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Spatial changes in the dental arch after premature extraction of the first primary molar – a 12-month observational study

Przestrzenne zmiany w łuku zębowym po jednostronnej przedwczesnej ekstrakcji pierwszego trzonowego zęba mlecznego – obserwacje 12-miesięczne

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Keywords

premature loss of the first primary molar, dental arch spatial changes, space maintainer

Summary

Introduction. Premature loss of the first primary molar may cause malocclusion or impair permanent tooth eruption.
Aim. The aim of the study was to assess spatial changes in the dental arch after unilateral premature extraction of the first primary molar.
Material and methods. The alginate impressions were taken in patients aged between 5 and 7 years who met the inclusion criteria based on medical history, clinical examination and panoramic x-ray during a preliminary qualifying examination 14 days before or on the day of extraction (before the procedure), as well as during follow up (at months 1, 3, 6 and 12 after extraction). Gypsum models were used to measure the circumference of the arch, the posterior and intercanine width, as well as the interdental distance: IIID-VM, IIID-VD on the side of extraction and the opposite side of the arch. The data were analysed statistically (Statistica 10, Statsoft, $p < 0.05$).
Results. A total of 14 mandibular and 16 maxillary teeth were extracted in 27 children aged between 5 and 7 years (mean age ± SD = 6.64 ± 1.01; 15 boys and 12 girls). A significant loss of interdental spaces for IIID-VM and IIID-VD between the study vs. control side due to distalisation of canine and mesialisation of the second primary molar was observed. Much less significant displacement of these teeth was noted in the case of the presence of the first permanent molar at the time of first primary molar extraction.
Conclusions. Premature loss of first primary molars results in reduced interdental distances which does not hinder the eruption of their permanent successors. There is no need for space maintainers.

Słowa kluczowe

przedwczesna utrata I zęba trzonowego mlecznego, zmiany przestrzenne łuku zębowego, utrzymywacz przestrzeni

Streszczenie

Wstęp. Przedwczesna utrata pierwszego zęba trzonowego mlecznego może prowadzić do wady zgryzu lub zaburzenia procesu wyrzynania zębów stałych.
Cel pracy. Celem pracy była ocena przestrzennych zmian w łuku zębowym po jednostronnej przedwczesnej ekstrakcji pierwszego zęba trzonowego mlecznego.
Materiał i metody. U pacjentów w wieku od 5. do 7. roku życia spełniających kryteria włączenia na podstawie wywiadu, badania klinicznego i pantomograficznego pobierano wyciski anatomiczne masą alginatową podczas wstępnego badania kwalifikującego w okresie do 14 dni przed ekstrakcją lub w dniu ekstrakcji przed jej prze-

prowadzeniem oraz podczas badań kontrolnych (1, 3, 6 i 12 miesięcy od ekstrakcji). Na modelach gipsowych zmierzono obwód łuku, tylną i międzykłową szerokość łuku, tylną i międzykłową długość łuku, odległości międzyzębowe: IIID-VM, IIID-VD po stronie ekstrakcji i przeciwnej stronie łuku. Dane poddano analizie statystycznej (Statistica 10, Statsoft, $p < 0,05$).

Wyniki. U 27 dzieci (średni wiek w latach ± SD = 6,64 ± 1,01; 15 chłopców i 12 dziewcząt) usunięto 14 zębów w żuchwie i 16 w szczęce. Zaobserwowano istotną utratę odległości międzyzębowych IIID-VM oraz IIID-VD pomiędzy stroną badaną i kontrolną na skutek dystalizacji kła i mezjalizacji II zęba trzonowego mlecznego. Istotnie mniej znaczące przemieszczenia tych zębów występowały w przypadku obecności w jamie ustnej I zęba trzonowego stałego w momencie ekstrakcji I zęba trzonowego mlecznego.

Wnioski. Przedwczesna utrata pierwszych zębów trzonowych mlecznych prowadzi do zmniejszenia odległości międzyzębowych w stopniu nieutrudniającym wyrzynania stałego następcy. Nie ma potrzeby stosowania utrzymywaczy przestrzeni.

Introduction

Premature loss of the first primary molar may result in adverse dental arch spatial changes and, consequently, malocclusion or impaired permanent tooth eruption.

It leads to distalisation of primary canine or mesialisation of the second primary molar, especially in the period of first permanent molar eruption (1).

These displacements may cause the first permanent molar to tilt towards the gap, as well as crowding of mixed and permanent dentition and arrested eruption of the permanent successors (2-5).

The opinions of doctors on the use of space maintainers in the case of the loss of the first primary molars before physiological tooth replacement are divergent (6). Literature contains both data supporting and negating the need for space maintainers. In a systematic review, Tunison et al. showed that the majority of studies on the subject fail to meet the quality criteria for methodology (7).

Aim

The aim of the study was to assess spatial changes in the dental arch after unilateral premature extraction of the first primary molar.

Material and methods

Patients aged between 5 and 7 years, with indications for extraction of a single first primary molar, no loss of other teeth in the dental arch, whose parents resigned from space maintainers, were included in the study. A written consent of parents/legal guardians for the child's participation in the study and child's cooperation were the inclusion criteria. Children with growth disorders, malocclusions, and confirmed congenital absence of tooth/teeth or the presence of supernumerary teeth were excluded from the study. The preliminary qualification examination (0) included medical history (information about chronic diseases, oral pain, parafunctions, orthodontic treatment); clinical dental examination for the presence of first primary molars with indications for extraction (e.g. tooth damage to an extent preventing conservative reconstruction, pulpopathies with inflamed peri-root tissue); an assessment of malocclusions (occlusion of dental arches in the transverse (midline, position of the lateral teeth), anteroposterior (horizontal bite, inter-arch tooth alignment, Angle's class), or vertical direction (vertical bite, lateral teeth contact)); radiological assessment for the presence of permanent tooth buds/supernumerary teeth based on panoramic radiography. Alginate impressions were collected from patients meeting the inclusion criteria during the preliminary examination which took place in the period of 14 days before or on the day of extraction (before the procedure). During follow-up (at 1, 3, 6 and 12 months after extraction), dental assessment was performed for the presence of teeth with indications for extraction or the loss of teeth since previous visit, as well as alginate impressions of the evaluated dental arch were taken. Alginate impressions were used to prepare gypsum models. The models were used to assess dental arch spatial changes by measuring the circumference of the arch, the posterior and intercanine width and length, as well as the interdental distance: distal surface of primary canine to mesial surface of second primary molar (IIID-VM) and distal surface of primary canine to distal surface of second primary molar (IIID-VD) on the side of extraction and the opposite side of the arch (fig. 1).

The data were analysed statistically (Statistica 10, Statsoft, $p < 0.05$; t-test, Mann-Whitney U test, Spearman's rank correlation). The study was approved by the Bioethics Committee of the Medical University of Warsaw (KB/47/2014).

Results

Among 44 patients qualified for the study based on the indication for a single molar extraction, 7 patients were excluded due to malocclusion (n = 4), lack of second premolar buds on examination (n = 1) and the presence of mesiodens (n = 2). A total of 37 patients meeting the inclusion criteria were enrolled in the study; however, 10 children were excluded during the 12-month follow-up due to further extractions. The final group included

27 children aged between 4.66 and 8.73 (mean age in years ± SD = 6.64 ± 1.01), including 15 boys and 12 girls. A total of 14 mandibular and 16 maxillary teeth were extracted in the study group.

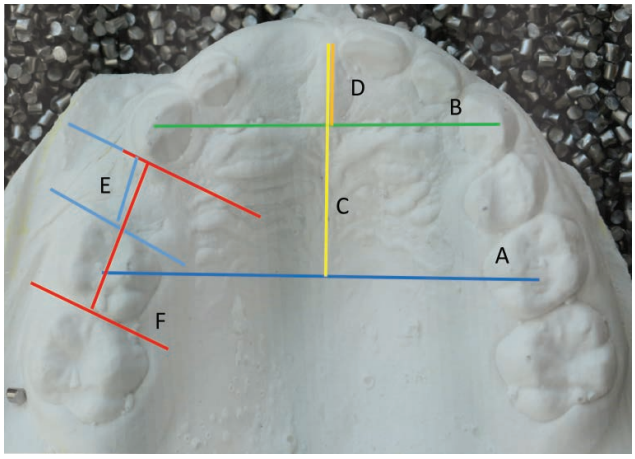

Fig. 1. Dental arch measurements: A – posterior and B – intercanine arch width, C – posterior and D – intercanine arch length, interdental distance: E – IIID-VM, F – IIID-VD

Interdental distances

The mean interdental distances were higher on the control side at each examination. We found negative correlations between IIID-VM in the study quadrant and the maxillary intercanine length and width, and a positive correlation between IIID-VD in the study quadrant and posterior mandibular length. There were significant differences in the mean IIID-VM in both arches between the study and the control side, except for the baseline measurement in the mandible (tab. 1). There were significant differences in the mean maxillary IIID-VD between the study and the control side at each examination, and only at months 6 and 12 in the case of the mandible.

The mean loss of maxillary IIID-VM distance was 0.88 (± 1.19) mm on the study side and 0.09 (± 0.64) mm on the control side during the follow-up period; the mean loss of mandibular IIID-VM distance was 0.96 (± 0.97) and 0.29 (± 0.47) mm, respectively. The mean loss of maxillary IIID-VD distance was 0.66 (± 1.34) mm on the side of extraction and 0.03 (± 0.56) mm on the opposing side; the same loss was 0.86 (± 1.25) and 0.21 (± 0.51) mm, respectively, for the mandible. Significantly different mean differences in the IIID-VM distance between the study and the control side on examinations 1-0, 3-0, 6-0 for the mandible and 3-0 and

Tab. 1. Mean interdental distances

Measurement	Arch	Mean IIID-VM [mm]	Difference	P	Mean IIID-VD [mm]	Difference	P
0	upper	B 7.156 / K 7.531	-0.375	0.029*	B 15.594 / K 15.938	-0.344	0.011*
	lower	B 7.929 / K 8.250	-0.321	0.133	B 17.250 / K 17.357	-0.107	0.596
1	upper	B 7.031 / K 7.469	-0.438	0.006*	B 15.438 / K 15.938	-0.500	0.006*
	lower	B 7.679 / K 8.250	-0.571	0.048*	B 17.143 / K 17.321	-0.179	0.336
3	upper	B 6.750 / K 7.469	-0.719	0.000*	B 15.344 / K 15.906	-0.563	0.005*
	lower	B 7.429 / K 8.214	-0.786	0.020*	B 17.036 / K 17.286	-0.250	0.355
6	upper	B 6.563 / K 7.406	-0.844	0.000*	B 15.188 / K 15.938	-0.750	0.000*
	lower	B 7.071 / K 8.000	-0.929	0.008*	B 16.643 / K 17.214	-0.571	0.033*
12	upper	B 6.281 / K 7.438	-1.156	0.003*	B 14.938 / K 15.906	-0.969	0.010*
	lower	B 6.964 / K 7.964	-1.000	0.016*	B 16.393 / K 17.143	-0.750	0.037*

*statistically significant

6-0 for the maxilla were noted. Significantly different mean differences in the IIID-VD distance between the study and the control side on examination 6-0 for both arches were observed (tab. 2).

Eruption of a permanent successor was observed in 7 patients on the study side and in none of patients on the control side.

A statistically significant difference in the change of interdental distances was found between the baseline and after 12 months (12-0) in the study quadrant, depending on the presence of the first permanent molar at baseline (tab. 3). No statistical differences in this measurement were found depending on the presence of the first permanent molar in the control quadrant. A significant positive correlation was

Tab. 2. Interdental distances (S – study side; C – control side)

Measurement	Dental arch	IIID-VM [mm]			IIID-VD [mm]		
		Mean	Difference	P	Mean	Difference	P
1-0 S	maxilla	-0.125 (± 0.22)	-0.063	0.333	-0.156 (± 0.44)	-0.156	0.264
1-0 C		-0.063 (± 0.25)			0.000 (± 0.32)		
1-0 S	mandible	-0.250 (± 0.38)	-0.250	0.029*	-0.107 (± 0.21)	-0.071	0.165
1-0 C		0.000			-0.036 (± 0.13)		
3-0 S	maxilla	-0.406 (± 0.42)	-0.344	0.029*	-0.250 (± 0.52)	-0.219	0.186
3-0 C		-0.063 (± 0.6)			-0.031 (± 0,34)		
3-0 S	mandible	-0.5 (± 0.52)	-0.464	0.009*	-0.214 (± 0.67)	-0.143	0.365
3-0 C		-0.036 (± 0.24)			-0.071 (± 0.27)		
6-0 S	maxilla	-0.594 (± 0.49)	-0.469	0.023*	-0.406 (± 0.55)	-0.406	0.018*
6-0 C		-0.125 (± 0.76)			0.000 (± 0.45)		
6-0 S	mandible	-0.857 (± 0.79)	-0.607	0.003*	-0.607	-0.464	0.017*
6-0 C		-0.250 (± 0.38)			-0.143		
12-0 S	maxilla	-0.875 (± 1.19)	-0.781	0.052	-0.66 (± 1.34)	-0.625	0.083
12-0 C		-0.094 (± 0.64)			-0.03 (± 0.56)		
12-0 S	mandible	-0.964 (± 0.97)	-0.679	0.014	-0.86 (± 1.25)	-0.643	0.073
12-0 C		-0.286 (± 0.47)			-0.21 (± 0.51)		
12-1 S	maxilla	-0.750 (± 1.21)	-0.719	0.062	-0.500 (± 1.17)	-0.469	0.173
12-1 C		-0.031 (± 0.46)			-0.031 (± 0.46)		
12-1 S	mandible	-0.714 (± 0.85)	-0.429	0.075	-0.750 (± 1.2)	-0.571	0.084
12-1 C		-0.286 (± 0,47)			-0.179 (± 0.46)		
12-3 S	maxilla	-0.469 (± 1.19)	-0.438	0.150	-0.406 (± 0.9)	-0.406	0.103
12-3 C		-0.031 (± 0.22)			0.000 (± 0.32)		
12-3 S	mandible	-0.464 (± 0.66)	-0.214	0.321	-0.643 (± 0.97)	-0.500	0.084
12-3 C		-0.250 (± 0.47)			-0.143 (± 0.31)		
12-6 S	maxilla	-0.281 (± 1.05)	-0.313	0.244	-0.250 (± 0.98)	-0.219	0.387
12-6 C		0.031 (± 0.22)			-0.031 (± 0.22)		
12-6 S	mandible	-0.107 (± 0.53)	-0.071	0.671	-0.250 (± 0.75)	-0.179	0.418
12-6 C		-0.036 (± 0.31)			-0.071 (± 0.18)		

*statistically significant

found between the difference in the interdental distance in the peri-extraction period and after a year on the study side and the presence of the first permanent molar in the quadrant (tab. 4).

Dental arch width

The mean baseline intercanine distance was 28.04 (± 2.53) mm in the mandible and 33.69 (± 3.24) mm in the maxilla, and the posterior distance was 39.57 (± 4.42) and 43.06 (± 3.98) mm, respectively. There were differences in the anterior arch width (the intercanine distance) between measurement at 12 months after extraction and earlier measurements. No statistically significant differences were found between baseline measurements (0) and the subsequent measurements for the anterior and posterior arch width [t-test] (tab. 5).

Dental arch length

The mean mandibular anterior arch length increased until month 12, and the mean maxillary anterior arch length after 12 months was lower compared to baseline.

Tab. 3. Changes in the interdental distances at 12-0 in the study quadrant depending on the presence of the first permanent molar at baseline (t-test)

Mean difference in the distance [mm]	The sixth tooth present in the study quadrant		t-test
	No	Yes	P
12-0 IIID-VM study side	-1.600	-0.575	0.011*
12-0 IIID-VM control side	-0.050	-0.250	0.369
12-0 IIID-VD study side	-1.500	-0.375	0.019*
12-0 IIID-VD control side	-0.100	-0.125	0.907

*statistically significant

The mean maxillary posterior arch length increased until the last measurement, while the mean mandibular posterior arch length decreased from the third month on (tab. 6).

Significant negative correlations were found between the anterior arch length and the IIID-VM distance on the study maxillary side and the anterior width in the maxilla, but only in the early period after extraction (tab. 7).

A significant positive correlation was found between IIID-VD at 3 months and the posterior arch length at 3, 6 and 12 months bilaterally in the mandible (S and C). No correlation was found between the posterior arch width and IIID-VD.

Arch circumference

There was a statistically significant difference in the maxillary arch circumference between baseline and examination at 12 months (tab. 8).

Discussion

There are only few literature reports on dental arch spatial changes secondary to extraction due to multiple factors that may disturb the results, as well as the lack of authors' consensus on the optimal time for conducting such observations (8). According to Richardson, the first 6 months are of key importance for verifying the loss of space (1). Other investigators recommend extending the evaluation period up to 12 months after extraction (9). In our study, observations were conducted for one year, which is a similar period compared to that used by other authors conducting similar research in recent years (8, 10, 11).

We assessed dental arch changes secondary to premature unilateral extraction of the first primary maxillary/mandibular molar. We observed a significant loss of IIID-VM and IIID-VD interdental distance in the study vs. control side in the first 6 months of the observational period (already after 1 month in the mandible) due to canine distalisation and second primary molar mesialisation. These results correspond to those presented

Tab. 4. The presence of the first permanent molar at baseline and the difference in the interdental distances at 12 months post-extraction (Spearman rank correlation)

Differences in the mean interdental distances [mm] – Spearman rank correlation	First permanent molar present in the study quadrant at baseline [T-1, N-0]	First permanent molar present in the control quadrant at baseline [T-1, N-0]
12-0 IIID-VM study side	0.453*	0.328
12-0 IIID-VM control side	-0.120	-0.323
12-0 IIID-VD study side	0.368*	0.247
12-0 IIID-VD control side	-0.049	-0.161

*statistically significant

Tab. 5. Arch width measurements

Mean intercanine distance/anterior arch width [mm] (± SD)			
Measurements	**Mandible**	**Maxilla**	**Total**
0	28.04 (± 2.53)	33.69 (± 3.24)	31.05 (± 4,07)
1	28.07 (± 2.59)	33.75 (± 3.2)	31.1 (± 4,07)
3	28.04 (± 2.52)	33.75 (± 3.2)	31.08 (± 4.07)
6	28.18 (± 2.6)	33.94 (± 3.23)	31.25 (± 4.12)
12	28.29 (± 2.58)	34.16 (± 3.22)	31.42 (± 4.15)
Mean posterior arch width [mm] (± SD)			
Measurements	**Mandible**	**Maxilla**	**Total**
0	39.57 (± 4.42)	43.06 (± 3.98)	41.43 (± 4.48)
1	39.57 (± 4.42)	43.06 (± 3.98)	41.43 (± 4.48)
3	39.57 (± 4.42)	43.06 (± 3.98)	41.43 (± 4.48)
6	39.61 (± 4.41)	43.06 (± 4.03)	41.45 (± 4.49)
12	39.61 (± 4.41)	43.13 (± 4.18)	41.48 (± 4.58)
Mean difference in the intercanine distance/anterior arch width [mm] (± SD)			
Measurements	**Mandible**	**Maxilla**	**Total**
12-0	0.25 (± 0.75)	0.47 (± 1.07)	0.37 (± 0.93)
12-1	0.21 (± 0.7)	0.41 (± 1)	0.32 (± 0.87)
12-3	0.25 (± 0.58)	0.41 (± 1)	0.33 (± 0.82)
12-6	0.11 (± 0.49)	0.22 (± 0.73)	0.17 (± 0.62)

Tab. 6. Arch length

Mean arch length [mm] (± SD)	**Anterior**			**Posterior**		
	Mandible	**Maxilla**	**Total**	**Mandible**	**Maxilla**	**Total**
0	6.57 (± 1.77)	10.47 (± 1.54)	8.65 (± 2.56)	21.68 (± 1.56)	25.22 (± 2.08)	23.57 (± 2.56)
1	6.64 (± 1.68)	10.53 (± 1.41)	8.72 (± 2.49)	21.71 (± 1.52)	25.22 (± 2.08)	23.58 (± 2.54)
3	6.82 (± 1.49)	10.63 (± 1.35)	8.85 (± 2.38)	21.64 (± 1.63)	25.13 (± 2.3)	23.5 (± 2.66)
6	6.82 (± 1.49)	10.69 (± 1.21)	8.88 (± 2.37)	21.64 (± 1.63)	25.25 (± 2.06)	23.57 (± 2.6)
12	6.86 (± 1.42)	10.28 (± 2.63)	8.68 (± 2.74)	21.54 (± 1.7)	25.53 (± 2.59)	23.67 (± 2.98)

Tab. 7. Correlations between the anterior arch length and width and the IIID-VM distance on the study side

Maxilla	IIID-VM distance on the study side [mm]					
	Measurements	0	1	3	6	12
Anterior arch length [mm]	0	-0.699*	-0.588*	-0.642*	-0.420	0.107
	1	-0.694*	-0.576*	-0.636*	-0.413	0.107
	3	-0.639*	-0.516*	-0.558*	-0.501*	0.085
	6	-0.630*	-0.516*	-0.536*	-0.493	0.072
	12	-0.514*	-0.430	-0.638*	-0.637*	0.149
Anterior arch width [mm]	0	-0.530*	-0.421	-0.342	0.016	0.378
	1	-0.524*	-0.439	-0.346	0.018	0.372
	3	-0.524*	-0.439	-0.346	0.018	0.372
	6	-0.574*	-0.523*	-0.397	-0.047	0.285
	12	-0.660*	-0.577*	-0.478	-0.147	0.114

* – statistically significant

Tab. 8. Arch circumference

Mean arch circumference [mm] (± SD)			
Measurements	**Mandible**	**Maxilla**	**Total**
0	70.79 (± 4.3)	79.06 (± 4.58)	75.2 (± 6.07)
1	70.93 (± 4.07)	78.81 (± 4.2)	75.13 (± 5.7)
3	71 (± 4.02)	79.13 (± 4.21)	75.33 (± 5.78)
6	70.86 (± 4.17)	80 (± 4.41)	75.73 (± 6.27)
12	71.71 (± 4.29)	80.5 (± 5.3)	76.4 (± 6.53)
Mean arch circumference [mm] (± SD)			
Measurements	**Mandible**	**Maxilla**	**Total**
1-0	0.14 (± 0.86)	-0.25 (± 1.13)	-0.07 (± 1.01)
3-0	0.21 (± 1.12)	0.06 (± 1.29)	0.13 (± 1.2)
3-1	0.07 (± 0.48)	0.31 (± 1.01)	0.2 (± 0.81)
6-0	0.07 (± 0.83)	0.94 (± 1.84)	0.53 (± 1.5)
6-1	-0.07 (± 0.92)	1.19 (± 1.8)	0.6 (± 1.57)
6-3	-0.14 (0.86)	0.88 (1.2)	0.4 (± 1.16)
12-0	0.93 (± 1.77)	1.44 (± 2.06)*	1.2 (± 1.92)
12-1	0.79 (± 1.89)	1.69 (± 2.3)	1.27 (± 2.13)
12-3	0.71 (± 1.73)	1.38 (± 1.89)	1.07 (± 1.82)
12-6	0.86 (± 1.41)	0.5 (± 1.63)	0.67 (± 1.52)

by Padma et al., who also observed a significant loss of interdental distances on the side of extraction (initially 8.23 ± 0.52 mm, which decreased to 6.4 ± 0.44 mm after 8 months; $p < 0.01$) (12). In their study in 2011, Lin et al. showed significantly reduced distance between distal canine surface and the distal primary second molar surface after a 12-month observational period ($p = 0.025$) (10). The difference between the study vs. control side was 1.08 mm compared to 0.86 mm in the above mentioned study for the same observational period. As reported by Lin and Chang (13), space loss is more common in the lower arch, as confirmed by our findings. Different findings were presented by Park et al. (14) and Macena et al. (15), who found no significant differences in interdental distances after premature loss of first primary molar.

Our study showed no statistically significant differences in dental arch width or length, which indicates that the changes in dental arches occurring within one year after extraction mainly involve primary canine distalisation and second primary molar mesialisation (towards the extracted tooth). Similar findings for a similar observational period were reported by Padma et al. (12), Lin et al. (10), Park et al. (14) and Macena et al. (15). The mean dental arch circumference increased by 0.93 mm in the mandible and 1.44 mm in the maxilla ($p > 0.05$) within a year ($p > 0.05$). The results for the lower dental arch obtained by other authors were also statistically insignificant (Padma). Lin et al. (10) found a statistically significant difference in maxillary circumference – 0.01 mm ($p = 0.043$).

We found much less significant tooth displacement (canine, second primary molar) in the presence of the first permanent molar in the oral cavity at the time of first primary molar extraction. These observations confirm the lack of indications for the use of space maintainers in such clinical cases (16, 17).

Difficulty in following up all qualified patients was one of the limitations of the study. Ten patients were excluded during the study due to the consequences of dental caries, which were the reason for further extractions, which could affect the results of observations.

To conclude, spatial changes in dental arches found in our study indicate no need for space maintainers after premature extraction of first primary molar. The loss of space is of little clinical importance and occurs mainly as a result of distal migration of the primary canine. A long-term (81 months) study conducted by Lin et al. (17) showed increased dimensions of dental arches, no mesialistion of first permanent molars or tilting of the second primary molars. It seems that the increase in dental arch length and width, both in the anterior and posterior sections, optimally compensates for space loss due to premature extraction of the first primary molar.

Conclusions

Premature loss of first primary molars results in interdental distances reduced to an extent that does not interfere with the eruption of a permanent successor. The loss of interdental distances increases in the case of unerupted first permanent molar during the peri-extraction period. Reduced interdental spaces affect maxillary inter-canine length and width and the posterior mandibular length, mainly as a result of primary canine distalisation. There is no need for space maintainers after a unilateral loss of the first primary molar in the presence of other teeth.

Conflict of interest
Konflikt interesów

None
Brak konfliktu interesów

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