Six-Year Clinical Performance of Lithium Disilicate Fixed Partial Dentures

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The aim of this randomized controlled trial was to evaluate the clinical performance of lithium disilicate fixed partial dentures (FPDs). Eighteen patients received lithium disilicate FPDs (study group), and 19 patients received porcelain-fused-to-metal FPDs (control). After 6 years, the survival probabilities were found to be 63% in the study group and 95% in the control group (log-rank test, P = .028). The data suggest that strict conditions should be considered before the use of lithium disilicate glass-ceramic for FPDs. *Int J Prosthodont 2011;24:204–206.*

ithium disilicate glass-ceramics exhibit a translucency and depth of shade very similar to those of natural teeth.¹ The aim of this study was to evaluate the clinical performance of lithium disilicate anterior and posterior fixed partial dentures (FPDs) over a mid-term period (6 years).

Materials and Methods

This study was designed as a randomized controlled trial and was approved by the local research ethics board. Patients in need of three-unit FPD treatment were eligible for participation. Exclusion criteria comprised active periodontitis, pronounced parafunction, and nonfeasibility of adequate chamfer preparation. Thirty-seven patients (23 women, 14 men; mean age: 47 years) received one FPD each (Table 1). Patients were split into two groups. The study group (n = 18) received lithium disilicate FPDs, while the control group (n = 19) received porcelain-fused-to-metal (PFM) FPDs.

Treatments were carried out in 2001 and 2003. The clinical protocol comprised chamfer preparation with rounded smooth contours, a monophase impression with a custom tray, fit check, and luting with Vivaglass CEM glass-ionomer cement (Ivoclar Vivadent). Follow-up examinations were conducted at 2 weeks, 3 months, and at 6-month intervals thereafter. Statistical analyses included Kaplan-Meier survival statistics and log-rank tests for equality of survival distributions.

Results

In the study group, two anterior and three posterior FPDs had to be removed because of framework fracture (Fig 1), and one anterior FPD was removed because of a fracture within the veneering. In the control group, decementation led to the need for removal of one FPD. A total of 15 patients were lost to follow-up (study group: n = 5, control: n = 10) for reasons unrelated to the dental treatment. The 6-year survival rate (survival was determined as having not been removed) in the study group was $62.7\% \pm 12.1\%$, while the survival rate in the control group was $94.7\% \pm 5.1\%$ (Fig 2). Survival distributions differed significantly (log-rank test, P = .028). Minor chippings without need for removal were found in six additional patients (study group: n = 1, control: n = 5). To analyze the influence of dropout patients on the statistical analysis, the log-rank test was recalculated under the hypothesis of no FPD failures in those patients of the study group who were lost to follow-up (bestcase scenario, P = .042).

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Table 1 Di	Distribution of Replaced Teeth							
	Incisors/ canines	Premolars	Molars					
Lithium disilica	te 8	8	2					
PFM	6	8	5					

PFM = porcelain-fused-to-metal



Fig 1 Anterior lithium disilicate FPD with a fracture at the connector/pontic area.



Fig 2 Kaplan-Meier survival rate analysis of PFM (control) and lithium disilicate (study) FPDs. Differences were statistically significant (P = .028).

Table 2 S	elected [Data on	Lithium	Disilicate	FPDs
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Author	Year	Observation time (y)	No. of restorations	No. of patients	Survival rate (%)
Esquivel-Upshaw et al ¹	2008	4	30	21	87%
Wolfart et al ²	2009	8	36	29	93%
Marquardt and Strub ³	2006	5	31	27	78%
Taskonak and Sertgöz ⁴	2006	2	20	15	50%
Present study	2010	6	18	18	63%

Discussion

Data in the literature on the survival of lithium disilicate FPDs are inconclusive (Table 2). One reason for the data heterogeneity might be differences in FPD fabrication. In the present study, anterior FPDs were fabricated using a layering technique by heat pressing and veneering of the framework. Posterior FPDs were pressed as one piece of core ceramic and stained for individualization. Studies reporting superior survival rates pressed all FPDs as one piece.^{1,2} In the present study, four failures involved connector fractures. Connector geometry seems to be crucial with respect to longevity. This is consistent with other studies that have documented connector areas to be the most vulnerable parts in lithium disilicate FPDs.^{1,3,4}

A meta-analysis on the outcome of FPDs fabricated by PFM technology showed survival rates comparable to the control in the present study.⁵ Based on the literature, PFM technology is still the "gold standard" for fabricating FPDs. The rationale for using a technology aside from the "gold standard" for FPD fabrication may be allergies, a patient's opposition to the use of metals, or special esthetic demands.

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Regarding the limited number of 37 patients and the considerably high dropout of 40% after 6 years, conclusions on the prognosis of lithium disilicate FPDs have to be drawn cautiously. However, the statistically significant difference was sustained even when the log-rank test was recalculated under the hypothesis of a best-case scenario. Hence, the loss to follow-up has only a minor implication on the overall statistical outcome.

Another inherent limitation of this study is the distribution on teeth replaced. With eight anterior, eight premolar, and only two molar FPDs in the study group, no conclusions can be drawn concerning a correlation between FPD position and survival.

Conclusion

Although the limited sample size precludes a definitive conclusion, the data suggest that strict conditions should be considered before using lithium disilicate glass-ceramic for the fabrication of FPDs.

Acknowledgment

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Literature Abstract

Toothbrushing, inflammation, and risk of cardiovascular disease: Results from Scottish Health Survey

Markers of low-grade inflammation have been consistently associated with a higher risk of cardiovascular disease. Consequently, contributing factors associated with inflammation and chronic infections, including oral infections, have been investigated to explain the relation between dental disease and cardiovascular disease. This study examined if self-reported tooth brushing behavior is associated with cardiovascular disease as well as markers of inflammation (C-reactive protein) and coagulation (fibrinogen). The Scottish Health Survey, a cross-sectional survey, was used to obtain the data. Oral health behavior was assessed in all survey years from selfreported frequency of visits to a dentist and frequency of tooth brushing. On a separate visit, nurses collected information on medical history, family history of cardiovascular disease, and blood pressure and took blood samples from consenting adults. The surveys were linked to a database of hospital admission and death. Information on deaths was ascertained from the general registrar office for Scotland. Cox proportional hazards models were used to estimate the risk of cardiovascular disease events or death according to oral hygiene. Of a total 555 cardiovascular disease events over 8.1 years, 170 were fatal. The principal diagnosis was coronary heart disease. Participants with poor dental hygiene had a 70% increased risk of cardiovascular disease in a fully adjusted model. There were also significant associations between frequency of tooth brushing and markers of low-grade systemic inflammation. They had increased concentrations of both C-reactive protein and fibrinogen. These associations remained significant after multiple adjustments. The results confirmed the association between oral hygiene and the risk of cardiovascular disease. In addition, inflammatory markers were significantly associated with poor oral hygiene. Future studies are necessary to determine whether the association between oral health behavior and cardiovascular disease is casual or merely a risk marker. Nonetheless, the measure of self-reported tooth brushing is a very useful and cost-effective marker for future health risk in large-scale population studies.

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