



A 7-YEAR STUDY ON SURVIVAL RATE OF FIXED PARTIAL DENTURE AND POST & CORE DONE BY 5TH YEAR DENTAL STUDENTS OF SCHOOL OF DENTAL SCIENCES, UNIVERSITI SAINS MALAYSIA

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ABSTRACT

The restoration of root-filled teeth remains a major concern in dentistry. When a large amount of the clinical crown has been lost, a post provides a way of secure anchoring to the filling material to the tooth. The post is inserted into the root canal and this enables the core to build up and retained. Post and core systems strengthen the root and serve to improve retention of the final restoration. The purpose of this retrospective study was to evaluate the survival and the success rate of the posts and cores and fixed prosthesis that had been done by 5th year dental students in Universiti Sains Malaysia Health Campus, since 2004 until 2011. The result of this study showed the survival rate for posts and cores for duration of first year was 94.44% and 94.29% in second year. For fixed prosthesis, the survival rate for duration of 1 year was 97.6% but survival rate of 7 years was dropped to 50.0%. Molar tooth had highest failure rate (45.4%), followed by premolar (27.3%) and anterior tooth (27.3%). From the failure samples, posterior tooth had higher rate for failure (72.7%) compared to anterior tooth. The data obtained from this study will be useful to dental students of Universiti Sains Malaysia to assess their clinical skill of doing fixed prosthodontics rehabilitation.

KEY WORDS: Fixed partial denture, Post and core, Success rate.



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INTRODUCTION

The restoration of root-filled teeth remains a major concern in Dentistry. The use of post and core systems as a foundation for the reconstruction of endodontically treated teeth. ¹Post are manufactured with different design, material, length, and diameter. The variety of post and core choices gives a variety of success rate of the treatment. Studies showed that the mean survival time until failure of post-retained restorations was 11 years. ² The parameters for failure of treatment of post and core and fixed prosthesis includes tooth fracture, dislodgement of post and core or fixed prosthesis, periodontal problem, loss of retention, tooth extracted after treatment, and others. ³ Other factors related to post and core system that contributes to the failures includes the remaining tooth structure, post design, post length, post diameter and type of post and core materials ⁴ The ability to prevent micro leakage in a post and core treated tooth determines the long term survival and success rate of post and core and Bonding system plays an important role in decreasing micro leakage in post-and-core system ⁵. Fixed partial dentures include a single crown which veneers the clinical crown, and a fixed bridge which includes abutments, retainer, and Pontic. ⁶ A clinical retrospective analysis of 1618 single crowns and 1219 three-unit bridges evaluated between 1969 and 1989 revealed that a survival rate 88.7% of metal-ceramic crowns and 80.2% of metal-ceramic bridges after 10 years, which support the superiority of metal-ceramic system over acrylic-veneered crown ⁷. It was reported that for ceramic, the most common reason of failure is due to the formation of the crack line within the ceramic ⁸. Studies showed that metal-ceramic strength reduced twenty to 30% in moist environment, hence contributing to the failure rates of metal-ceramic fixed partial dentures. ⁹ The major cause of failure is due to improper design of restoration for occlusion, where inadequate tooth preparation leads to porcelain fracture. ¹⁰ A retrospective study involving a total number of 864 teeth in 360 patients was done over 60 months concluded that the survival rate of 92.7% was recorded for

posts and cores treated with fixed Prosthodontics after 60 months, with the most common cause of failure is loss of post retention, followed by post fracture.¹¹ Another study identified the incidence of complications of fixed Prosthodontics and posts and cores concluded that complications can occur due to clinical failure, substandard care, or even appropriately performed treatment procedures. ¹² The mean complication incidence occurs in posts and cores are 10% observed in 1 year to 25 years. ¹² Among the most common complications in posts and cores reported are post loosening (5%), root fracture (3%), caries (2%), and periodontal disease (2%).¹² Another study stated that 13.2% of the teeth restored with metal posts end up with complications such as fractures. Out of 775 endodontically treated teeth reviewed in 508 patients, teeth restored with a post system has a higher failure rate compared to teeth without posts. ¹³ Thus, the decision of adding a post to improve retention should only be considered when there is presence of extensive crown destruction, as higher root fracture rate (7%) can occur due to post insertion. The most common cause of failure of endodontically treated tooth is secondary caries, while the failure rate is affected by post dislodgement, root fracture, and coronal restoration fracture. ¹⁴ The purpose of this retrospective study was to evaluate the survival and the success rate of the posts and cores and fixed prosthesis that had been done by 5th year dental students in Universiti Sains Malaysia Health Campus, since 2004 until 2011 (7 years), as well as the factors which contribute to the occurrence of complications after treatments.

MATERIALS & METHODS

For this study, source of population was all the patients who received fixed partial denture and post and core treatment starting from Jan 2004 until Jan 2011. Simple random sampling was done for 65 subjects. The folders of 144 patients, who had undergone treatment for post and core and fixed partial denture over a

period of 7 years, done by 5th year dental students, School of Dental Sciences, Universiti Sains Malaysia were included in this study. A total of 72 cases of post and core and 106 cases of fixed partial denture were recorded. The follow-up record and complete treatment were available during the analysis. All the process of collecting data was done in the record unit, Hospital Universiti Sains Malaysia. The folder of the each subject was requested 1 week before the research began. Then the process of collecting data was done for about two weeks during working hours. The following parameters were used in the evaluation: date of received and complete the treatment (age of the treatment), location of the tooth (upper or lower jaw), type of tooth (anterior, premolar, and molar), and cause of failure (dislodged, periodontal problem, etc.). For this study, the success of the case was determined by the presence of fixed partial denture and post and core at the end of research without any adjustment. This was done by checking the patient current visit and if there is any recorded new treatment done on the tooth which on the subject. While for the failure of case was depend on, whether the restorations had been dislodged before the end of research date, any fracture root or tooth, loss of retention, periodontal problem, radiographic sign of failure or any other result except than success, this was also included if the restorations might have been recemented before end of research.

All of the data were analyzed using (SPSS,version 20) the Kaplan-Meier's Survival rate analyses test to determine the survival time of the fixed partial denture and post and core restorations.

RESULTS

In this study, the observation period of the fixed partial dentures and posts and cores range from 1 to 7 years, starting from January 2004 until January 2011. There were 72 cases of posts and cores and 112 cases of fixed partial denture data were recorded. For fixed partial dentures, 6 out of 112 cases were considered as failure. After 2 years of treatment due to uncomfortable claimed by patient 1 out of 2 cases recorded as failed in 2004. 1 case recorded as success in 2005. In 2006, 3 cases observed, with 1 case failed after 2 years of treatment due to dislodgement of the restoration. 2 cases were recorded in 2007, with 1 case failed after 4 years of treatment due to dislodge. 16 cases were recorded in 2008 and all the cases were successfully rehabilitated. In year 2009, 44 cases were reviewed, here 1 case failed after 1 year of treatment due to dislodge and another case failed after 2 years of treatment due to loss of retention, In year 2010, 42 cases were collected, 1 case failed within 1 year of treatment due to dislodge. (Table 1)

Table 1
Kaplan-Meyer for Fixed Prosthodontics Denture cases.

Year (observed year until January 2011)	No. of cases observed	No. of cases failed	Survival probability	Standard error of survival probability
2004	2	1	0.5	0.35
2005	1	0	1.0	0
2006	3	1	0.875	0.219
2007	2	1	0.5	0.25
2008	16	0	1.0	0
2009	44	2	0.932	0.037
2010	42	1	0.976	0.023

For posts and cores, the total failure cases were 3 out of 72 cases. No case was recorded in 2004. For the successful cases 1 case was in 2005 and 2 cases were found in 2006. In 2007 and 2008, 8 cases were recorded respectively all success were found successfully completed. In year 2009, 35

cases were recorded with 2 cases failed within 1 year. 1 case was found in 2010, which was failed within 1 year. For the reasons of post failures, 2 cases were dislodged in year 2009, 1 case in 2010 was failed due to patient complaint of throbbing pain after post insertion. (Table 2)

Table 2
Kaplan-Meyer for Post and Core.

Year (observed year until January 2011)	No. of cases observed	No. of cases failed	Survival probability	Standard error of survival probability
2004	0	0	0	0
2005	1	0	1.0	0
2006	2	0	1.0	0
2007	8	0	1.0	0
2008	8	0	1.0	0
2009	35	2	0.943	0.039
2010	18	1	0.944	0.053

The survival probability of all the data were assessed for each year using Kaplan-Meyer analysis. The calculated survival rate for posts and cores for first year was 94.44% and 94.29% was during second year. It has increased to 100% success rate for other years. For the fixed prosthesis, the survival rate for duration of 1 year was 97.6%, while for survival rate of 7 years was 50.0%. Most common cause of failure was due to dislodgement of the prosthesis. Molar had highest failure rate (45.4%), followed by premolar (27.3%) and anterior teeth (27.3%). Posterior teeth has higher rate of failure (72.7%). (Table 3 and Table 4)

Table 3
Type of failure and type of tooth involved for Fixed Partial Denture.

ypes of failure	Time until failure (type of tooth)						
	1	2	3	4	5	6	7
Extracted	0	0	0	0	0	0	0
Loss of retention	0	1 (posterior tooth)	0	0	0	0	0
Dislodged	2 (posterior tooth)	1 (anterior tooth)	0	1 (posterior tooth)	0	0	0
Fractured	0	0	0	0	0	0	0
Periodontal problem	0	0	0	0	0	0	0
Others	0	1 (anterior tooth)	0	0	0	0	0

Table 4
Type of failure and type of tooth involved in Post and Core.

Types of failure	Time until failure (type of tooth)						
	1	2	3	4	5	6	7
Extracted	0	0	0	0	0	0	0
Loss of retention	0	0	0	0	0	0	0
Dislodged	2 (posterior tooth)	0	0	0	0	0	0
Fractured	0	0	0	0	0	0	0
Periodontal problem	0	0	0	0	0	0	0
Others	1 (anterior tooth)	0	0	0	0	0	0

DISCUSSION

One of the objectives of survival analysis is to estimate the time of event for a group of individuals or samples. This study assessed the survival probability of posts and cores and fixed partial prosthesis, Kaplan–Meyer analysis allows the assessment of the survival probability of an object over a given period of time. There were several typical problems encountered that related with this retrospective study such as the availability and consistency of the data for analyses. In this study, the clinical findings had been recorded in the folders of the patients. several factors were assessed to determine the success rate and failure of the treatment. A case was considered as failure when the restorations were dislodged, fractured of the root or tooth, loss of retention, periodontal problem, radiographic sign of failure or any other result except than success, including the restorations re-cemented before the end of research. Our results have shown that the most common cause of failure was dislodged restoration, both in fixed partial denture and post and core, which was 66.7%. However, this result is contrast with the findings of other study which showed that the most common cause of failure in post and core is loosening of post (5.0%).⁽¹²⁾ While for fixed prosthesis, Pjetursson et al stated that the most frequent technical complication or failure was loss of retention (16.1%) followed by material fractures (5.9%).¹⁵ From the aspect of tooth type, for both posts and cores and fixed prosthesis, molar had highest failure rate (45.4%), followed by premolar (27.3%) and anterior tooth (27.3%). From the failure samples, posterior tooth had higher rate for failure (72.7%) compared to anterior tooth. Therefore, a few studies recorded a prevalence of failures in the upper jaw, generally in the anterior region^{16,17}. For the both findings of posts and cores and fixed prosthesis, the most common cause of failure was dislodged restoration and failure rate is higher among posterior teeth, is likely to be explained by the lack of experience and skill of the students while doing these cases, as clinical errors tend to occur during treatment. Posterior teeth are

more difficult to approach, in terms of getting instrument in and visibility, together with moisture control, thus with an inexperienced hand, will lead to failure in future. In the case of fixed partial denture survival rate of 7 years was 50.0%, which was decrease from 1 year success rate (97.6%). Posts and cores has a success rate close to 100% over the year, although there is several failure cases on early year most probably due to clinical error (survival rate of 1 year was 94.44% and 94.29% during second year). In this study, we have a limited comparison of survival time or survival probabilities, as our results were obtained by different statistical method and due to lack of samples. Factors that contribute for high success rate in post and core are probably due to strict criteria of case selection and close supervision by the instructors during treatment procedures to make sure that the treatment is completed and successfully done. This study result showed higher success rate in post and core compared to fixed partial dentures, which is also similar as another study.¹⁸ there were several limitations in this study. Firstly, the limitation in obtaining the subject for several years due to missing records or patient registration files at the polyclinic. Another limitation was obtaining patients with incorrect registration number due to student mistake in writing the patients' registration record and handwriting errors. . Longer observation period will have more accurate result as problems may be more prone to occur after our observation period, thus having more accurate survival rate of the subjects.

CONCLUSION

In this study, the survival rate of the fixed partial denture and post and core done by 5th year dental students Universiti Sains Malaysia were observed. Several observation demonstrated that post and cores have a success rate of 100% over the years. For fixed prosthesis, the survival rate for duration of 1 year was 97.6%, while for survival rate of 7 years was 70.7%. The most common cause of failure was dislodged restoration, for fixed partial dentures and posts and cores.

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