,

Countour Groups	Convex		Flat		Concave		Chi-square
	N	%	N	%	N	%	
Group 5 – XtraBase-Palodent	23	57.5%	16	40%	1	2.5%	$p_{5,6}$<0.001
Group 6 – XtraBase-myQuickmat	8	20%	31	77.5%	1	2.5%	

When restoring distal surface of second primary molars, the convex shape is most often found in those using the MyJuniorKit matrix system. The flat profile is often found in restorations made with Palodent or myQuickmat, and the difference is statistically significant.

The presence or absence of voids is presented in Tables 5 and 6.

The table shows that the risk of void formation on the surface contacting the first primary molar exists when using condensable filling materials but not when using bulk-fill material. Of all the samples examined, 9.16% were found to have voids and poor adaptation of the compomer to the gingival base.

Table 6 presents a similar trend observed and evaluated in the medial restorations of second primary molars. Voids were observed when compomer and layering restorative techniques were combined with Palodent or MyQuickmat matrix systems. In contrast, no voids were found when using the MyJunior matrix system or bulk fill composite for direct cavity restoration.

Tables 7 and 8 present the data on the presence of overhangs in the restorations.

Table 5. Presence of voids to the tooth 74/84

Voids	Yes		No		Chi-square
Groups	N	%	N	%	
Group 1 – Dyract - myJunior	4	10%	36	90%	$p_{1,2}$<0.001, $P_{1,3}$=0.210,
Group 2 – Dyract -Palodent	10	25%	25	50%	$p_{1,4}$=0.040, $P_{1,5}$=0.040,
Group 3 – Dyract - myQuickamat	8	20%	32	80%	$p_{1,6}$=0.040, $P_{2,3}$=0.005,
Group 4 – XtraBase- myJunior	0	0%	40	100%	$p_{2,4}$<0.001, $P_{2,5}$<0.001,
Group 5 – XtraBase-Palodent	0	0%	40	100%	$p_{2,6}$<0.001, $P_{3,4}$=0.003,
Group 6 – XtraBase-myQuickmat	0	0%	40	100%	$p_{3,5}$=0.003, $P_{3,6}$<0.001,

Table 6. Presence of voids to the tooth 36/46

Voids	Yes		No		Chi-square
Groups	N	%	N	%	
Group 1 – Dyract - myJunior	0	0%	40	100%	$p_{1,2}$=0.003, $p_{1,3}$=0.040,
Group 2 – Dyract -Palodent	8	20%	32	80%	$p_{2,3}$=0.052, $p_{2,4}$=0.210,
Group 3 – Dyract - myQuickamat	4	10%	36	90%	$p_{2,5}$=0.003, $p_{2,6}$=0.002,
Group 4 – XtraBase- myJunior	0	0%	40	100%	$p_{3,4}$=0.040, $p_{3,5}$=0.040,
Group 5 – XtraBase-Palodent	0	0%	40	100%	$p_{3,6}$=0.040.
Group 6 – XtraBase-myQuickmat	0	0%	40	100%	

Table 7. Presence of an overhangs area towards tooth 74/84

Overhangs	Yes		No		Chi-square
Groups	N	%	N	%	
Group 1 – Dyract - myJunior	0	0%	40	100%	$p_{1,2}$=0.040, $p_{1,3}$=0.003,
Group 2 – Dyract -Palodent	4	10%	36	90%	$p_{1,4}$<0.001, $p_{1,5}$<0.001,
Group 3 – Dyract - myQuickamat	8	20%	32	80%	$p_{1,6}$<0.001, $p_{2,3}$=0.210,
Group 4 – XtraBase- myJunior	12	30%	28	70%	$p_{2,4}$=0.025, $p_{2,5}$<0.001,
Group 5 – XtraBase-Palodent	32	80%	8	20%	$p_{2,6}$<0.001, $p_{3,4}$=0.302,
Group 6 – XtraBase-myQuickmat	32	80%	8	20%	$p_{3,5}$<0.001, $p_{3,6}$<0.001, $p_{4,5}$=0.002, $p_{4,6}$=0.002, $p_{5,6}$=0.610

Table 8. Presence of an overhangs area towards tooth 36/46

Overhangs	Yes		No		Chi-square
Groups	N	%	N	%	
Group 1 – Dyract - myJunior	4	10%	36	90%	$p_{1,2}$=0.040, $p_{1,3}$<0.001,
Group 2 – Dyract -Palodent	8	20%	32	80%	$p_{1,4}$=0.002, $p_{1,5}$<0.001,
Group 3 – Dyract - myQuickamat	20	50%	20	50%	$p_{1,6}$<0.001, $p_{2,3}$=0.005,
Group 4 – XtraBase- myJunior	16	60%	24	40%	$p_{2,4}$=0.051, $p_{2,5}$<0.001,
Group 5 – XtraBase-Palodent	24	60%	16	40%	$_{2,6}$<0.001, $p_{3,4}$=0.369,
Group 6 – XtraBase-myQuickmat	24	60%	16	40%	$p_{3,5}$=0.369, $p_{3,6}$=0.369, $p_{4,5}$=0.074, $p_{4,6}$=0.074, $p_{5,6}$=0.590

The data show real risks for presence of overhangs towards the gingival floor when using bulk-fill composite materials. Overhangs, forming on the gingival base is unlikely if a paste-like composite material is used to restore class II cavities in the primary dentition. Most overhangs are reliably found with bulk-fill restorative material and the myQuickmat circumferential matrix system.

In Class II defects on the distal surface of second primary molars, overhang formation is possible if a circumferential matrix system is used. There is a small risk if a sectional matrix system and compomer filling material are combined (groups 1 and 2). Statistically significant differences support the data.

4. DISCUSSION

Reproduction of interproximal contact is one of the main goals of restorative treatment (Chuang, et al., 2011). Proper contact between two adjacent teeth is essential for maintaining tooth position, stability, good hygiene in the proximal areas, and preventing food debris retention (Almaki, et al, 2019). The size, location, and shape of the proximal contact areas depend on the contours of the anatomical surface of the two adjacent proximal surfaces and their position - medial or distal (Almaki, et al, 2019). A well-formed, correctly positioned, tight proximal contact can protect the gingival tissues (Almaki, et al, 2019). There are a variety of matrix systems on the market – pre-contoured, non-contoured, straight, sectional, circumferential, and others. However, we have hardly found any study evaluating them in the primary dentition. Determining the ideal matrix system for proximal restorations helps to establish good contacts and contours that maintain the natural interdental space in young children. Our study aimed to determine the most appropriate matrix system/restorative material combination for Class II restorations in mandibular primary molars, selecting the most commonly used matrix systems in the primary dentition (MyJuniorKit, Palodent Plus, myQuickmat All-round). MyJunior kit is a sectional matrix system that restores primary molars (online). Quickmat All-round is a circumferential matrix system designed to fabricate anatomical restorations of distal teeth with missing structures (online). Palodent® Plus is a sectional matrix system that provides tight and precise contacts, with natural contours (online).

Contact tightness can vary in strength. A loose contact may result in food retention, while a tight contact may cause discomfort and difficulties while using dental floss (Abbassy, et al., 2023). Clinicians most commonly use different matrices or metal strips to assess contact tightness. Some authors evaluated the contact of Class II premolar restorations using matrices and found that the average number of retained flat metal matrices in the interdental space was between 1.4 and 2.7 (Chuang, et al., 2011). Using a sectional matrix system increases the contact tightness (Chuang, et al., 2011). The authors also found that contact tightness was more dependent on the type of matrix than on the composite material used for the restoration (Chuang, et al., 2011). Our data confirm this trend – significantly tighter contacts are obtained using a sectional matrix system not depending on the filling materials used in the study (Tables 1 and 2). Significantly weaker contacts are recorded if the matrix system used is circumferential (Tables 1 and 2). It is difficult to determine which matrix system is most suitable for restoring severely decayed primary molars (Dindukurthi, et al., 2021). FenderMate, T-band, and Pro-Matrix show promising results in restoring proximal contacts and contours, but none of the systems can create 100% accurate proximal contacts and contours (Dindukurthi, et al., 2021). Our data show that the MyJunior matrix system, designed specifically for primary teeth, can most accurately reproduce the proximal zone of primary molars, whose equator is located cervically in the proximal area. Similar data are recorded when using another sectional matrix system – Palodent. Several studies report the effectiveness of specific matrix systems (Abbassy, et al., 2023, Cenci, et al., 2006). The contact can be classified as open, tight, or optimal, as the Palodent V3 sectional matrix system forms significantly tighter contacts than the circumferential Tofflemire matrix system (Faras, et al., 2018).

When assessing the tightness of the proximal contact area using Unifloss and a standardized metal blade with a thickness of 30 µm, better results were found using the Palodent and Palodent Plus systems (Kumari, et al., 2023). In the present study, different numbers of flat metal strips were used to enter the interdental space to assess the tightness of the contact. The highest mean number of matrices – 3.6, was found with the bulk-fill material and the myQuickmat matrix system (Table 2). A digital force gauge measured the force to remove a 0.05 mm thick matrix from the interdental space, finding the Trimax contact tool and Palodent Plus matrix system achieved the best proximal contact tightness (Abbassy, et al., 2023). Proximal contact tightness can be determined using a universal testing machine (Instron model 3345) (Tolba, et al., 2023). The data show that the sectional matrix system matrix provided statistically significantly tighter contacts than the circumferential matrix group (Tolba, et al., 2023). A similar trend was observed in the present study (Tables 1 and 2).

Using a circumferential matrix system leads to the formation of flatter contours. In contrast, more convex contours are formed when sectional matrix systems are used – Palodent or MyJuniorKit (Shin, et al., 2023). Convex tooth surfaces are not observed in restorations of lower second molars (Shin, et al., 2023). Our data showed different results. MyJuniorKit is the matrix system in which convex contact surfaces are most often formed, while flat ones are more often found in Palodent or MyQuickmat (Tables 3 and 4). Another study found flatter contours of restorations when using the Saddle matrix compared to Palodent (Kumari, et al., 2023). According to another study, *In vitro* matrix systems (FenderMate, T-band, Pro-Matrix) restore proximal contacts and contours in the primary dentition (Dindukurth,i et al., 2021). The shape of restorations made with a contoured matrix varies considerably depending on the restorative material used (Cerdán, et al., 2021). When composite materials are used, convex or irregular surfaces of the proximal restorations are mainly observed (Cerdán, et al., 2021). The type of composite material and the restorative technique do not affect the proximal restorations as much as the type of matrix (Cerdán, et al., 2021, El-Shamy et al., 2019).

Polymerization shrinkage is another factor affecting proximal composite restorations' contact tightness (El-Shamy et al., 2012). Bulk-fill composites show reduced shrinkage during polymerization compared with conventional resin composites, but this does not seem sufficient to change the tightness of the contact point. Our study found that voids are unlikely to form when flowable bulk-fill materials are used (Tables 5 and 6). The risk of overhangs formation is exceptionally high when a circumferential matrix system is used (Tables 7 and 8).

5. CONCLUSION

Despite advances in preventive dentistry, carious lesions in the primary molars remain challenging in modern clinical practice. The effectiveness of the proximal contour of primary teeth restorations is influenced more by the type of matrix system used than by the filling material or filling technique. Using sectional matrix systems designed explicitly for primary teeth (MuJuniorKit) significantly improves the proximal contacts of Class II composite restorations in primary molars. Circumferential matrices have a higher risk of edge formation than sectional matrices, and a higher risk of void formation is seen with compomers and layering restoration techniques.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Authors hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

ACKNOWLEDGEMENTS

The article was developed with the support of a scientific project “Grant-2023”, Contract No. 184/03.08.2023.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Abbassy, K.M., Elmahy, W.A., & Holiel, A.A. (2023). Evaluation of the proximal contact tightness in class II resin composite restorations using different contact forming instruments: a 1-year randomized controlled clinical trial. BMC Oral Health, 23(1):729.

Almalki, A.D., & Al-Rafee, M.A. (2019) Evaluation of presence of proximal contacts on recently inserted posterior crowns in different health sectors in Riyadh City, Saudi Arabia. Journal of Family Medicine and Primary Care, 8(11):3549-3553.

Burke, F.J., & Shortall, A.C. (2001). Successful restoration of loadbearing cavities in posterior teeth with direct replacement resin-based composite. Dental Update, 28:388–398.

Cenci, M.S., Lund, R.G., Pereira, C.L., de Carvalho, R.M., & Demarco, F.F. (2006). In vivo and *In vitro* evaluation of Class II composite resin restorations with different matrix systems. Journal of Adhesive Dentistry, 8(2):127-32.

Cerdán, F., Ceballos, L., & Fuentes, M.V. (2021). Quality of approximal surfaces of posterior restorations in primary molars. Journal of Oral Science, 63(4):347-351.

Chisini, L.A., Collares, K., Cademartori, M.G., de Oliveira, L., Conde, M., Demarco, F.F., et al. (2018). Restorations in primary teeth: a systematic review on survival and reasons for failures. International Journal of Paediatric Dentistry, 28(2):123-139.

Chuang, S.F., Su, K.C., Wang, C.H., & Chang, C.H. (2011). Morphological analysis of proximal contacts in class II direct restorations with 3D image reconstruction. Journal of Dentistry, 39(6):448-56.

Cumerlato, C., Demarco, F.F., Barros, A.D., Peres, M.A, Peres, K.G, Morales Cascaes, A., et al. (2019). Reasons for direct restoration failure from childhood to adolescence: A birth cohort study. Journal of Dentistry, 89:103183.

Dindukurthi, M.K., Setty, J.V., Srinivasan, I., Melwani, A., Hegde, K.M., & Radhakrishna, S. (2021). Restoration of Proximal Contacts in Decayed Primary Molars Using Three Different Matrix Systems in Children Aged 5–9 Years: An In Vivo Study. International Journal of Clinical Pediatric Dentistry, 14(1):70–74.

El-Housseiny, A., Alamoudi, N.M., Nouri, S., & Felemban, O. (2019). A randomized controlled clinical trial of glass carbomer restorations in Class II cavities in primary molars: 12-month results. Quintessence International, 50(7):522-532.

El-Shamy, H., Saber, M.H., Dörfer, C.E., El-Badrawy, W., & Loomans, B.A. (2012). Influence of volumetric shrinkage and curing light intensity on proximal contact tightness of class II resin composite restorations: *In vitro* study. Operative Dentistry, 37(2):205-210.

El-Shamy, H., Sonbul, H., Alturkestani, N., Tashkandi, A., Loomans, B.A., Dörfer, C., et al. (2019). Proximal contact tightness of class Ⅱ bulk-fill composite resin restorations: An *In vitro* study. Dental Materials Journal, 38(1):96-100.

Faras, R., Ghivari, S., Pujar, M., & Pkhatri, M. (2018). Evaluation of proximal contact tightness in class II composite restorations in molars using circumferential matrix band system and palodent v3 sectional matrix system - an *In vitro* study. Indian Journal of Research, 7(11):16-18.

Finucane, D. (2019). Restorative treatment of primary teeth: an evidence-based narrative review. Australian Dental Journal, 64 Suppl 1:S22-S36.

Kirthiga, M., Muthu, M.S., Kayalvizhi, G., & Krithika, C. (2018). Proposed classification for interproximal contacts of primary molars using CBCT: a pilot study. Wellcome Open Research, 3:98.

Kumari, S., Raghu, R., Shetty, A., Rajasekhara, S., & Padmini, S.D. (2023). Morphological assessment of the surface profile, mesiodistal diameter, and contact tightness of Class II composite restorations using three matrix systems: An *In vitro* study. Journal of Conservative Dentistry, 26(1):67-72.

Mathewson, R.J., Primosch, R.E. (2014). Morphology of the primary teeth. In: Mathewson RJ, Primosch RE, eds. Fundamentals of Pediatric Dentistry. 3rd ed. Batavia, III., USA: Quintessence Publishing Co;2014;197.

MyJuniorKit, Official website of the brand Polydentia, page with description about the product MyJuniorKit. https://polydentia.ch/en/product/matrix-system-myjunior-kit/

MyQuickmat All-round API, Official website of the brand Polydentia, page with description about the product MyQuickmat All-round API. https://polydentia.ch/en/product/myquickmat-all-round-api/

Owens, B.M., & Phebus, J.G. (2016). An evidence-based review of dental matrix systems. General Dentistry, 64(5):64-70.

Palodent Plus Sectional matrix system. https://www.dentsplysirona.com/en-us/discover/discover-by-brand/palodent-family/palodent-plus.html

Peumans, M., Van Meerbeek, B., Asscherickx, K., Simon, S., Abe, Y. Lambrechts, P. et al. (2001). Do condensable composites help to achieve better proximal contacts? Dental Materials, 17(6):533-541.

Pinto, G., Oliveira, L.J., Romano, A.R., Schardosim, L.R., Bonow, M., Pacce, M. et al. (2014). Longevity of posterior restorations in primary teeth: results from a paediatric dental clinic. Journal of Dentistry, 42(10):1248-1254.

Prakki, A., Otávio Chalup Saad, J., & Rodrigues, J.R. (2004). Clinical evaluation of proximal contacts of Class II esthetic direct restorations. Quintessence International, 35(10):785–9.

Raghu, R., & Srinivasan, R. (2011). Optimizing tooth form with direct posterior composite restorations. Journal of Conservative Dentistry, 14(4):330-6.

Saber, M.H., El-Badrawy, W., Loomans, B.A., Ahmed, D.R., Dörfer, C.E., & El Zohairy, A. (2011) Creating tight proximal contacts for MOD resin composite restorations. Operative Dentistry, 36(3):304-310.

Shin, H., Lee, N., Song, J., Kim, J.S., & Jih, M. (2023). Morphological Assessment of Proximal Restoration Depending on Different Matrix Systems in Primary Molars with a 3D Scanner: *In vitro* Studies. Journal of Korean Academy of Pediatric Dentisttry, 50(4):396-408.

Tolba, Z.O., Oraby, E., & Abd El Aziz, P.M. (2023) Impact of matrix systems on proximal contact tightness and surface geometry in class II direct composite restoration in-vitro. BMC Oral Health, 23(1):535.

Walia, T., Kirthiga, M., Brigi, C., Muthu, M.S., Odeh, R., Pakash Mathur, V., et al. (2021). Interproximal contact areas of primary molars based on OXIS classification - a two centre cross sectional study. Wellcome Open Research, 5:285.

Wirsching, E., Loomans, B.A., Klaiber, B., & Dörfer, C.E. (2011). Influence of matrix systems on proximal contact tightness of 2- and 3-surface posterior composite restorations in vivo. Journal of Dentistry, 39(5):386-90.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2025): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/129748