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GTR with bioabsorbable barriers: Long-term results

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Objectives

Evaluation of the long-term results after GTR therapy of infrabony defects using 2 different bioabsorbable barriers after 5 years.

Material and Methods

Patients:

- 15 patients (3 male, 12 female) 22 to 64 years of age.
- untreated severe periodontitis.
- 15 pairs of contralateral infrabony defects.

Radiographic examination

- At baseline, 12, and 60 ± 3 months after GTR-therapy: standardized radiographs of all teeth with infrabony defects with modified film holders (VIP 2 film Positioning, UpRad Corp., Fort Lauderdale, FL, USA).
- Intraoral dental radiographs (Ultra-speed, Eastman Kodak Co., Rochester, NY, USA), size 2 film.
- X-ray source (Heliodent 70, 70 kV, 7 mA, Siemens, Bensheim, Germany).
- Development unit (Periomat, Dürr Dental GmbH, Bietigheim-Bissingen, Germany).

Clinical examinations:
at baseline, 12, and 60 ± 3 months after GTR-therapy at 6 sites per tooth:

- Gingival (GI) and Plaque Index (PlI).
- PD and PAL-V to the nearest 0.5mm (PCPUNC 15; Hu Friedy, Chicago, USA).

Periodontal surgery:
GTR therapy:

- 15 defects: polydioxanone barrier (Mempol, Ethicon, Norderstedt, Germany); test group.
- 15 defects: polylactide acetyltributyl citrate barrier (Guidor, Guidor AB, Huddinge, Sweden); control group.

Radiographic measurements:

- Digitization of all radiographs with a flatbed scanner (Linotype Saphir, Friadent AG, Mannheim, Germany) with a resolution of 600 x 1200 dpi.
- All further measurements were made using a computer program (Friacom 2.5, Friadent AG, Mannheim, Germany): with 9.5x magnification.
- Marking of the ends of the maxillary wire on the radiographs and entering of its actual length. All further measurements were adjusted automatically for magnification.
- Measurement of the distances CEJ-BD (Figs. 1, 2).

Fig. 1 a, b, c: standardized radiographs of an infrabony defect mesial 45 at baseline (a), 12 (b), and 60 months (c) after GTR-therapy with a polydioxanone barrier: CEJ (cemento-enamel junction), BD (most apical extension of bony defect).

Fig. 2 a, b, c: standardized radiographs of an infrabony defect distal 35 at baseline (a), 12 (b), and 60 months (c) after GTR-therapy with a polylactide acetyltributyl citrate barrier: CEJ (cemento-enamel junction), BD (most apical extension of bony defect).

Definition of landmarks: If the CEJ was destroyed by a restoration, its margin was taken as reference. BD: the most coronal point where the periodontal ligament space showed continuous width. If no periodontal ligament space was identified, the point where the projection of AC crossed the root surface was taken as the landmark. If both structures could be identified at one defect, the point defined by the periodontal ligament was used as BD. If several bony contours could be identified, the most apical point that crossed the rootsurface was defined as BD (Figs. 1, 2).

- All radiographic measurements were performed by two examiners blinded to the clinical measurements and repeated after 7 days: DK and BP. To reduce error the means of all 4 measurements were entered into analysis.

Statistical analysis:

- Statistical unit: patient
- Kolmogorov-Smirnov/ Lilliefors-test for normal distribution.
- Comparison of clinical and radiographic parameters from baseline to 12 and 60 months after surgery and between test and control with paired t tests.

Results

Results I

- 13 of 15 patients were available for the 60-months re-examination: 1 patient did not reappear for the 60 months re-examination, 1 patient deceased after the 12 months re-examination.
- PlI and GI at baseline, 12, and 60 months after surgery are given in Tab. 1 and 2.
- Both groups showed a statistically significant PD reduction ($P < 0.001$), PAL-V gain ($P \leq 0.001$), and bony fill 12 and 60 months after surgery (Tab. 4, 5, 7).
- Both groups showed a statistically significant PAL-V loss from 12 to 60 months ($P < 0.05$) (Tab. 5).
- 60 months after GTR therapy 3 defects in the control group and 1 in the test group had PAL-V loss ≥ 3 mm compared to the 12 months re-examination.
- The study failed to show statistically significant differences between test and control group regarding PD reduction, PAL-V gain, and bony fill 12 and 60 months after surgery.

Results II

	Polylactide	Polydioxanone	Difference	*P*
Baseline	0.23 ± 0.60	0.08 ± 0.28	0.15 ± 0.38	0.157
12 months	0.62 ± 0.87	0.46 ± 0.78	0.15 ± 0.99	0.516
Change	0.39 ± 0.96	0.39 ± 0.65	0.00 ± 1.23	1.000
P	0.131	0.059		
60 months	0.39 ± 0.77	0.46 ± 0.78	-0.08 ± 0.28	0.317
Change	0.15 ± 1.07	0.39 ± 0.87	-0.23 ± 0.44	0.083
P	0.581	0.129		

Tab. 1: Plaque Index (n=13).

	Polylactide	Polydioxanone	Difference	*P*
Baseline	1.54 ± 0.88	1.69 ± 0.75	-0.15 ± 0.55	0.317
12 months	0.31 ± 0.75	0.39 ± 0.77	-0.08 ± 1.04	0.705
Change	-1.23 ± 1.01	-1.31 ± 0.95	-0.08 ± 1.19	0.888
P	0.005	0.004		
60 months	1.15 ± 0.99	0.46 ± 0.89	0.69 ± 0.95	0.034
Change	-0.39 ± 1.61	-1.23 ± 1.30	-0.85 ± 1.28	0.039
P	0.441	0.011		

Tab. 2: Gingival Index (n=13)

	Polylactide	Polydioxanone	Difference	*P*
Baseline	7.35 ± 1.94	7.31 ± 1.20	0.04 ± 1.80	0.94
12 months	2.42 ± 0.91	3.15 ± 1.35	0.15 ± 0.99	0.046
Change	-4.92 ± 2.01	-4.15 ± 1.56	0.00 ± 1.23	0.211
P	< 0.001	< 0.001		
95% Confidence Interval			-2.04 ± 0.50	
60 months	3.39 ± 1.12	3.69 ± 1.49	-0.31 ± 1.38	0.436
Change	-3.96 ± 1.34	3.62 ± 1.61	-0.35 ± 1.81	0.503
P	< 0.001	< 0.001		
95% Confidence Interval			0.75 ± 1.44	
Change	0.96 ± 1.16	0.54 ± 1.68	0.42 ± 2.05	0.471
12-60 months				
P	0.001	0.269		
95% Confidence Interval			-0.82 ± 1.66	

Tab. 4: Probing Depth (n=13).

	Polylactide	Polydioxanone	Difference	*P*
Baseline	8.35 ± 1.61	8.31 ± 1.32	0.04 ± 1.20	0.910
12 months	4.35 ± 1.70	4.85 ± 1.56	-0.50 ± 1.53	0.261
Change	4.00 ± 0.91	3.46 ± 1.52	0.54 ± 1.69	0.273
P	< 0.001	< 0.001		
95% Confidence Interval			-1.59 ± 0.33	
60 months	5.96 ± 1.87	6.08 ± 2.17	-0.12 ± 1.70	0.811
Change	2.39 ± 1.00	2.23 ± 1.80	0.15 ± 1.85	0.770
P	< 0.001	0.001		
95% Confidence Interval			-0.97 ± 1.27	
Change	-1.62 ± 1.06	-1.23 ± 1.93	-0.39 ± 2.24	0.547
12-60 months				
P	< 0.001	< 0.040		
95% Confidence Interval			-1.74 ± 0.97	

Tab. 5: Vertical Probing Attachment Level (n=13).

	Polylactide		Polydioxanone	
PAL-V	12 months	60 months	12 months	60 months
≤ 2 mm	1	6	3	8
> 2 - ≤ 4 mm	9	7	6	3
> 4 - ≤ 6 mm	3	-	4	2
> 6 mm	-	-	-	-

Tab. 6: Distribution of Vertical Probing Attachment Gain.

	Polylactide	Polydioxanone	Difference	*P*
Baseline	9.35 ± 2.99	8.86 ± 2.56	0.50 ± 2.27	0.443
12 months	8.41 ± 2.75	7.70 ± 2.80	0.71 ± 2.21	0.272
Change	0.94 ± 1.41	1.15 ± 1.31	-0.21 ± 1.89	0.697
P	< 0.05	< 0.01		
60 months	8.33 ± 3.12	7.31 ± 3.18	1.01 ± 2.77	0.213
Change	1.03 ± 1.63	1.54 ± 2.19	-0.51 ± 2.83	0.527
P	< 0.05	< 0.05		

Tab. 7: Distance Cemento-enamel Junction (CEJ) to Bony Defect (BD) (n=13).

Discussion and Conclusions

- There are no statistically significant differences regarding PD reduction, PAL-V gain, and bony fill after GTR therapy using polylactide acetyltributyl citrate or polydioxanone.
- PAL-V gain after GTR therapy in infrabony defects using both bioabsorbable barriers was stable after 5 years in 21 of 26 defects (81%).
- PAL-V gain achieved by GTR therapy using bioabsorbable membranes may be maintained up to 5 years successfully.

This Poster was submitted by Diana Krigar.

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Poster Faksimile:

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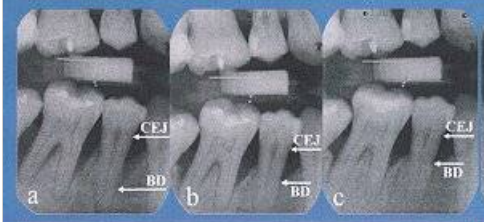

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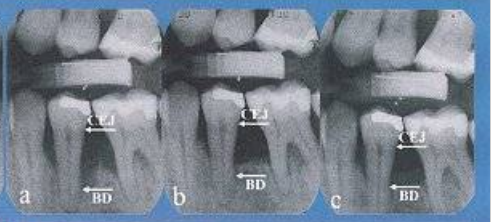

Fig. 2 a, b, c: standardized radiographs of an infrabony defect distal 35 at baseline (a), 12 (b), and 60 months (c) after GTR-therapy with a polylactide acetyltributyl citrate barrier; CEJ (cemento-enamel junction), BD (most apical extension bony defect).

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Methods and Material II

Radiographic measurements

- Digitization of all radiographs with a flatbed scanner (Linotype Saphir, Friadent AG, Mannheim, Germany) with a resolution of 600 x 1200 dpi.
- All further measurements were made using a computer program (Friacom 2.5, Friadent AG, Mannheim, Germany); with 9.5x magnification.
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- Measurement of the distances CEJ-BD (Fig. 1,2).
- All radiographic measurements were performed by two examiners blinded to the clinical measurements and repeated after 7 days: DK and BP. To reduce error the means of all 4 measurements were entered into analysis.

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- Statistical unit: patient
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- PlI and GI at baseline, 12, and 60 months after surgery are given in Tab. 1 and 2.
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- Both groups showed a statistically significant PAL-V loss from 12 to 60 months ($P < 0.05$) (Tab. 5).
- 60 months after GTR therapy 3 defects in the control group and 1 in the test group had PAL-V loss ≥ 3 mm compared to the 12 months re-examination.
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Conclusions

- There are no statistically significant differences regarding PD reduction, PAL-V gain, and bony fill after GTR therapy using polylactide acetyltributyl citrate or polydioxanone.
- PAL-V gain after GTR therapy in infrabony defects using both bioabsorbable barriers was stable after 5 years in 22 of 26 defects (85%).
- PAL-V gain achieved by GTR therapy using bioabsorbable membranes may be maintained up to 5 years successfully.

Results II

Tab. 1: Plaque Index (n= 13):

	Polylactide	Polydioxanone	Difference	P
Baseline	0.23±0.60	0.08±0.28	0.15±0.38	0.157
12 months	0.62±0.87	0.46±0.78	0.15±0.99	0.516
Change	0.39±0.96	0.39±0.88	0.00±1.23	1.000
P	0.131	0.059		
60 months	0.39±0.77	0.46±0.78	- 0.08±0.28	0.317
Change	0.15±1.07	0.39±0.87	- 0.23±0.44	0.083
P	0.591	0.129		

Tab. 2: Gingivat Index (n= 13):

	Polylactide	Polydioxanone	Difference	P
Baseline	1.54±0.88	1.69±0.75	- 0.15±0.55	0.317
12 months	0.31±0.75	0.39±0.77	- 0.08±1.04	0.795
Change	-1.23±1.01	-1.31±0.95	-0.08±1.19	0.855
P	0.005	0.004		
60 months	1.15±0.99	0.46±0.89	0.69±0.95	0.034
Change	-0.38±1.61	-1.23±1.30	-0.85±1.26	0.039
P	0.441	0.011		

Tab. 4: Probing Depth (n= 13):

	Polylactide	Polydioxanone	Difference	P
Baseline	7.35±1.94	7.31±1.38	0.04±1.60	0.948
12 months	2.42±0.91	3.15±1.35	0.15±0.99	0.046
Change	-4.92±2.01	-4.15±1.56	0.00±1.23	0.311
P	< 0.001	< 0.001		
95% Confidence Interval			-2.94-0.56	
60 months	3.38±1.12	3.69±1.49	-0.31±1.38	0.435
Change	-3.96±1.36	-3.92±1.61	-0.35±1.81	0.900
P	< 0.001	< 0.001		
95% Confidence Interval			0.75-1.44	
Change	0.96±3.16	0.54±1.88	0.42±2.05	0.471
12-60 months				
P	0.001	0.269		
95% Confidence Interval			-0.82-1.66	

Tab. 5: Vertical Probing Attachment Level (n= 13):

	Polylactide	Polydioxanone	Difference	P
Baseline	6.35±1.61	8.31±1.32	0.04±1.20	0.916
12 months	4.35±1.70	4.85±1.56	-0.50±1.53	0.261
Change	4.00±0.91	3.46±1.52	0.54±1.69	0.275
P	< 0.001	< 0.001		
95% Confidence Interval			-1.59-0.33	
60 months	5.96±1.87	6.08±2.17	-0.12±1.70	0.811
Change	2.35±1.00	2.23±1.56	0.15±1.85	0.770
P	< 0.001	0.001		
95% Confidence Interval			-0.97-1.27	
Change	1.62±1.04	1.23±1.93	0.39±2.24	0.547
12-60 months				
P	< 0.001	< 0.040		
95% Confidence Interval			-1.74-0.97	

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	Polylactide		Polydioxanone	
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Tab. 7: Distance Cemento-enamel Junction (CEJ) to Bony Defect (BD) (n= 13):

	Polylactide	Polydioxanone	Difference	P
Baseline	9.35±2.99	8.06±2.56	0.50±2.27	0.443
12 months	8.41±2.75	7.70±2.80	0.71±2.21	0.272
Change	0.94±1.41	1.15±1.31	-0.21±1.89	0.687
P	<0.05	<0.01		
60 months	8.33±3.12	7.31±3.18	1.01±2.77	0.213
Change	1.03±1.63	1.54±2.19	-0.51±2.05	0.527
P	<0.05	<0.05		