THE JOURNAL OF PROSTHETIC DENTISTRY

CLINICAL RESEARCH

Over 14-year survival of pressed e.max lithium disilicate glass-ceramic complete and partial coverage restorations in patients with severe wear: A prospective clinical study

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ABSTRACT

Statement of problem. Long-term clinical data are lacking on the comparative survival of adhesively luted lithium disilicate glass-ceramic complete and partial coverage restorations in patients with severe wear and the effect that different clinical variables have on their survival.

Purpose. The purpose of this study was to examine the 14-year survival of pressed e.max lithium disilicate glass-ceramic complete and partial coverage restorations in patients with severe wear and to evaluate associated clinical parameters.

Material and methods. Patients demonstrating severe wear and requiring single unit defect-specific partial or complete coverage restorations were recruited in a clinical private practice and received lithium disilicate restorations. The effect of various clinical parameters was evaluated using Kaplan-Meier survival curves to account for attrition bias and other causes of failure. The statistical significance of differences between parameters was determined by using the log rank test (α=.05).

Results. A total of 53 participants (24 men and 29 women) requiring 662 lithium disilicate restorations were evaluated. The mean age of the participants at the time of restoration placement was 60 (range 25 to 85 years). Of 662 units, 551 were anterior and posterior complete and 111 were posterior partial coverage restorations. Six failures (bulk fracture or large chip) requiring replacement occurred with the average time to failure of 4.5 (range 2 to 8) years, yielding a crude estimate of annual failure of 0.1% (cumulative monitoring period of 4650 years, overall survival rate of 98.6%). Of the 551 complete coverage restorations, 4 failed (0 anterior, 4 posterior), yielding a crude estimate of 0.1% annual failure with the survival function time at 14 years. Of the 111 partial coverage restorations, 2 failed, yielding a crude estimate of 0.4% annual failure with the survival function time at 12 years. The only statistically significant difference was seen between anterior crowns and posterior onlays, with no failures in anterior crowns (P<.001). Other clinical variables had no significant effect on survival (P>.05).

Conclusions. Pressed e.max lithium disilicate partial and complete coverage restorations both showed high survival rates in patients with severe wear over 14 years with an overall yearly failure rate of 0.1%. Risk of failure at any age was minimal for both men and women. All anterior crowns survived. The highest annual failure rate (0.4%) was for posterior onlay partial coverage restorations. (J Prosthet Dent 2025;133:737-746)

Tooth wear through attrition, abrasion, erosion, and noncarious cervical lesions remains a common oral health problem that seems to worsen with age.[1,2] When generalized severe wear is identified, especially in younger patients, a clinician should take into consideration potential parafunctional muscle activity[3,4] because sleep bruxism–a phenomenon described as the nocturnal combination of clenching and grinding of teeth–has been reported to be associated with wear.[5] Regardless of the etiology, patients who show signs of severe wear resulting in loss of function and esthetics require restorative intervention.[1,6]

Presented at the American Academy of Restorative Dentistry's 93rd Annual Meeting, Chicago, Ill., February 24–25, 2024.
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
We hereby declare that there are no conflicts of interests that need to be reported by any of the authors or their family members.
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Clinical Implications

Adhesively bonded pressed e.max lithium disilicate complete and partial coverage restorations represent a treatment of choice, with excellent longevity in patients with severe wear. Onlay restorations showed statistically slightly lower survival rates than anterior complete coverage restorations, but the preservation of tooth structure justifies their use. The study was designed to provide evidence-based outcomes that could guide clinicians in choosing the ceramic material and type of restoration for patients with severe wear.

The smile has become a sign of social status and is directly related to patient self-perception and confidence.[7] Therefore, patients demand tooth-colored, highly esthetic restorations, making metal-ceramic restorations less satisfactory because of the potential for metal exposure at the cervical area.[8] Additionally, in the era of minimally invasive treatment protocols,[9] metal-ceramic complete coverage restorations do not seem adequate because of the more aggressive tooth preparation.

e.max lithium disilicate glass-ceramics have been reported to have excellent clinical performance and survival rates over 16.9 years in both anterior and posterior dentition.[10–14] Additionally, they can provide an adequate minimally invasive restoration with a 95.27% survival for partial coverage restorations.[10,11] Nevertheless, the clinical performance of e.max lithium disilicate is still unclear in patients with severe wear because of their potentially higher occlusal forces. Therefore, the aim of this study was to analyze the long-term clinical performance of e.max lithium disilicate complete and partial coverage restorations in patients with severe wear. The prospective study was initiated in 2003 and the database parameters, as well as the recall methods, were adopted from previously published studies by the same group of researchers.[10–12,15–17] The null hypotheses were that no difference would be found in the survival rate of pressed e.max lithium disilicate complete and partial coverage restorations in patients with severe wear and that the confounding variables (dental arch, tooth position in the dental arch, and age and sex of participants) would not influence the long-term outcomes.

MATERIAL AND METHODS

Patients demonstrating evidence of severe wear and requiring single-unit defect-specific posterior partial coverage restorations, single unit anterior or posterior complete coverage restorations, or a combination were seen in a clinical private practice. They were offered the choice of composite resin, cast gold, metal-ceramic, or lithium disilicate restorations. Those who chose lithium disilicate restorations were included in the current study as participants. This study had been approved by the Tufts Health Science Institutional Review Board #STUDY00000261.

The selection process for inclusion and exclusion criteria has been previously described[10–12] and was adopted in the study. Additionally, the diagnosis of severe wear was assessed based on the dental and medical history, a questionnaire, and thorough clinical assessment. Patients demonstrating wear with the loss of enamel on > 1/3 of the assessed tooth surface[18] through attrition and abrasion were included in the study (Figs. 1-6). Some of the patients demonstrated generalized severe wear in combination with the possible loss of occlusal vertical dimension (OVD).[6] Participants who showed no signs of severe wear, demonstrated poor oral hygiene or uncontrolled periodontal disease or, preferred composite resin, cast gold, or metal-ceramic restorations were excluded.

The decision as to which type of lithium disilicate restoration (complete, inlay or onlay partial coverage), preparation, and fabrication methods and steps were based on guidelines of fixed prosthodontics[19,20] and adopted from previously published articles.[10–12] The recorded clinical confounding variables have also been reported previously.[10–12]

Upon completion of the treatment, the participants were provided with an occlusal device with even centric contacts and anterior guidance in eccentric movements. The participants were recalled every 6 months, and the status of the restoration(s) was evaluated and recorded, including the time to failure or, if failure did not occur, the time that the restoration had been retained in the mouth. These represent the 28 parameters recorded for each

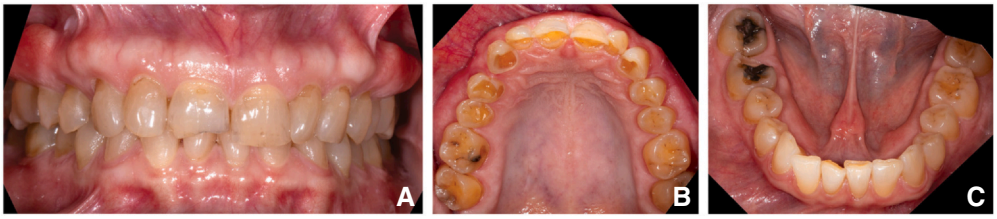

Figure 1. Preoperative images of representative patient with severe wear and in need of re-establishment of occlusal vertical dimension. A, Frontal view. B, Maxillary occlusal view. C, Mandibular occlusal view.

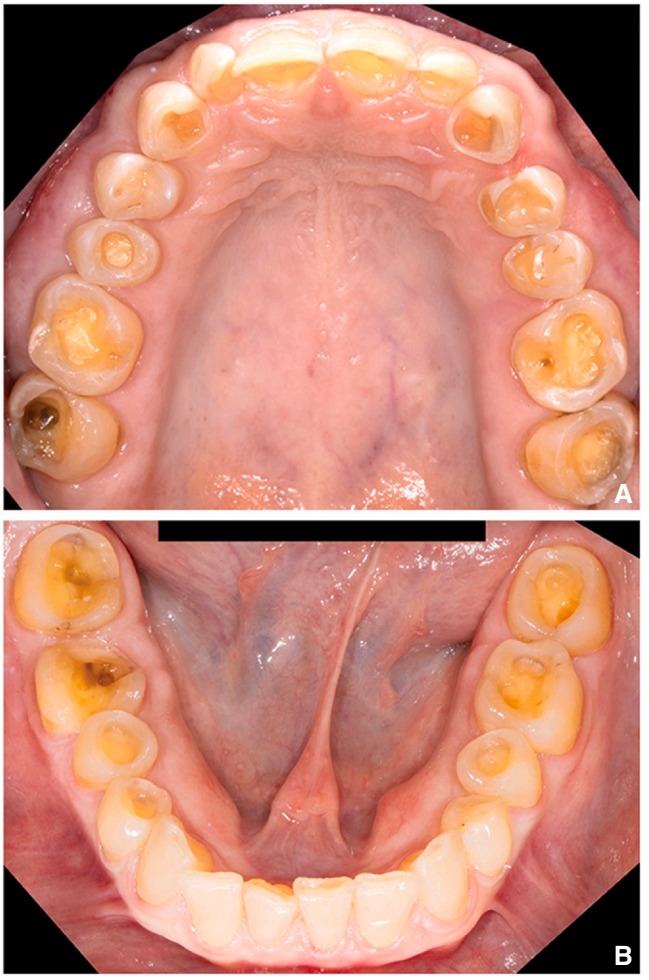

Figure 2. Prepared posterior dentition. A, Maxillary arch. B, Mandibular arch.

Figure 4. Prepared anterior dentition.

Figure 5. Completed treatment with e.max lithium disilicate anterior complete coverage restorations. A, Centric occlusion. B, Protrusive.

participant and restorations listed in Table 1.[12] The definition of failed restorations was as previously described.[11]

The statistical analyses were adopted from the methodology of previously published articles.[10–12] Data for described variables were analyzed for the survival of restorations or subsets of restorations (Table 1)[12] using Kaplan Meier survival curves with clustering (frailty model analysis) if failures occurred.[21–24] The log rank test (α=.05) was used to determine the significance of differences between the survival curves. The sum of the censoring and survival times for each group was used to calculate the total time at risk. The number of failures in each group was divided by the corresponding total time at risk to record estimated risk.

RESULTS

Data collection began in March 2009 and was truncated for this analysis after 14.1 years or about 169 months.

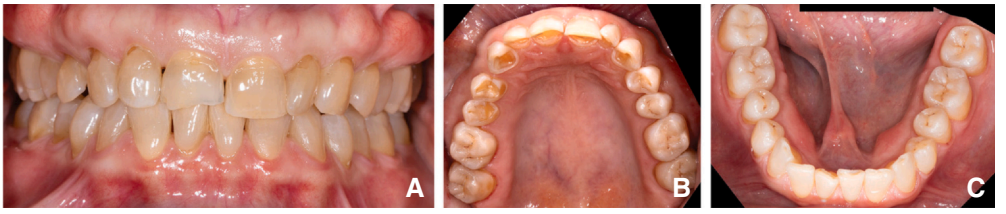

Figure 3. Restored posterior dentition using e.max lithium disilicate partial coverage restorations. A, Frontal view. B, Maxillary occlusal view. C, Mandibular occlusal view.

Figure 6. Patient after treatment and re-established occlusal vertical dimension. A, Centric occlusion right side view. B, Centric occlusion left side view. C, Protrusive right-side view. D, Protrusive left side view. E, Left mediotrusion. F, Right mediotrusion. G, Extraoral image of patient at repose.

The study included 662 pressed lithium disilicate restorations placed in 53 participants with severe wear. Of these 662 restorations, 551 were anterior and posterior complete, and 111 were posterior partial coverage restorations. Of 53 participants, 24 were men and 29 were women. The mean age for the participant at the time of restoration placement was 60 (range 25 to 85) years. Of 53 participants, 19 had generalized wear with the loss of OVD and required the re-establishment of OVD through complete mouth reconstruction.

A total of 6 failures were recorded for the 662 restorations providing a crude estimate of annual percentage failure of 0.1%, with the survival function time at 14.1 years (Tables 1, 2). The 6 failures occurred during a cumulative monitoring period of 4650 years, with an overall survival rate of 98.6%. The average time to failure was 4.5 (range 2 to 8) years (Fig. 7). No debonded restorations were recorded. A Kaplan-Meier survival function of all times to failure (Fig. 8) shows that most failures (83.3%) occurred within the first 5 years.

A total of 4 failures were recorded for 551 complete coverage restorations, yielding a crude estimate of annual percentage failure of 0.1%, with the survival function time at 14 years. The 4 failures occurred during a cumulative monitoring period of 4143 years, with an overall survival rate of 99.2%.

A total of 2 failures were recorded for the 111 partial coverage restorations yielding a crude estimate of annual percentage failure of 0.4%, with the survival function time at 12 years (Tables 1, 2). The 2 failures occurred during a cumulative monitoring period of 507 years, with an overall survival rate of 92.2%.

Table 2. Statistically significant difference presented in Table 1 log rank test

Anterior Complete	Posterior Complete	.061
	Posterior Inlay	>.999
	Posterior Onlay	<.001*

*$P<.05$,

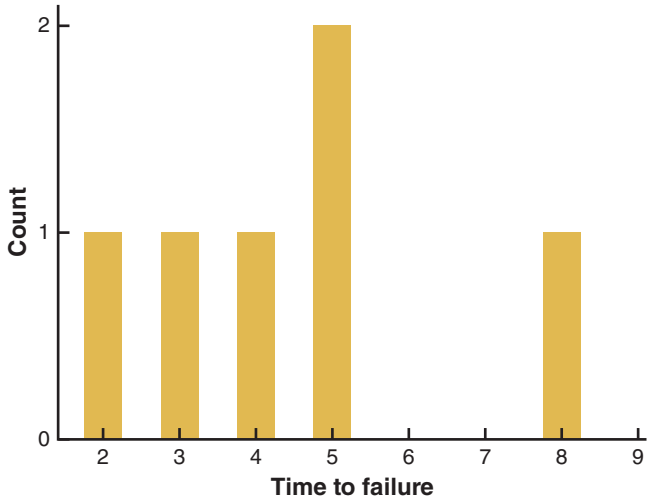

Figure 7. Time to failure.

Table 1. Effect of type of restoration on estimated risk of failure of anterior complete, posterior complete, and posterior partial coverage e.max lithium disilicate glass-ceramic restorations in patients with severe wear

	Units	Failure	Cumulative Monitoring Years	Estimated Annual Risk (%)	Relative Risk*	Survival Function (%)
Total	662	6	4650	0.1	NA	98.6
Complete	551	4	4143	0.1	1.0	99.2
Partial	111	2	507	0.4	4.1	92.2
Anterior Complete	264	0	1912	0.0	0.0	100.0
Posterior Complete	287	4	2231	0.2	1.0	98.4
Posterior Inlay	14	0	123	0.0	0.0	100.0
Posterior Onlay	97	2	384	0.5	2.9	85.7

*Relative risk compared with anterior complete coverage restorations.

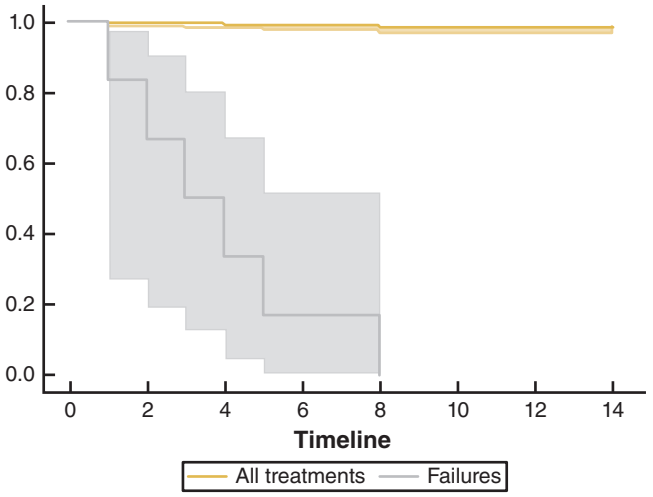

Figure 8. Kaplan–Meier survival function of e.max lithium disilicate glass-ceramic restorations placed in patients with severe wear.

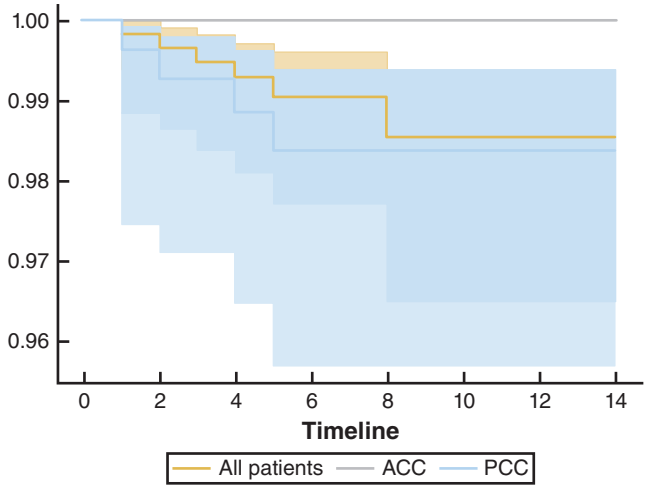

Figure 9. Kaplan–Meier survival function of e.max lithium disilicate glass-ceramic anterior complete and posterior complete coverage restorations placed in patients with severe wear. No significant difference between these 2 groups (*P*=.06, log rank test). ACC, anterior complete coverage; PCC, posterior complete coverage.

The survival of lithium disilicate complete and partial coverage restorations in the patients with severe wear is summarized in Figure 9 and Tables 1, 2. The survival rates of the anterior and posterior complete and posterior partial coverage restorations were anterior complete 100% (n=264, 0 failures), posterior complete 98.4% (n=287, 4 failures), posterior inlays 100% (n=14, 0 failures) and posterior onlays 85.7% (n=97, 2 failures). No failures occurred in any group after 8 years in service. The only statistically significant difference was seen between anterior crowns and posterior onlays, with no failures in anterior crowns (*P*<.001).

The survival of lithium disilicate complete and partial coverage restorations placed on the maxillary and mandibular teeth of the patients with severe wear is summarized in Table 3. No statistically significant difference was found between the arches (*P*=.687). The probability of survival for a typical maxillary restoration was 99% at 14 years (n=385, 3 failures) and for a typical mandibular restoration was 97.9% at 14 years (n=277, 3 failures).

The failure rate per year for anterior and posterior complete and posterior partial coverage restorations for each tooth in both arches is summarized in Table 3. All 6 failures occurred in the posterior dentition with 0 failures in anterior complete coverage restorations.

The probability of survival of lithium disilicate anterior and posterior complete and posterior partial coverage restorations in men and women with severe wear is summarized in Figures 10 to 12 and in Table 4. Survival function for complete coverage restorations in men (n=259, 3 failures) was 98.5% at 12 years and for partial coverage restorations (n=61, 1 failure) 96% at 8 years. Survival function for complete coverage restorations in women (n=292, 1 failure) was 99.6% at 14 years and for partial coverage restorations (n=50, 1 failure) 93.3% at 12 years, with no statistically significant difference (*P*=.191).

The effect of age on the estimated risk of failure of lithium disilicate anterior and posterior complete and posterior partial coverage restorations in patients with severe wear is summarized in Table 5. Survival function for these restorations in the <33-year age group (n=59, 0 failures) was 100% at 11 years, in the 33- to 52-year age group (n=89, 1 failure) 97.1% at 13 years, and in the >52-year age group (n=514, 5 failures) 98.8% at 14 years, with no statistically significant difference (*P*>.05).

DISCUSSION

In the present study, the long-term survival of 662 pressed e.max lithium disilicate glass-ceramic complete and partial coverage restorations placed in patients with severe wear was evaluated. The overall survival rate was 98.6% over 14.1 years. The only statistically significant difference was seen between anterior crowns and posterior onlays, with no failures in anterior restorations; other evaluated confounding variables had minimal to no effect. Thus, the null hypothesis that no difference would be found in the survival rate of pressed e.max lithium disilicate complete and partial coverage restorations in patients with severe wear and that the confounding variables (dental arch, tooth position in the dental arch, and age and sex of participants) would not influence the long-term outcomes was rejected.

With the increased life expectancy and the retention of natural teeth in older individuals, an increase in the need for restorative dentistry has also been seen.[25] This

Table 3. Effect of arch position on estimated risk of failure for anterior and posterior complete and posterior partial coverage e.max lithium disilicate glass-ceramic restorations in patients with severe wear

Arch	Restoration	Tooth	N of Units	Failure	Cumulative Years	Annual Risk%	Relative Risk	Survival Function %	Years
Mandible	Anterior	Canine	31	0	241	0.0	0.0	100.0	14
	Complete	Lateral Incisor	32	0	238	0.0	0.0	100.0	14
		Central Incisor	30	0	217	0.0	0.0	100.0	14
	Posterior	Third Molar	2	0	16	0.0	0.0	100.0	7
	Complete	Second Molar	27	1	198	0.5	1.6	96.1	12
		First Molar	34	0	266	0.0	0.0	100.0	12
		Second Premolar	36	0	257	0.0	0.0	100.0	12
		First Premolar	26	1	205	0.5	1.6	95.6	14
	Posterior	Second Molar	4	0	31	0.0	0.0	100.0	12
	Inlay	First Molar	1	0	8	0.0	0.0	100.0	7
		Second Premolar	2	0	21	0.0	0.0	100.0	12
		First Premolar	1	0	12	0.0	0.0	100.0	11
	Posterior	Second Molar	15	1	77	1.3	4.2	75.0	12
	Onlay	First Molar	14	0	50	0.0	0.0	100.0	12
		Second Premolar	12	0	47	0.0	0.0	100.0	10
		First Premolar	10	0	36	0.0	0.0	100.0	6
Maxilla	Anterior	Canine	50	0	367	0.0	0.0	100.0	14
	Complete	Lateral Incisor	56	0	415	0.0	0.0	100.0	14
		Central Incisor	65	0	434	0.0	0.0	100.0	14
	Posterior	Third Molar	4	1	20	5.0	16.1	50.0	7
	Complete	Second Molar	37	0	288	0.0	0.0	100.0	13
		First Molar	39	1	323	0.3	1.0	97.4	13
		Second Premolar	40	0	314	0.0	0.0	100.0	14
		First Premolar	42	0	344	0.0	0.0	100.0	14
	Posterior	Second Molar	2	0	15	0.0	0.0	100.0	11
	Inlay	First Molar	2	0	21	0.0	0.0	100.0	11
		Second Premolar	2	0	15	0.0	0.0	100.0	9
	Posterior	Second Molar	12	0	49	0.0	0.0	100.0	7
	Onlay	First Molar	12	0	44	0.0	0.0	100.0	9
		Second Premolar	11	1	46	2.2	7.0	83.3	12
		First Premolar	11	0	35	0.0	0.0	100.0	6
Arch	Restoration	Tooth	N of Units	Failure	Cumulative Years	Annual Risk %	Relative Risk	Survival Function %	Years
Maxilla	Anterior	Canine	50	0	367	0.0	0.0	100.0	14
	Complete	Lateral Incisor	56	0	415	0.0	0.0	100.0	14
		Central Incisor	65	0	434	0.0	0.0	100.0	14
	Posterior	Third Molar	4	1	20	5.0	16.1	50.0	7
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		First Premolar	42	0	344	0.0	0.0	100.0	14
	Posterior	Second Molar	2	0	15	0.0	0.0	100.0	11
	Inlay	First Molar	2	0	21	0.0	0.0	100.0	11
		Second Premolar	2	0	15	0.0	0.0	100.0	9
	Posterior	Second Molar	12	0	49	0.0	0.0	100.0	7
	Onlay	First Molar	12	0	44	0.0	0.0	100.0	9
		Second Premolar	11	1	46	2.2	7.0	83.3	12
		First Premolar	11	0	35	0.0	0.0	100.0	6
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	Complete	Lateral Incisor	32	0	238	0.0	0.0	100.0	14
		Central Incisor	30	0	217	0.0	0.0	100.0	14
	Posterior	Third Molar	2	0	16	0.0	0.0	100.0	7
	Complete	Second Molar	27	1	198	0.5	1.6	96.1	12
		First Molar	34	0	266	0.0	0.0	100.0	12
		Second Premolar	36	0	257	0.0	0.0	100.0	12
		First Premolar	26	1	205	0.5	1.6	95.6	14
	Posterior	Second Molar	4	0	31	0.0	0.0	100.0	12
	Inlay	First Molar	1	0	8	0.0	0.0	100.0	7
		Second Premolar	2	0	21	0.0	0.0	100.0	12
		First Premolar	1	0	12	0.0	0.0	100.0	11
	Posterior	Second Molar	15	1	77	1.3	4.2	75.0	12
	Onlay	First Molar	14	0	50	0.0	0.0	100.0	12
		Second Premolar	12	0	47	0.0	0.0	100.0	10
		First Premolar	10	0	36	0.0	0.0	100.0	6

increase seems to be supplemented by the recent evidence of 29% of young adults showing signs and patterns of wear.[1] Considering the high esthetic demands and comprehension of the benefits of minimally invasive dentistry, ceramic partial coverage restorations are being provided more widely.[10,11] However, patients with severe wear have always been associated with increased occlusal forces, bruxism, and/or parafunctional habits.[26,27] Although tooth wear carries a multifactorial etiology, rather than solely being related to occlusal force,[28] restorative dentists may favor complete coverage restorations and higher strength ceramics like zirconia to prevent the potential damage related to these increased occlusal forces and/or parafunctional activities.[26,27,29,30]

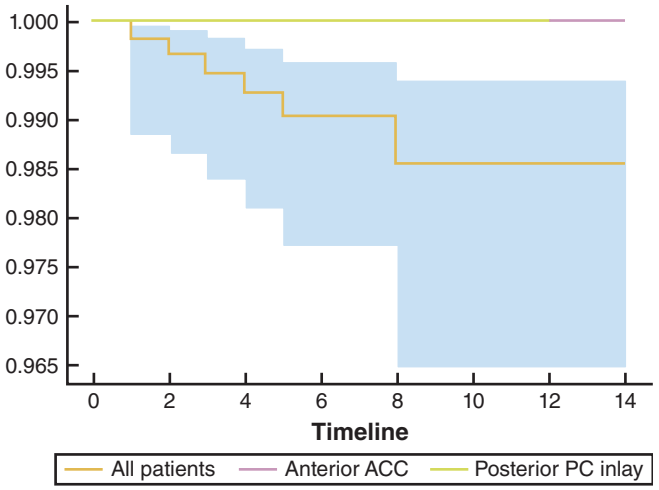

Figure 10. Kaplan–Meier survival function of e.max lithium disilicate glass-ceramic anterior complete and posterior partial inlay restorations placed in patients with severe wear. No significant difference between these 2 groups (*P*>.999, log rank test). CC, complete coverage; PC, partial coverage.

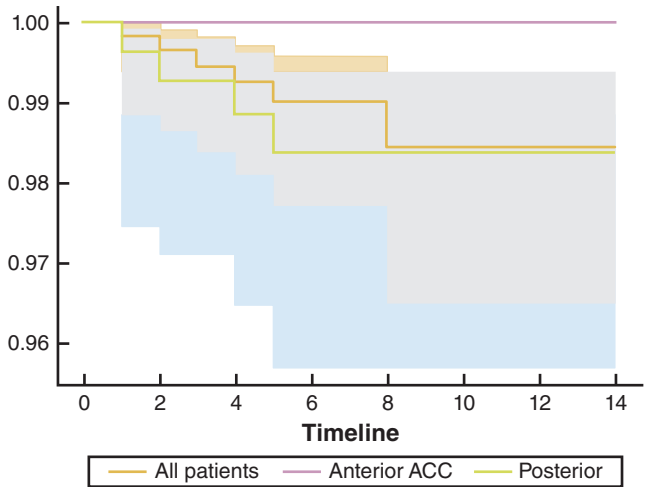

Figure 11. Kaplan–Meier survival function of e.max lithium disilicate glass-ceramic anterior complete and posterior partial onlay restorations placed in patients with severe wear. Significant difference between these 2 groups (*P*<.001, log rank test). CC, complete coverage; Posterior, posterior onlay.

The authors are unaware of a previous prospective study that analyzed the clinical performance of e.max lithium disilicate glass-ceramic restorations in patients with severe wear, compared the performance of complete and partial coverage restorations, and followed-up for over 14 years. A total of 6 failures were recorded, of which 4 occurred in complete coverage restorations and 2 in partial coverage restorations. All the failures happened in the posterior dentition; no anterior restorations were fractured, explained by the increased occlusal loads in the posterior dentition.[31]

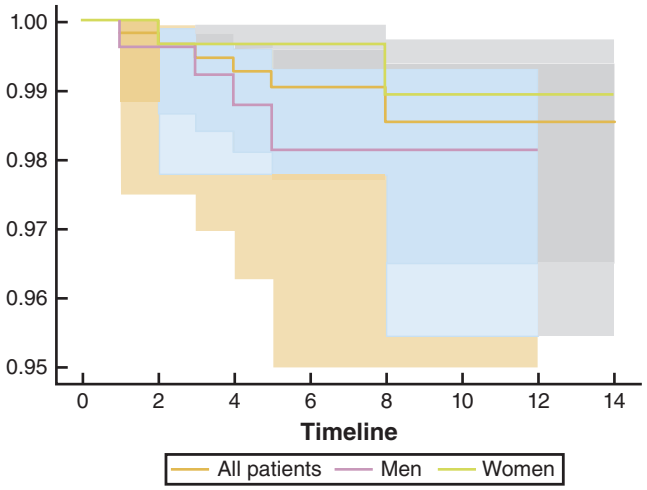

Figure 12. Kaplan–Meier survival function of e. max lithium disilicate glass-ceramic complete and partial coverage restorations placed in men and women with severe wear. No significant difference between these 2 groups (*P*=.191, log rank test).

The mean time failure was 4.5 ±2.07 years with no failures after 8 years in function, suggesting that long-term fatigue or degradation of the lithium disilicate ceramic is not occurring. A similar lack of accelerating failure has been reported previously.[10–12]

The survival of posterior restorations was 98.4% for complete coverage, 100% for inlays, and 85.7% for onlays. These findings encourage the use of e.max lithium disilicate not only in the anterior but also in the posterior dentition of patients with severe wear and were consistent with the results of a study reporting 100% survival rates for occlusal onlays in patients with severe wear.[32] Although onlays might have a higher fracture risk, even the 85.7% survival at 12 years seems clinically acceptable given that most of the tooth structure has been preserved.[33] Additionally, a recent publication demonstrated that onlays have a reduced incidence of postprosthetic endodontic therapy when compared with posterior crowns or inlays[34] that makes the choice of an onlay even more justifiable. A restorative dentist can always reserve the subsequent option of placing a complete coverage restoration should an irreparable fracture of an onlay occur.

Age and sex have been considered important clinical factors in dental research.[35,36] No statistically significant difference was found in the 3 age groups of wear patients. This reconfirms the findings contradicting the idea of correlation between age and occlusal force.[31] Sex did not have a statistically significant affect, with 4 recorded fractures in men and 2 in women (Table 4, Fig. 12). This finding was unexpected, as occlusal force[26] and ceramic survival[16] have previously been correlated with sex. The current study provides scientific and clinical evidence for reliably choosing e.max lithium

Table 4. Effect of sex on estimated risk of failure for anterior and posterior complete and posterior partial coverage e.max lithium disilicate glass-ceramic restorations in patients with severe wear

Sex	Type of Restoration	N of Units	Failures	Cumulative Monitoring Years	Estimated Annual Risk of Failures (%)	Relative Risk*	Survival Function**
Men	Total	320	4	1784	0.2	3.2	98.2
	Complete	259	3	1605	0.2	4.7	98.5
	Partial	61	1	179	0.6	14.2	96.0
Women	Total	342	2	2866	0.1	1.0	99.0
	Complete	292	1	2538	0.0	1.0	99.6
	Partial	50	1	328	0.3	7.7	93.3

*Relative risk compared with women

** survival function at 12 years (men), and 14 years (women)

No statistically significant difference between men and women.

Table 5. Effect of age on estimated risk of failure of anterior and posterior complete and posterior partial coverage e.max lithium disilicate glass-ceramic restorations in patients with severe wear

	Units	Failures	Cumulative Monitoring Years	Estimated Annual Risk of Failures (%)	Relative Risk*	Survival Function (%)**
< 32	59	0	435	0.0	0.0	100.0
33 to 52	89	1	661	0.1	1.1	97.1
>53	514	5	3554	0.1	1.0	98.8

*Relative risk compared with age group >53

** survival function at 14 years (>53), 13 years (33 to 52), and 11 years (<32).

No statistically significant difference among age categories.

disilicate glass-ceramic complete and partial coverage restorations in men and women, regardless of their age and the presence of severe wear.

No debonded restorations were recorded. Some nonpeer-reviewed online platforms have been sharing the idea of cementing e.max lithium disilicate complete coverage restorations using conventional cementation protocols if the thickness of the material is > 2 mm and the prepared abutment has adequate resistance and retention form. However, clinical studies have shown that this idea is misleading.[37] Although, the current study did not compare adhesive bonding and conventional cementation, excellent survival rates suggest that e.max lithium disilicate should only be adhesively bonded, regardless of the thickness of the ceramic and type of restoration – complete or partial.

Severe wear often results in the loss of OVD. Then, restoration of lost tooth structure also requires reestablishing OVD.[6] A total of 19 of the participants needed such treatment (Figs. 1-6). Which material can provide a long-term successful outcome given the need for resistance to fracture and wear, maintenance of occlusal schemes, lack of chipping, and tooth-like esthetics has always been debatable. While gold has unmatched fracture resistance,[38] it cannot provide the required esthetics. Metal-ceramic requires additional tooth preparation, can result in a grayish cervical appearance, and has been reported to be associated with an annual chipping rate of over 1%.[8] Although composite resin restorations have been used more often in patients with severe wear,[39] a retrospective study with a mean ±standard deviation time in service of 71.8 ±28.6 months reported all failed restorations to be direct composite resins, recording 97.8% survival for composite resin and 100% for ceramic restorations.[39] Additionally, a recent study that quantified wear reported 3-fold higher wear and degradation in computer-aided design and computer-aided manufacturing (CAD-CAM) composite resin when compared with e.max lithium disilicate.[40] e.max lithium disilicate has been reported to have similar wear rates to those of natural enamel[41] and to be fracture-resistant in patients with severe wear.

All patients receiving complete mouth rehabilitation were restored using occlusal concepts of mutually protective occlusion[20] where anterior teeth protect posterior dentition from lateral interferences during excursive movements. The authors would like to emphasize the importance of occlusal concepts and the prevention of posterior interference in patients who require establishment of OVD.

Limitations of the study include that the data were collected in a private practice setting and that some participants dropped out. The Kaplan-Meier survival function was used to create censored data and account for these factors.

The authors have pointed out the difficulty of accumulating clinical evidence in restorative dentistry in previous publications.[11,16,19,42] Although, the current study is limited to 53 patients, albeit 19 requiring the reestablishment of OVD, it still holds value, as 662 restorations were evaluated and followed up for 14 years. More importantly, the authors are unaware of a previous prospective study that compared the survival of complete and partial coverage lithium disilicate restorations in patients with severe wear.

The results of the present study emphasize that pursuing complete coverage restorations in teeth with sufficient tooth structure can be considered unnecessary

even if severe wear patterns are present. The results also suggest that adhesively bonded e.max lithium disilicate is an adequate material for patients with severe wear and in need of re-establishment of OVD.

CONCLUSIONS

Based on the findings of this prospective clinical study, the following conclusions were drawn:

1. The survival of 662 e.max lithium disilicate complete and partial coverage restorations placed in 53 participants with severe wear was evaluated at 14.1 years.
2. Only 6 failures were recorded with a 14-year cumulative survival of 98.6% and no failures after 8 years in function, suggesting that long-term fatigue or degradation of the lithium disilicate ceramic is not occurring.
3. The data indicated that acid-etched and adhesively bonded e.max lithium disilicate complete and partial coverage restorations exhibited excellent survival in the anterior and posterior dentition of patients with severe wear.
4. The only statistically significant difference was seen between anterior crowns and posterior onlays, with no failures in anterior crowns.
5. The evaluated confounding variables had no effect.
6. Taking into consideration the data size and the follow-up time, the current study provides evidence to guide clinicians in choosing the treatment modality and material for patients with severe wear.

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Acknowledgments
The authors thank the late Dr Sigmond Socransky who inspired this work over so many years. The authors also thank Mr Keith Falcone and Mrs. Shauna Government for their assistance in data collection as well as Mr Thomas Sing, Mr Giovanni Stanzani, and Mr John Yellen for their outstanding laboratory work to create the restorations. The authors dedicate this article to the late Dr Dianne Rekow who has been an inspiration in ceramic research.

PATIENT CONSENT
Written informed consent was obtained prior to each treatment.

CRediT authorship contribution statement
Kenneth Malament was responsible for all the clinical work, conceptualization, data curation, investigation, and methodology. **Mariam Margvelashvili-Malament** was responsible for project administration, writing original draft, visualization, data curation and is the PI of the study. Valery Polyakov was responsible for formal analysis and visualization. **Van Thompson** was responsible for review/editing. All the named authors were involved in the work and read the manuscript prior to the submission for publication.

https://doi.org/10.1016/j.prosdent.2024.06.031