

To Investigate the Incidence of Pulpal Necrosis in Vital Teeth Restored with Metal-Ceramic Crowns (CMCS) or Bridge Retainer

Neeraj Sharma¹, Prabhat Mandhotra², Shilpa Kumari², Saurabh Garg³, Tarush Thakur⁴, Priyanka Negi⁵

¹Reader, Department of Conservative Dentistry and Endodontics, Himachal Dental College, Sundernagar, Mandi, Himachal Pradesh, India.

²Senior lecturer, department of Conservative Dentistry and Endodontics, Himachal Dental College, Sundernagar, Mandi, Himachal Pradesh, India.

³Medical Officer (Dental) Department of Health and Family Welfare Himachal Pradesh, (Final year PG Student, Department of Conservative Dentistry and Endodontics, Himachal Dental College) Sundernagar, Mandi, Himachal Pradesh, India.

⁴Consultant, Department of Orthodontist, Himachal Pradesh, India.

⁵Medical officer (Dental), Department of Health and Family Welfare, Himachal Pradesh, India.

Received: October 2020

Accepted: October 2020

ABSTRACT

Background: For centuries, full-coverage restorations have been used to support and protect teeth after extensive caries removal, root canal therapy, or cracks. However, the procedure to prepare a tooth for a crown and subsequently restore it leaves many opportunities for pulpal irritation or pulpal necrosis. The present study was conducted to investigate the incidence of pulpal necrosis in vital teeth restored with metal-ceramic crowns or bridge retainers. **Methods:** The present study was conducted among OPD patients of Himachal Dental College, Sundernagar who had received a CMC or a conventional fixed-fixed bridge on vital tooth/teeth over one year. A total of 100 CMCs and 100 bridges with no history of root canal treatment of the abutment teeth were identified. Clinical assessment was done, history was taken. At the review appointment, the selected restoration(s) was examined in detail clinically. The presence of a periapical radiolucent area was taken as an indicator of the non-vitality of the dental pulp. Statistical analysis was performed using the Statistical Package for the Social Sciences software version 21.0 (SPSS Inc., Chicago, IL, USA). $P < 0.05$ was considered significant. **Results:** In the present study total CMCs were 100 in which maximum CMCs were failed due to endodontic reasons (17%) and total failed CMCs were 33%. The total bridges were 100 in which maximum was failed due to endodontic reasons (24%) and total failed bridges were 49%. Total abutment teeth involved in endodontic failure bridges were 90 in which pulpally involved teeth were 34. Maxillary teeth were more in no. that was pulpally necrosed (70.58%). The total CMC failed was 17 due to endodontic reasons. Maxillary teeth were more in no. that was pulpally necrosed (64.70%). **Conclusion:** This study concluded that bridges failed as compared to CMCs due to endodontic reasons. More no. of teeth becomes pulpally necrosed in both bridges and CMCs were maxillary anterior teeth.

Keywords: Pulpally Necrosed, CMC, bridges, endodontic failure.

INTRODUCTION

If a tooth is congenitally missing, fails to erupt, or is lost, the effect may vary greatly depending upon many factors. Factors include: which particular tooth is involved, whether any other tooth/teeth have been lost in the same arch, the teeth articulation and the local and general periodontal condition. Also, drifting or tilting of adjacent teeth may take place, and the extent of this depends mainly on the age, and periodontal condition of the patient, the amount of intercuspation and the tooth position in the arch. Therefore to avoid the problems mentioned, it is desirable to prevent tooth loss if possible and plan early so, that when required, the teeth can be replaced as soon as

possible.^[1] Ramfjord (1974) described how missing teeth can be successfully replaced with fixed bridges prostheses to improve patient aesthetics, phonetics, comfort, and function and to maintain the health and integrity of the dental arches.^[2] Full coverage crowns have long been used to restore heavily damaged teeth and/or, in the case of metal-ceramic crowns (CMCs), to satisfy the patient's aesthetic demand. They are also frequently used as retainers for fixed prostheses to replace missing teeth. In either case, the teeth involved might likely have suffered cumulative insults from caries, periodontal disease, or trauma, be it physical or due to restorative procedures, before the restoration.^[3] Any history of dental disease and restorations could have an impact on the health of the dental pulp and further treatment might precipitate pulpal problems in the future.^[4] Hence, the present study was conducted to investigate the incidence of pulpal

Name & Address of Corresponding Author

Dr. Priyanka Negi,
Medical officer (Dental),
Department of Health and Family Welfare,
Himachal Pradesh, India
E-mail: docpriyankanegi@gmail.com

necrosis in vital teeth restored with metal-ceramic crowns or bridge retainers.

MATERIALS AND METHODS

The present study was conducted among OPD patients of Himachal Dental College, Sundernagar who had received a CMC or a conventional fixed–fixed bridge on vital tooth/teeth over one year. Before the commencement of the study, permission was taken from the ethical committee of the institute and written informed consent was obtained from the patients. A total of 100 CMCs and 100 bridges with no history of root canal treatment of the abutment teeth were identified. The tooth (or, in the case of a bridge, at least one of the abutment teeth) had not received any form of root canal treatment before the construction of the restoration; and The tooth either received a CMC or bridge retainer (BR) for a fixed–fixed bridge are included in the study. All resin-bonded retainers were excluded from the study. Clinical assessment was done, history was taken for any possible pre- and intra-operative factors that might contribute to the development of pulpal necrosis: preexisting DMFT score, presence of dental pins or pulp capping, the status of the preexisting restoration filling and the alveolar bone level, the reason for crown/bridge construction, period of temporization and the luting cement used. At the review appointment, the selected restoration (s) was examined in detail clinically. The presence of caries (recurrent or new) and the quality and status of the restoration were noted. Percussion test, palpation of the corresponding attached mucosa, and cold and electric pulp tests (where possible) were carried out. A long-cone, paralleling periapical radiograph was then taken. The restoration was deemed to have failed if any one or a combination of the following complications were noted: (i) technical or mechanical – including fracture of any part of the restoration or the tooth, and loss of retention of the restoration; (ii) aesthetic; (iii) presence of secondary caries; (iv) endodontic; and (v) any other reason, such as tooth extraction (Cheung 1991). But, for purpose of this study, only the endodontic reason was considered; that is, the abutment tooth became pulpally or periapically involved or had been root filled after the restoration. The diagnosis of the pulpal status of the crowned teeth often relies on clinical symptoms and radiographic assessment. Here, the presence of a periapical radiolucent area was taken as an indicator of the non-vitality of the dental pulp. Statistical analysis was performed using the Statistical Package for the Social Sciences software version 21.0 (SPSS Inc., Chicago, IL, USA). $P < 0.05$ was considered significant.

RESULTS

In the present study total CMCs were 100 in which maximum CMCs were failed due to endodontic reasons (17%) and total failed CMCs were 33%. The total bridges were 100 in which maximum was failed due to endodontic reasons (24%) and total failed bridges were 49%. Total abutment teeth involved in endodontic failure bridges were 90 in which pulpally involved teeth were 34. Maxillary teeth were more in no. that was pulpally necrosed (70.58%). The total CMC failed was 17 due to endodontic reasons. Maxillary teeth were more in no. that was pulpally necrosed (64.70%).

Table 1: Reasons for failure of CMCs

Reasons for failure	CMCs n(%)
Endodontic	17 (17%)
Aesthetic	4 (4%)
Prosthetic	4 (4%)
Fracture of porcelain	1 (1%)
Tooth fracture	2 (2%)
Root caries	2 (2%)
Others	3 (3%)
Total failed CMCs	33 (33%)
Total CMCs analysed	100 (100%)

Table 2: Reasons for failure of Bridges

Reasons for failure	Bridges n(%)
Endodontic	24 (24%)
Endodontic+ debond	10 (10%)
Pain	4 (4%)
Loss of retention	8 (8%)
Others	3 (3%)
Total failed bridges	49 (49%)
Total bridges analysed	100 (100%)

Table 3: Frequency of tooth types and the development of pulpal necrosis in bridge-group

Tooth type	Presence of necrosis in bridge-group
Maxillary anteriors	24 (70.58%)
Maxillary premolars	3 (8.82%)
Maxillary molars	3 (8.82%)
Mandibular anteriors	0 (0%)
Mandibular premolars	2 (5.88%)
Mandibular molars	2 (5.88%)
Total pulpally involved teeth	34 (100%)

Table 4: frequency of tooth types and the development of pulpal necrosis in CMC group

Tooth type	Presence of necrosis in the CMC group
Maxillary anteriors	11 (64.70%)
Maxillary premolars	2 (11.76%)
Maxillary molars	2 (11.76%)
Mandibular anteriors	0 (0%)
Mandibular premolars	1 (5.88%)
Mandibular molars	1 (5.88%)
Total pulpally involved teeth	17 (100%)

DISCUSSION

Over the years, many reports on the longevity and reasons for failures in fixed prostheses have been published. But in many studies, the condition leading to the replacement of the restorations was

Sharma et al; Incidence of Pulpal Necrosis in Vital Teeth Restored with Metal-Ceramic Crowns

regarded as the only criterion for failure whereas other types of complications, most notably endodontic, were not considered.^[5,6]

In the present study total, CMCs were 100 in which maximum CMCs were failed due to endodontic reasons (17%) and total failed CMCs were 33%. The total bridges were 100 in which maximum was failed due to endodontic reasons (24%) and total failed bridges were 49%. Total abutment teeth involved in endodontic failure bridges were 90 in which pulpally involved teeth were 34. Maxillary teeth were more in no. that was pulpally necrosed (70.58%). The total CMC failed was 17 due to endodontic reasons. Maxillary teeth were more in no. that was pulpally necrosed (64.70%).

Kontakiotis et al. reported that the incidence of asymptomatic pulp necrosis of the teeth following crown preparation was 9.1%, which decreased to 5.3% when only intact teeth were evaluated and increased to 12.5% in teeth with preoperative caries, restorations or crowns.^[7]

Saunders & Saunders (1998) conducted a cross-sectional, radiographic survey of patients for whom a set of full-mouth periapical radiographs was available and reported that 19% of initially vital teeth developed periradicular radiolucency after (an unknown period of) crown placement.^[8]

Cheung et al. found that 33% of vital abutment teeth developed signs of endodontic complications at some point after cementation of the final restorations during a follow-up period of up to 15 years.^[9]

Kim & Trowbridge (199) found that the deeper and more extensive tooth preparation would result in a greater degree of inflammatory pulpal response.^[10]

CONCLUSION

This study concluded that bridges failed as compared to CMCs due to endodontic reasons. More no. of teeth becomes pulpally necrosed in both bridges and CMCs were maxillary anterior teeth.

REFERENCES

1. Ramfjord SP. Periodontal aspects of restorative dentistry. J Oral Rehabil, 1974; 1: 107-26.
2. Roberts DH. The failure of retainers in bridge prostheses. An analysis of 2,000 retainers. Br Dent J 1970; 128: 117-24.
3. Ericson S, Hedegård B, Wennström A (1966) Roentgenographic study of vital abutment teeth. Journal of Prosthetic Dentistry 16, 981-7
4. Seltzer S, Bender IB (1984) The Dental Pulp – Biologic Considerations in Dental Procedures, 3rd ed. Philadelphia: Lippincott.
5. Scurria MS, Bader JD, Shugars DA (1998) Meta-analysis of fixed partial denture survival: prostheses and abutments. Journal of Prosthetic Dentistry 79, 450-64
6. Marrant G (1956) Bridges, with particular relation to the periodontal tissues. Dental Practitioner 6, 178-86.

7. Kontakiotis EG, Filippatos CG, Stefopoulos S, Tzanetakos GN. A prospective study of the incidence of asymptomatic pulp necrosis following crown preparation. Int Endo J 2015; 48: 512-517.
8. Saunders WP, Saunders EM (1998) Prevalence of periradicular periodontitis associated with crowned teeth in an adult Scottish subpopulation. British Dental Journal 185, 137-40.
9. Cheung GS, Lai SC, Ng RP. Fate of vital pulps beneath a metal-ceramic crown or a bridge retainer. Int Endod J 2005; 38: 521-530.
10. Kim S, Trowbridge H (1998) Pulpal reaction to caries and dental procedures. In: Cohen S, Burns RC, eds. Pathways of the Pulp, 7th edn. St Louis, MO: Mosby, pp. 532-51.

Copyright: © the author(s), 2020. It is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits authors to retain ownership of the copyright for their content, and allow anyone to download, reuse, reprint, modify, distribute and/or copy the content as long as the original authors and source are cited.

How to cite this article: Sharma N, Mandhotra P, Kumari S, Garg S, Thakur T, Negi P. To Investigate the Incidence of Pulpal Necrosis in Vital Teeth Restored with Metal-Ceramic Crowns (CMCS) or Bridge Retainer. Ann. Int. Med. Den. Res. 2020; 6(6):DE53-DE55.

Source of Support: Nil, **Conflict of Interest:** None declared