A 15-year Clinical Comparative Study of the Cumulative Survival Rate of Cast Metal Core and Resin Core Restorations Luted with Adhesive Resin Cement

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Purpose*:** The aim of this study was to compare the core survival rates (CSRs) of cast metal versus resin core restorations luted with adhesive resin cement, as well as to determine the risk factors for core failure. ***Materials and Methods: Nine hundred ninety-one patients (2,124 cores) who received either cast metal or resin cores luted with adhesive resin cement at the Fixed Prosthodontic Clinic of Okayama University Dental Hospital between April 1988 and December 1991 and whose structured clinical core record was filled appropriately comprised the study subjects. The clinical core record included information regarding patient age, sex, core restoration type, tooth location, tooth type, remaining coronal dentin, and root canal form. CSRs, as well as causes for failure, were analyzed 15 years postinsertion. Since 381 patients lacked data regarding predictors for core failure, a subsample of 610 patients (1,053 cores) was used for the subsequent risk factor analysis. ***Results*:** The cumulative CSR of resin cores (78.7%) was significantly higher than that of cast metal cores (55.4%; log-rank test, $P < .0001$). The Cox proportional hazards test revealed that sex (male, $P < .0001$), absence of remaining coronal dentin ($P = .0057$), core restoration type (cast metal, $P = .0186$), and higher age at core insertion ($P = .0380$) were significant predictors for core failure. The incidence of complications, such as core loosening ($P = .0016$) and tooth extraction ($P < .0001$), was significantly higher in cast metal cores. ***Conclusions*:** Cast metal cores were associated with a significantly lower CSR than resin cores, and significant risk factors for core failure were sex (male), absence of remaining coronal dentin, core restoration type (cast metal), and higher age at core insertion. *Int J Prosthodont 2010;23:397–405.*

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Endodontically treated teeth often display decreased physical resistance due to considerable tooth structure damage caused by caries, consecutive filling failures, or fractures.[1,2] In severe cases resulting from a large amount of tooth destruction, post and core buildups have been used prior to the definitive restoration.[1–4] Two different buildup techniques are widely accepted, namely the indirect cast metal post and core restoration (cast metal core) and the direct prefabricated post and resin core restoration (resin core).[1–7]

In daily clinical decision making, knowledge of the long-term core success rates associated with different techniques, as well as being aware of the risk factors for failure, are essential for core selection. Although there are numerous published studies analyzing core survival rates (CSRs), it is still unclear which treatment is preferable for a specific tooth condition (for example, a two- or three-wall remaining coronal dentin).[1,3] Five systematic reviews resulted in an impractical study comparison because of a great diversity in cement materials, techniques, sampling, statistical methods, and study design, as well as a lack of controlled prospective studies and randomized clinical trials.[1,3–6]

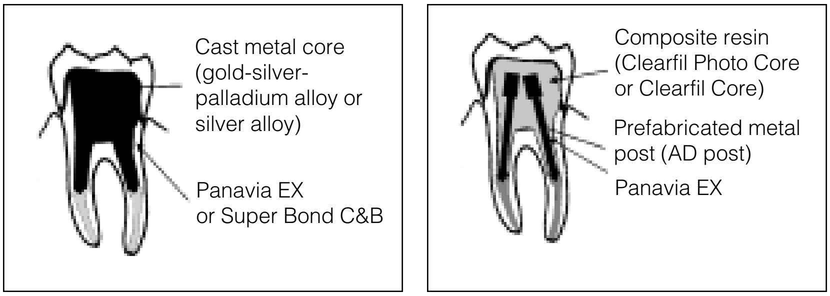

Fig 1 Core types: **(left)** indirect cast metal core and **(right)** direct resin core.

The type of cement material used has been reported to play a crucial role in increasing post retention strength and tooth fracture resistance in in vitro and clinical follow-up studies.[3,8–11] Although conventional cements (zinc phosphate or glass-ionomer cements) are widely used because of their simplicity and proven efficacy, adhesive resin cement is regarded as effective in improving the long-term success of cores, mainly because its physical properties are similar to dentin. Furthermore, adhesive resin cement has displayed a high degree of clinical reliability regarding bond adhesion to root dentin.[3,11,12]

Despite an increasing number of clinicians using adhesive resin cement for both resin and cast metal core restorations, no study has been published showing the CSRs and risk factors for failure of adhesively luted cast metal cores. In addition, most studies have reported retrospective CSRs of cast metal cores luted with conventional cements and resin cores using various types of prefabricated posts 5 or 10 years postinsertion.[1–4] Also, longitudinal follow-up studies evaluating CSRs for more than 10 years are scarce.[7]

Therefore, this clinical comparative cohort study was designed to verify the 15-year survival rate of cast metal core and resin core treatments luted with adhesive resin cements. This study also sought to identify the risk factors for core failure. The null hypothesis was that no significant difference in the CSR would be observed between the two core groups.

Materials and Methods

Study Population

The study subjects were selected among patients who consecutively attended the Fixed Prosthodontic Clinic of Okayama University Dental Hospital, Okayama, Japan, between April 1988 and December 1991. Eligible patients were those who received cast metal or resin core restorations and whose structured clinical core records were completed appropriately. A total of 1,024 subjects and 2,174 cores were eligible. Thirty-three subjects were excluded due to unmatched data in hospital chart and core records. Therefore, the actual sample for CSR analysis consisted of 991 subjects (male: 276, female: 715) and 2,124 cores (cast metal: 372, resin: 1,752).

Among the study population, 381 subjects lacked data concerning the analyzed predictor variables for core failure and were consequently excluded from the subsequent Cox proportional hazards analysis. Therefore, the subsample for the risk analysis consisted of 610 patients (male: 155, female: 455) and 1,053 cores (cast metal: 187, resin: 866).

This study protocol was reviewed and approved by the Ethical Committee for Human Study of Okayama University Graduate School of Medicine, Dentistry, and Pharmaceutical Sciences (no. 176).

Core Restoration Techniques

Figure 1 shows a schematic diagram of the two types of core restorations. For the resin core restoration, the root canal was drilled parallel-walled with a Largo Peeso Reamer (Dentsply), and a prefabricated metal post (AD post, Kuraray) of an identical diameter was cemented with Panavia EX (Kuraray), according to the manufacturer's instructions. The bonding agent was either Clearfil New Bond (Kuraray) or Clearfil Photo Bond (Kuraray) after dentin pretreatment with 40% phosphoric acid (30 seconds) and 10% sodium hypochlorite (60 seconds).[13–16] After post cementation, composite resin (Clearfil Photo Core or Clearfil Core, Kuraray) was used for the core buildup.

For the cast metal core preparation, the root canal cavity was drilled with a taper reamer (Dentech) and an impression was made using a silicone impression material (Exafine, GC). The cast metal core was made of a gold-silver-palladium alloy (Castwell M.C. [12% gold], GC) or a silver alloy (Miro Bright, GC) and was prepared by one dental laboratory. The cast metal core was luted with either Panavia EX or Super Bond C&B (Sun Medical) adhesive cement. When the core was cemented with Panavia EX, the aforementioned steps used for resin core cementation were performed. For cores luted with Super Bond C&B, dentin pretreatment was performed with 10% citric acid and 3% ferric chloride for 10 seconds, according to the manufacturer's instructions.

The selection of the adhesive cements and core materials was determined according to the individual preferences of 45 experienced clinicians (residents, postgraduate students, and faculty professors) who treated the patients. Immediately after core insertion, the treating clinician filled out the hospital chart and other clinicians completed the clinical core record according to their own inspection. The type of restoration placed on the treated tooth was either a full crown or a fixed partial denture.

Classification of Survival, Failure, and Censored

The core condition (survival, failure, or censored) was assessed by one investigator from data contained in the hospital chart and the clinical core record. Surviving cores included cores that remained in their original form up to the analysis endpoint (November 16, 2004). Failures involved one of the following three complications: core loosening (due to caries, root/tooth fracture, or post fracture), core removal (due to caries, root/tooth fracture, or periapical periodontitis), or tooth extraction or hemisection (due to caries, root/tooth fracture, post fracture, marginal periodontitis, periapical periodontitis, or an unspecified reason). Censored cases involved cores in their original form for which clinical follow-up was lost prior to the endpoint due to the patient's withdrawal from the dental hospital (unwilling to return, change of address, or change of treatment to another dental office) or the patient's death (alternative outcome).

In instances of restorations involving multiple teeth (eg, fixed partial dentures), each tooth was considered as one individual core.

Risk Factors for Core Failure and Complications

Baseline data of risk factors included the core restoration type (cast metal or resin core), age at core insertion, sex, date of core insertion (working duration), remaining coronal dentin (absent or present), core margin location (below or above crown margin), root canal forms (straight or funnel), tooth location (mandible or maxilla), tooth type (anterior or posterior), and index of decayed, missing, and filled teeth (DMFT Index).

The DMFT Index was followed-up by the periodic recall of patients. The number of missing teeth was counted to show the overall intraoral condition in both core groups throughout the entire study period.

Statistical Analysis

The chi-square test and *t* test were used to compare the baseline data between the cast metal and resin core groups of the actual sample for CSR estimation, as well as the subsample for the risk factor analysis for core failure.

The CSR was calculated by the Kaplan-Meier method and lifetable analysis.[17] The log-rank test was used to compare the survival curves between the two core groups.[18] Comparative analyses between the two adhesive cements used in the cast metal core group were performed with Kaplan-Meier and log-rank tests. Log-rank analysis was also used to verify whether a significant difference between core cementation performed by faculty professors or postgraduate students and residents would account for CSR differences.

Finally, the Cox proportional hazards test was used to calculate the relative risk for core failure of each predictor variable. Intergroup comparison of core complications was analyzed using the chi-square test. The significance level was set at $P < .05$.

Results

Baseline Data Comparison

A baseline comparison between the cast metal and resin core groups of the intended and actual samples was performed based on age at core insertion, sex, DMFT Index, and number of remaining teeth (Table 1). There was no statistical difference in regard to the mean age at core insertion (cast metal: 52.0 ± 14.2 years, resin: 50.6 ± 13.8 years) and sex ratio (male: 51, female: 146 for the cast metal core; male: 225, female: 569 for the resin core) between the intended and actual samples or between the two core groups. In addition, there was no significant difference in the remaining number of teeth between the two core groups throughout the entire study period (Fig 2).

However, an intergroup baseline data comparison of the subsample for subsequent analysis of risk factors for core failure revealed significant differences in regard to remaining coronal dentin ($P < .0001$), core margin location ($P < .0001$), root canal form ($P < .0001$), tooth location ($P < .0001$), tooth type ($P = .0001$), and DMFT Index ($P = .0001$) among the two core groups (Table 2).

CSR and Risk Factors for Core Failure

A Kaplan-Meier analysis indicated that the 15-year estimated cumulative survival rate of the resin core (78.7%) was significantly higher than that of the cast metal core (55.4%; log-rank test, $P < .0001$) (Fig 3). A lifetable analysis of survival, failure, and censored cores is shown in Table 3.

No significant difference was observed in CSRs between the two resin cements (Panavia EX and Super Bond C&B) used in the cast metal core group (log-rank

Table 1 Baseline Data Comparison Between Cast Metal and Resin Core Groups of the Intended and Actual Study Samples

	Cast metal core			Resin core		
	Intended sample	Actual sample	*P*	Intended sample	Actual sample	*P*
Patients (cores)	220 (407)	197 (372)		804 (1,767)	794 (1,752)	
Age at core installation (mean ± SD) (y)	51.9 ± 14.2[a]	52.0 ± 14.2[b]	.9965†	50.6 ± 13.8[a]	50.6 ± 13.8[b]	.9954†
Age range (y)	16–86	16–78		16–82	16–82	
Sex (M/F)	52/168[c]	51/146[d]	.9705‡	227/577[c]	225/569[d]	.6587‡
DMFT Index (mean ± SD)		19.8 ± 5.4[e]			18.0 ± 6.1[e]	
No. of remaining teeth (mean ± SD)		22.8 ± 5.2[f]			23.4 ± 5.0[f]	

SD = standard deviation; M = male; F = female.
[a]*P* = .0793†; [b]*P* = .0927†; [c]*P* = .1366‡; [d]*P* = .3608‡; [e]*P* = .9877†; [f]*P* = .1775.†
†*t* test; ‡chi-square test.

Table 2 Baseline Intergroup Comparison of the Subsample for Analysis of the Risk Factors for Core Failure

	Cast metal core	Resin core	*P*
Patients (cores)	111 (187)	499 (866)	
Age at core installation (mean ± SD) (y)	50.6 ± 15.1	50.5 ± 13.6	.9389*
Age range (y)	18–76	16–82	
Sex (M/F)	23/88	132/367	.2096†
Remaining coronal dentin (absent/present)	129/58	160/706	< .0001†
Core margin location (below crown margin/normal)	62/125	129/737	< .0001†
Root canal form (straight/funnel)	126/61	780/86	< .0001†
Tooth location (mandible/maxilla)	135/52	485/381	< .0001†
Tooth type (anterior/posterior)	85/102	268/598	.0001†
DMFT Index (mean ± SD)	21.1 ± 5.5	18.9 ± 5.7	.0001*
No. of remaining teeth (mean ± SD)	23.5 ± 4.8	23.8 ± 4.6	.3883*

SD = standard deviation; M = male; F = female.
**t* test; †chi-square test.

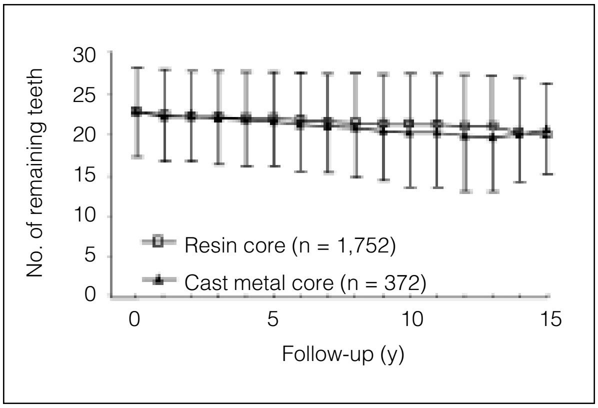

Fig 2 Comparison of the number of remaining teeth between cast metal and resin core groups in the actual study sample. A *t* test revealed no statistical difference at any point in time.

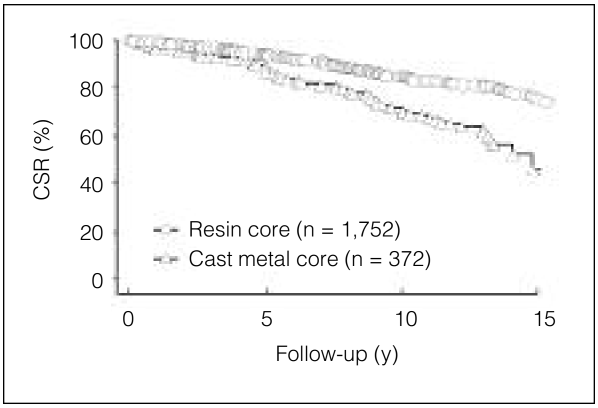

Fig 3 Kaplan-Meier 15-year survival curves of cast metal cores (55.4%) and resin cores (78.7%). The significant statistical difference was verified by the log-rank test ($P < .0001$).

test, $P = .2921$) (Fig 4). As a result, they were recognized to be a homogenous group in the subsequent statistical analyses.

Moreover, the log-rank test showed no significant difference in CSRs between the cores cemented by faculty professors or by postgraduate students and residents, neither in the entire core sample analysis ($P = .2120$) nor in each of the core groups (cast metal core: $P = .4430$, resin core: $P = .4782$).

According to the Cox proportional hazards test, sex (male, $P < .0001$), absence of remaining coronal dentin ($P = .0057$), core restoration type (cast metal core, $P = .0186$), and aging ($P = .0380$) were significant risk factors for core failure (Table 4).

Table 3 Lifetable of Survival, Failure, and Censored Cores

Year	Cast metal core				Resin core			
	Survival (n)	Censored (n)	Failure (n)	Survival ratio (%)	Survival (n)	Censored (n)	Failure (n)	Survival ratio (%)
0–1	372	79	10	100.0	1,752	302	12	100.0
1–2	283	51	3	97.0	1,438	152	17	99.3
2–3	229	24	5	95.9	1,269	94	13	98.0
3–4	200	15	2	93.7	1,162	125	17	97.0
4–5	183	8	6	92.7	1,020	77	13	95.5
5–6	169	6	10	89.6	930	52	16	94.2
6–7	153	11	3	84.2	862	44	10	92.5
7–8	139	9	4	82.5	808	54	23	91.4
8–9	126	6	7	80.0	731	50	17	88.7
9–10	113	3	6	75.5	664	61	13	86.6
10–11	104	13	4	71.4	590	37	13	84.8
11–12	87	12	4	68.5	540	38	8	82.9
12–13	71	20	2	65.1	494	53	2	81.6
13–14	49	31	4	63.0	439	179	11	81.3
14–15	14	7	2	55.4	249	124	6	78.7

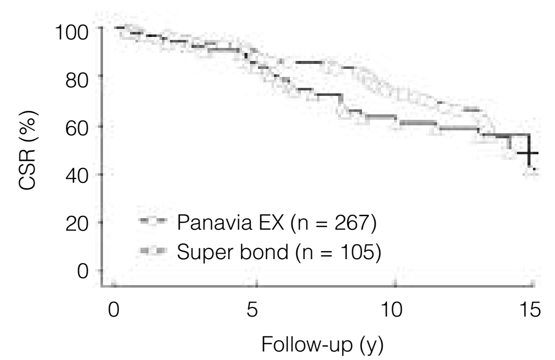

Fig 4 Kaplan-Meier survival curves of Panavia EX and Super Bond C&B used for cast metal core cementation. There was no statistical difference between the two cements (log-rank test, $P = .2921$).

Table 4 Multiple Regression Analysis of Risk Factors for Failure of Core Restorations

Predictor variables	P*	95% CI	Relative risk
Sex (female or male)	< .0001	0.282–0.598	0.411
Remaining coronal dentin (absent or present)	.0057	1.192–2.806	1.828
Type of core restoration (cast metal or resin)	.0186	1.096–2.730	1.729
Age at core installation (y)	.0380	1.001–1.034	1.017
Tooth location (mandible or maxilla)	.3358	0.824–1.765	1.206
Core margin location (below crown margin or normal)	.4041	0.762–1.966	1.224
Tooth type (anterior or posterior)	.7486	0.714–1.598	1.068
DMFT Index	.8507	0.971–1.036	1.003
Root canal form (straight or funnel)	.8712	0.572–1.604	0.958

CI = confidence interval.
*Cox proportional hazards test.

The failure rates were 19.4% and 11.0% for cast metal and resin cores, respectively (Table 5). The major core complication was tooth extraction/hemisection (cast metal: 14.0%, resin: 7.2%), followed by core loosening (cast metal: 3.8%, resin: 1.4%). The causes of tooth extraction/hemisection included caries (cast metal: 4.8%, resin: 1.2%), tooth fracture (cast metal: 2.4%, resin: 0.7%), and marginal periodontitis (cast metal: 2.4%, resin: 1.0%), while caries deterioration (cast metal: 3.5%, resin: 1.0%) was the main factor causing core loosening (Table 5).

Table 5 Description of Complications of Cast Metal and Resin Core Restorations

	Cast metal core, n (%)	Resin core, n (%)	*P**
Total	372 (100.0)	1,752 (100.0)	
Core failures	72 (19.4)	193 (11.0)	
1- Core loosening	14 (3.8)	24 (1.4)	.0016
Caries	13 (3.5)	17 (1.0)	.0002
Post fracture	0 (0.0)	4 (0.2)	.3563
Tooth fracture	1 (0.3)	3 (0.2)	.6934
2- Core removal	6 (1.6)	44 (2.5)	.2992
Caries	3 (0.8)	18 (1.0)	.6957
Endodontic retreatment	3 (0.8)	26 (1.5)	.3064
3- Tooth extraction or hemisection	52 (14.0)	126 (7.2)	< .0001
Caries	18 (4.8)	22 (1.2)	< .0001
Tooth fracture	9 (2.4)	13 (0.7)	.0037
Marginal periodontitis	9 (2.4)	17 (1.0)	.0210
Post fracture	0 (0.0)	2 (0.1)	.5144
Periapical periodontitis	12 (3.2)	56 (3.2)	.9766
Unknown	4 (1.1)	15 (0.9)	.6835

*Chi-square test.

Discussion

Study Design

There were three prominent differences between this study and prior long-term studies: *(1)* the prospective 15-year follow-up period and the large study population, *(2)* the applied structured clinical core record that enabled objective and standardized assessment, and *(3)* the cementation of both core restorations with adhesive resin cement, which displayed a better in vitro performance than conventional luting systems previously.[8–11]

Despite a thorough search in the Medline database, this study was the first to show the longitudinal CSRs of cast metal cores luted with adhesive resin cement. Moreover, this study was the first to compare the cast metal core CSRs with the CSRs of resin cores cemented with a similar adhesive luting material.

On the other hand, this study also had some limitations, such as the large number of censored cases, which might occur naturally in long-term studies due to a patient's hesitation or inability to return for periodontal maintenance. Some patients were not able to return due to physical impairment, change of address, or other unknown reasons not identified in the clinical core record. However, a comparison of censored core rates between cast metal and resin core groups showed no statistical differences (chi-square test, $P = .1385$). Therefore, the core survival/failure rates of both groups were not influenced notably by the large number of censored cases. Future studies should use a more rigorous periodontal recall system, such as sending letters to subjects, making phone calls, or even providing additional benefits (eg, transportation costs) to reduce the number of censored cases.

Another limitation was the nonrandomization of core treatment selection, which was determined according to the clinician's preference. This aspect of the study could partially explain the baseline intergroup disparities of the subsample for analysis of risk factors for core failure, particularly in regard to remaining coronal dentin and core margin location (Table 2). However, a subsequent multivariate analysis (Cox proportional hazards test) of the follow-up data hopefully negated the baseline discrepancies because some of the significant factors detected at baseline (core margin location, tooth type, tooth location, and DMFT Index) were not identified as statistically significant risk factors for core failure (Tables 2 and 4). To better control and equalize intergroup baseline data, as well as to obtain more reliable and valid results, randomized clinical trials would be the best clinical design. However, randomization is impossible in some clinical studies due to ethical considerations.

Finally, the clinical classification of the remaining coronal dentin was determined by the clinician's own judgment rather than by the precise categorization of the number of remaining dentin walls or the degree of dentin height and width. Future studies should include more specific and accurate dental anatomical inclusion criteria.[1]

Core Survival Rates and Risk Factors for Core Failure

The null hypothesis that no significant differences in the CSRs between the two core groups would be observed was rejected. The results of the Kaplan-Meier curve clearly demonstrated the higher CSR of the resin core group (log-rank test, $P < .0001$) (Fig 3). The lifetable analysis demonstrated that the 15-year cumulative

CSRs were 55.4% and 78.7% for the cast metal group and the resin core group, respectively (Table 3).

According to a recent systematic review, there has been only one quasi-randomized clinical trial evaluating the CSRs of resin and cast metal cores.[1] The results observed herein are consistent with that clinical study, which demonstrated that the CSR of resin cores was associated with significantly fewer failures than conventional cast metal cores after 4 years of clinical follow-up.[19]

However, previous prospective longitudinal studies demonstrated no differences in the CSRs between the two core restorations, affirming that both treatments have good long-term outcomes.[20,21] One study, however, involved a limited sample size of less than 100 cores,[20] while the cementation techniques were not adequately described in the other study.[21] Two previous systematic reviews reported that the CSR up to 72 months varied from 87.2% to 91.0% for cast metal cores and from 81.0% to 86.4% for resin cores.[4,6] In this study, a CSR of 89.6% for cast metal cores and a notably higher rate of 94.2% for resin cores for the same time interval was observed (Table 3).

There have been very few long-term follow-up studies evaluating CSRs for more than 15 years. As a result, a detailed comparison was not feasible. A recent study reported a 17-year cumulative CSR of 84.0% for cast metal cores luted with zinc phosphate or glass-ionomer cement and a variance from 71.0% to 84.0% for resin core cases with minimal and substantial dentin height, respectively.[7] The patient sample in that study, however, could have been biased due to different selection criteria used by the 17 dental offices that collected the data.

In accordance with previous reviews and longitudinal studies, the authors believe that the major risk factor for core failure is the absence of remaining coronal dentin (Table 4).[1–4,7,20,21] Extensive tooth damage caused by caries, trauma, or consecutive filling failures weakens the structure of the remaining tooth dentin biomechanically, thus increasing the likelihood for tooth or root fracture.[1–3] Several in vitro studies have also shown that a decreased amount of remaining dentin height and thickness is associated with lower tooth fracture resistance independent of the core restoration type.[2,22–25] Therefore, preservation of tooth structure during any dental procedure is a must.[1–3]

For that reason, differences in tooth preparation techniques could have influenced the overall CSR. The cast metal cores required undercut-free tapered root canal preparation, which sometimes required dentin overcutting. However, in the resin core treatment, the tooth could be restored even with internal undercut. Root preparation was therefore more conservative (ie, with minimal dentin cut and axial wall parallelism).[2,26] Moreover, the prefabricated post may have fit better because its standardized diameter size matched the Largo Peeso Reamer.

The Cox proportional hazards test also revealed the cast metal core restoration type as a significant risk factor for core failure, independent of the absence of remaining coronal dentin (Table 4). An additional intergroup comparison among the specific subsample of cores luted only in severely damaged teeth (with an absence of remaining coronal dentin) demonstrated a significantly lower failure rate of resin cores than cast metal cores (log-rank test, $P = .0282$). This finding could be explained partially by the similar elasticity modulus of the resin used and proper tooth dentin, which would absorb more occlusal forces, reduce the probability of disruption of the adhesive layer, and prevent tooth fracture.[27–29]

On the other hand, cast metal cores could presumably increase the probability of tooth fracture, especially in teeth with extensive coronal dentin destruction, due to mechanical properties of greater hardness and lower resilience in comparison to tooth dentin, which would not reduce the intensity of occlusal forces distributed to the devitalized root and coronal dentin.[24,30] This explanation is supported by the higher incidence of complications in the cast metal core group, which experienced a 14.0% incidence of tooth extraction/hemisection and an almost 4.0% incidence of core loosening. In contrast, the resin core group experienced incidence rates of 7.2% and 1.4% for the respective conditions (Table 5). In vitro studies have also demonstrated that endodontically treated teeth restored with cast metal cores had a higher probability of vertical fracture; moreover, the fractures were more catastrophic and usually resulted in tooth extraction.[23,24]

Nevertheless, these results should be analyzed cautiously because of the marked baseline differences of the subsample for risk analysis for core failure (Table 2). There could have also been a possible bias effect due to unknown predictor variables (noninvestigated predictors). Therefore, the extent to which the consequences of sample nonrandomization and the limited number of analyzed predictors could have influenced the CSR is unknown. For example, a recent study demonstrated that dentin contaminated with provisional cements used between appointment intervals reduced resin bond strength significantly in comparison to freshly cut dentin.[31] Therefore, direct resin core cementation might have led to better bond adhesion to the tooth structure, thus resulting in better outcomes. This phenomenon could also explain the significantly lower incidence of caries in the resin core group.

The decreased mechanical strength of aged teeth could explain why age at core installation was an independent predictor for core failure (Table 4).[32–34] For example, Kinney et al[34] reported an almost 20.0% reduction in dentin fracture resistance in aged teeth. Moreover, elderly patients would have a higher incidence of root canal retreatment and core recementation associated with cumulative deleterious fatigue due to long-term sustained occlusal stress.

Finally, a significantly higher core failure rate was observed in male subjects. This finding may be partially explained by the fact that the occlusal force of men is generally higher than that of women.[35,36] Individual oral care might have played an important role in treatment longevity; however, no conclusion could be drawn concerning that variable because no data were collected in regard to the frequency and quality of oral health maintenance.

Other factors such as tooth location, tooth type, DMFT Index, core margin location, and root canal form did not show the statistical significance after the 15-year observation period. Previous studies have drawn attention to tooth type because anterior teeth are loaded nonaxially and therefore may be subject to more damaging occlusal stress.[2,37–39] However, based on the results observed herein, the authors believe that the effects of oblique occlusal loading on the anterior teeth were not likely to be a relevant risk factor for core failure, rather the amount of remaining dentin would be a determinant, independent of tooth type or position.

Conclusion

This clinical comparative cohort study investigated the 15-year CSR of resin and cast metal core restorations. This study showed that the survival rate of resin cores was significantly higher than that of the cast metal cores and the absence of remaining coronal dentin, core restoration type (cast metal), higher age at core insertion, and sex (male) were significant risk factors for core failure. Furthermore, the incidence of core complications such as caries, tooth fracture, and marginal periodontitis was significantly higher in the cast metal core group.

These data are helpful for understanding the long-term prognosis of adhesively cemented cast metal and resin cores and may be useful in clinical decision making. Future studies are necessary to evaluate the relationship between the core survival rate and the influence of as yet unidentified risk factors, such as the degree of remaining coronal and root dentin structure (wall number and thickness), occlusal force, parafunctional habits (clenching and bruxism), type of prosthetic treatment loading the treated tooth, post length, post diameter, and strict periodontal condition.

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Literature Abstract

The economic value of teeth

This is a rare but interesting paper published by nondental individuals on a community-based dental topic. This paper examined the economic value and the effect of oral health on labor market outcomes by exploiting variation in access to fluoridated water during childhood. The authors studied US populations with local water district fluoridation from the 1960s onward. Since this study was conducted by nonclinicians, oral health was not evaluated in the data. It was assumed that children who live in a district with water fluoridation have better teeth in general. The 1992 Water Fluoridation Census, compiled by the Center of Disease Control, contained details on the fluoridation status of every public water system in the United States (eg, date, population served, natural or chemically adjusted). The authors combined several secondary data sets in this study to obtain information on fluoridation status, earnings, and background demographics. Their results showed that children who grew up in a district with fluoridated water earn more than a comparable cohort without fluoridated water. Fluoride exposure during childhood until four anterior teeth have erupted has a statistically significant effect on the hourly earnings of women; the effect for men is statistically insignificant. The beneficial economic effect is almost limited exclusively to women from a low socioeconomic status. There was little evidence to support occupational sorting, statistical discrimination, and productivity as potential channels of these effects.

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