



Requirements of Back to Back Crowns in Children Aged 2 to 6 Years in Mandibular Arch - An Observational Study

Ivan Obadiah¹, Deepa Gurunathan^{*2}, Vignesh Ravindran²

¹Saveetha Dental college and hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-600077, Tamil Nadu, India

²Department of Pediatric and Preventive Dentistry, Saveetha Dental college and hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-600077, Tamil Nadu, India

Article History:

Received on: 08 Sep 2020

Revised on: 08 Oct 2020

Accepted on: 14 Oct 2020

Keywords:

stainless steel crown,
dental caries,
pulpectomy,
space maintainer

ABSTRACT

Pre-formed stainless steel crowns has been proved to be successful and efficient full coverage restoration in pediatric dentistry especially after pulp therapy and for restoring multi-surface carious lesions. The purpose of this study is to enumerate the need and requirements of back-to-back crowns in the mandibular arch of children aged 2 to 6 years. This cross-sectional observational study was carried out retrospectively by analysing the treatment done by providing back-to-back crowns in mandibular arch and thereby determining the requirement for the same. Out of 134 pairs of back-to-back crowns, 86.7% of the teeth required pulp therapy; 28.5% of the teeth had a class 2 carious lesion. Pulp therapy was the most common requirement for back-to-back crowns in the mandibular arch, followed by Class 2 restorations.



*Corresponding Author

Name: Deepa Gurunathan

Phone: 9994619386

Email: deepag@saveetha.com

ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11iSPL3.3471>

Production and Hosted by

IJRPS | <https://ijrps.com>

© 2020 | All rights reserved.

After intervening the symptoms of the patient such as pain, swelling or sensitivity by pulp therapy, restorations etc., it is important to preserve the treatment done and also it is mandatory to regain the function of the treated tooth. Full coverage restorations serve best in such situations in providing a better prognosis (Miller and Feinberg, 1962).

Preformed metal crowns also commonly referred to as stainless steel crowns were brought up to pediatric dentistry by Humphrey in 1950 (Nash, 1939). It has been noticed that they are delivering superior prognosis than that of large multi-surface amalgam restorations and also proven to have longer clinical lifespan than two or three surface amalgam restorations (Dawson *et al.*, 1981). Stainless steel crowns have a strong advantage or relative lack of sensitivity to oral conditions during placement and cementation. In an uncooperative crying child it is often possible to place a well-fitting crown without compromising longevity or quality of the restoration. Therefore, inability to efficiently control saliva is an indicator for choosing the stainless steel crown as the restoration of choice. However its main disadvantage is the metallic appearance. In children

INTRODUCTION

Managing dental caries successfully in a pediatric population involves many challenges and requires efficient skills and knowledge in framing a treatment plan with good prognosis (Ludwig *et al.*, 2014). Early childhood caries (ECC) is a serious community health problem in many countries across the world, including both developing and industrialized countries (Uribe, 2009). Its consequences are capable of affecting the quality of life of the children affected and also their parents (Sharna *et al.*, 2019).

with excessive carious lesions that have widely distributed throughout their dentition, it is commonly observed that both the primary molars i.e first and second primary molars in any quadrant of the primary dentition is carious and requires a full coverage restoration to regain its function (Kindelan *et al.*, 2008).

Stainless steel crowns are indicated for various cases like following pulp therapy, in case of proximal carious lesions and also as a full-coverage abutment for space maintainers. In cases where two adjacent teeth require stainless steel crowns, specific adaptations were required to be done in the crowns to fit them. Among the vast wide range of pediatric dental patients, specific requirements for back to back stainless steel crowns are not studied and analysed. This study is specifically designed to enumerate the usage of back to back stainless steel crowns in the mandibular arch of children aged 2 to 6 years and to determine the requirements of the same.

MATERIALS AND METHODS

This study was conducted in a university setting among the pediatric dental patients visiting the department of pediatric and preventive dentistry in Saveetha Dental College and Hospital. The ethical approval was given by the institutional review board. Data collection and analysis was done by two examiners. This retrospective observational study was conducted from June 2019 to March 2020. A total of 1571 cases were reviewed and cross-verification was carried out by postoperative photo figures. Sampling bias was minimized by keeping the eligibility criteria specific, which is, teeth requiring back to back stainless steel crowns in mandibular arch. A total of 134 pairs of back to back crowns were included after review.

The case reports were analysed from the patient record software of the university. 1571 cases which included stainless steel crowns were manually verified with photo figures for segregating them as back to back crowns and also to restrict the population age from two to six years. The variables which were to be studied in study are the reasons for the requirement of back to back crowns like pulp therapy, class II carious lesions and space-maintaining abutments. Statistical analysis was done using SPSS Software version 23. Chi-square test was carried out to determine the correlation between the requirements of back to back stainless steel crowns. Sample selection was done based on the following.

Inclusion criteria

1. Children of age 2 to 6 years

2. Children who required back to back crowns in mandibular arch

Exclusion criteria

1. Children who are above 6 years of age
2. Children who didn't require back to back crowns in the mandibular arch.
3. Children with special health care needs.

RESULTS AND DISCUSSION

A total of 134 pairs of back to back crowns which denote 368 teeth individually, were analysed. Majority of the patients in this study were categorized under the age group of 3 to 5 years (Figure 1). The age of the patients who required more of pulp therapy in this study were the age group of 4 years (Figure 2). Males were found to be treated more with back to back crowns than females (Figure 3). Both the quadrants in the mandibular arch, that is the right and left quadrants were equally distributed (Figure 4). 86.7% of the teeth requiring back to back crowns underwent pulp therapy. 28.5% of the teeth required class 2 restorations. 19.2% of the teeth required both pulp therapy and class 2 restorations. Statistically, significant difference observed between pulp therapy and class 2 restorations (p-value - 0.003). Back to back stainless steel crowns were not given in mandibular arch as an abutment to space maintainer (Table 1).

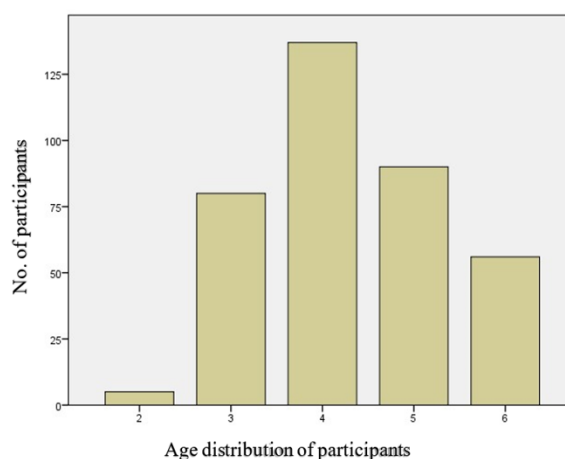


Figure 1: Bar chart showing the distribution of age of participants included in the study.

In Figure 1, X-axis represents the age of the patients participated in this study, Y-axis represents the number of participants; The majority of the patients requiring back to back stainless steel crowns in mandibular arch were from 3 years to 5 years of

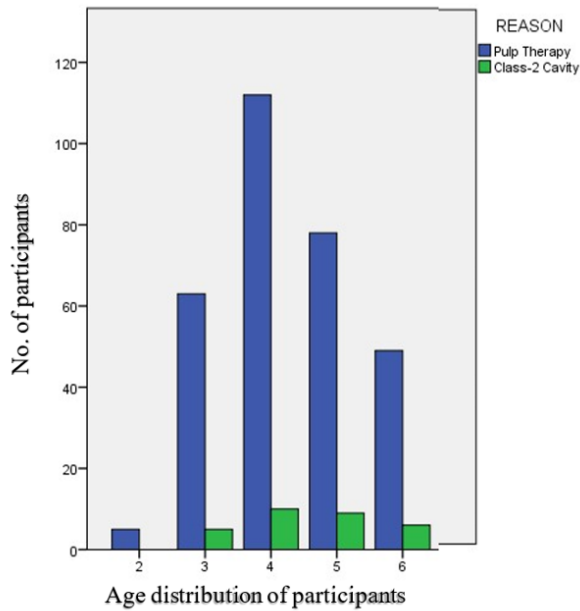


Figure 2: Bar chart showing the relationship of age of the patient with the reason for back to back crowns.

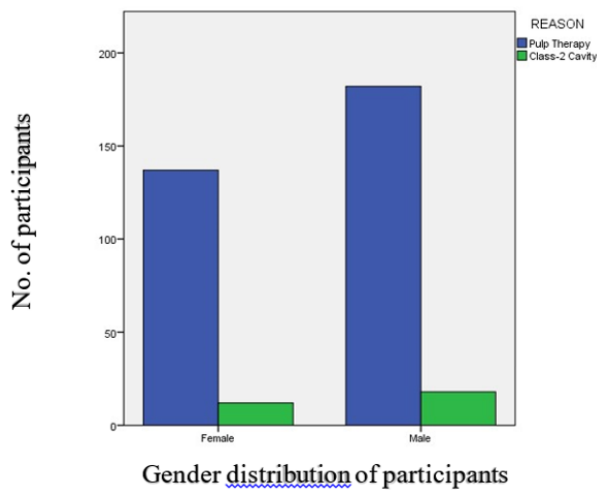


Figure 3: Bar chart showing the relationship of the gender of the patient with the requirement of back to back crowns.

Table 1: Table enumerating the various requirements of back to back stainless steel crowns in mandibular arch in children of age 2 to 6 years

Reason for crown	Count	Percentage
Total pulp therapy	319	86.7 %
Total class II cavity	105	28.5 %
Class II cavity requiring pulp therapy	71	19.2 %
Space maintenance	0	

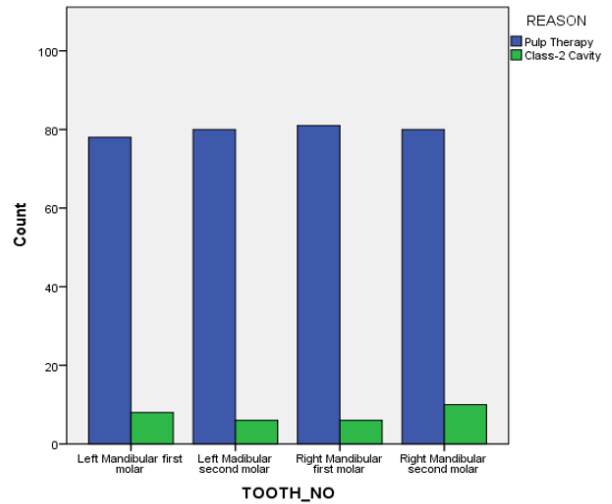


Figure 4: Bar Chart showing the distribution of back to back crowns in the right and left quadrants.

age. In Figure 2, X-axis represents the age of the patients participated in this study, Y-axis represents the number of participants; Blue represents Class II restorations and Green represents Pulp therapy; Pulp therapy was the commonly observed reason for the requirement of back to back stainless steel crowns in mandibular arch. In Figure 3, X-axis represents the gender of the patients participated in this study, Y-axis represents the number of participants; Blue represents Class II restorations and Green represents Pulp therapy; Male children were highly treated with back to back crowns. In Figure 4, X-axis represents the name of the teeth involved, Y-axis represents the frequency of occurrence; Blue represents Class II restorations and Green represents Pulp therapy; Back to back stainless steel crowns in mandibular arch were equally distributed among the quadrants. Statistically significant difference observed between pulp therapy and class 2 restorations (chi-square - 2.78; p-value- 0.003)

From the above results, it is clear that the most common requirement for back to back stainless steel crowns in mandibular arch in children aged 2 to 6 years was pulp therapy. Conventionally, pulp therapy in primary teeth were carried out using endodontic hand files to shape and clean the root canals. But, recently an effective and efficient rotary endodontic file exclusive for primary teeth was introduced (Jeevanandan, 2017). All the cases in this study were rendered pulp therapy using this rotary file system. These rotary files for primary teeth were proven to be efficient in operating time compared to hand files (Panchal et al., 2019). Not only canal preparation time is reduced in using rotary files in pedodontics, but also the obtu-

ration quality despite the behaviour of the child was proven to be better than conventional preparation using hand files (Govindaraju *et al.*, 2017b,a; Jeevanandan and Govindaraju, 2018). To add to these efficient studies, these pediatric rotary files have proven to be more effective than reciprocating files also (Lakshmanan *et al.*, 2020; Nair *et al.*, 2018). The awareness and knowledge about these pediatric rotary files have spread widely across many pediatric dentists and also among general dental practitioners (Govindaraju *et al.*, 2017c). But just as the common saying "prevention is better than cure", more care has to be taken in preventing early childhood caries, sparing the child the hazardous outcomes of dental caries in a young age and also the trauma and stress undergone through a dental procedure. One of the most highly carried out preventive strategies against early childhood caries is the use of fluoride. Fluoridated toothpastes were readily available over the counter and have proven efficient in preventing dental caries (Ramakrishnan and Bhukri, 2018). Studies had been carried out in assessing the fluoride content of bottled drinking water thereby improvising the preventive purview (Somasundaram *et al.*, 2015). An innovative study has been carried out and proven the efficiency of chewable toothbrushes for children which is an easy and commendable strategy in prevention of dental caries in children (Govindaraju, 2017). As the placement of a stainless steel involves reduction of tooth structure which is an invasive procedure, less invasive techniques such as predicting the dental status using biological markers should be studied more. A biochemical approach in preventing the early childhood caries is more effective as various markers can be assessed and proper measures can be taken (Subramanyam *et al.*, 2018).

In this present study, out of 368 back to back crowns, 319 teeth required pulpectomy, 105 teeth required class 2 restorations and 71 teeth required pulp therapy followed by class 2 restorations. In a study, the mean prevalence of cavitated lesions in primary dentition was found to be 33.85%. Males were more affected than females. Mandibular molars and maxillary anterior teeth were the predominantly affected teeth (Sachdeva *et al.*, 2015). In another prevalence study regarding dental caries in primary dentition, it has been found that the decay experience was common in second primary molars (Warren *et al.*, 2002). According to recent studies, posterior teeth which have been rendered pulp therapy should be provided with a full coverage restorations and if cuspal coverage is to be obviated, short term strengthening is essential (Tikku *et al.*, 2010). Proximal carious lesions are also a major reason for

the requirement of a full coverage restoration in primary teeth (Azizi, 2014). Rising failure rate of Class 2 restorations using high viscosity Glass ionomer cement due to proximal breakdown was observed in a study, proving the need for a full coverage restoration in proximal caries (Scholtanus and Huysmans, 2007). Class 2 resin restorations show more failure than class 2 amalgam restorations (Overton and Sullivan, 2012).

In this present study all the stainless steel crowns were luted with type 1 glass ionomer cement. Studies of extracted primary molars have proven that the stainless steel crowns that were luted with resin modified glass ionomer cements have lesser microleakage than conventional cement. A study comparing conventional crown preparation for stainless steel crowns with that of halls technique, showed no statistically significant differences in microleakage between these two preparations (Gruythuysen *et al.*, 2010).

Stainless steel crowns are given in permanent teeth also after endodontic procedures or even in case of cuspal fractures due to trauma. However in primary teeth cuspal fractures are uncommon. The awareness and knowledge in handling traumatic dental injuries among general dentists have grown enormously over the years (Ravikumar *et al.*, 2017). Discussing about crowns in pediatric dentistry, esthetic crowns like zirconia crowns are gaining popularity among dentists as well as the patients. Providing a crown to a grossly decayed tooth or a tooth with proximal caries will prevent space loss due to migration of the adjacent teeth into the cavitated surface of the tooth. This thereby prevents future malocclusion sparing the need for orthodontic intervention. However, interdental spacings in permanent dentition due to developmental malformations like high frenum attachment has to be corrected through surgical intervention (Christabel, 2015).

In the mandibular arch, if there is any premature loss of primary tooth space maintainers like band and loop, extended band and loop, distal shoe were given in unilateral cases. In bilateral loss of tooth, lingual arch space maintainer is given. In cases, where the abutment tooth is carious or requires pulp therapy, this band is replaced with a stainless steel crown. In this present study, no such tooth was found with back to back stainless steel crowns. Not only pediatric dental patients are encountered with dental caries and pulpal inflammation but also, with much worse pathology like dental abscess, cysts and tumors such as ranula (Packiri, 2017). Treating a child after acquiring dental caries is essential in preventing further detrimental progressions

but preventing early childhood caries must be the first goal for the parents, pedodontists and also the care takers of the children. Because, dental caries are not considered as a serious health issue by many parents till they are asymptomatic, which will eventually lead to a symptomatic problem. Dental neglect (Gurunathan and Shanmugaavel, 2016) is a serious issue leading to invasive treatment like pulp therapy which needs to be preserved by a full coverage restoration. This present study enumerated the common requirements for back to back stainless steel crowns in mandibular arch specifically in children of age 2 to 6 years thereby providing a better insight of the progression and clinical manifestations of early childhood caries in such scenarios. The limitations of this study were that it doesn't include treatments done over a wide geographic region rather included the treatments done only by a few operators. This might have biased the formulation of the treatment plan leading to crown placement in a tooth which would have been arguable by a different clinician. More studies, including more different techniques and treatment plans should be carried out for more specific results and outcomes.

CONCLUSION

Out of 1571 stainless steel crowns given in the past year, 23% of them was back to back crowns in the mandibular arch. The most common requirement for back to back stainless steel crowns in the mandibular arch for children aged 2 to 6 years was pulp therapy. Next common requirement for back to back stainless steel crowns in the mandibular arch for children aged 2 to 6 years was found to be Class 2 carious lesions.

Conflict of interest

The authors declare that they have no conflict of interest for this study.

Funding support

The authors declare that they have no funding support for this study.

REFERENCES

Azizi, Z. 2014. The Prevalence of Dental Caries in Primary Dentition in 4- to 5-Year-Old Preschool Children in Northern Palestine. *International Journal of Dentistry*, pages 1–5.

Christabel, S. L. 2015. Prevalence of Type of Frenal Attachment and Morphology of Frenum in Children, Chennai, Tamil Nadu. *World Journal of Dentistry*, 6(4):203–207.

Dawson, L. R., Simon, J. F., Taylor, P. P. 1981. Use of

amalgam and stainless steel restorations for primary molars. *ASDC Journal of Dentistry for Children*, 48(6):420–422.

Govindaraju, L. 2017. Effectiveness of Chewable Tooth Brush in Children-A Prospective Clinical Study. *Journal of Clinical and Diagnostic Research*, 11(3):31–34.

Govindaraju, L., Jeevanandan, G., Subramanian, E. M. G. 2017a. Clinical evaluation of the quality of obturation and instrumentation time using two modified rotary file systems with manual instrumentation in primary teeth. *Journal of clinical and diagnostic research*, 11(9):55–58.

Govindaraju, L., Jeevanandan, G., Subramanian, E. M. G. 2017b. Comparison of quality of obturation and instrumentation time using hand files and two rotary file systems in primary molars: A single-blinded randomized controlled trial. *European Journal of Dentistry*, 11(03):376–379.

Govindaraju, L., Jeevanandan, G., Subramanian, E. M. G. 2017c. Knowledge and practice of rotary instrumentation in primary teeth among indian dentists: A questionnaire survey. *Journal of International Oral Health*, 9(2):45.

Gruythuysen, R., van Strijp, G., Wu, M.-K. 2010. Long-term Survival of Indirect Pulp Treatment Performed in Primary and Permanent Teeth with Clinically Diagnosed Deep Carious Lesions. *Journal of Endodontics*, 36(9):1490–1493.

Gurunathan, D., Shanmugaavel, A. K. 2016. Dental neglect among children in Chennai. *Journal of Indian Society of Pedodontics and Preventive Dentistry*, 34(4):364.

Jeevanandan, G. 2017. Kedo-S Paediatric Rotary Files for Root Canal Preparation in Primary Teeth – Case Report. *Journal of Clinical and Diagnostic Research*, 11(3):3–5.

Jeevanandan, G., Govindaraju, L. 2018. Clinical comparison of Kedo-S paediatric rotary files vs manual instrumentation for root canal preparation in primary molars: a double blinded randomised clinical trial. *European Archives of Paediatric Dentistry*, 19(4):273–278.

Kindelan, S. A., Day, P., Nichol, R., Willmott, N., Fayle, S. A. 2008. UK National Clinical Guidelines in Paediatric Dentistry: stainless steel preformed crowns for primary molars. *International Journal of Paediatric Dentistry*, 18:20–28.

Lakshmanan, L., Mani, G., Jeevanandan, G., Ravindran, V., Ganapathi, S. E. M. 2020. Assessing the quality of root canal filling and instrumentation time using kedo-s files, reciprocating files and k-files. *Brazilian Dental Science*, 23(1).

- Ludwig, K. H., Fontana, M., Vinson, L. A., Platt, J. A., Dean, J. A. 2014. The success of stainless steel crowns placed with the Hall technique. *The Journal of the American Dental Association*, 145(12):1248–1253.
- Miller, I. F., Feinberg, E. 1962. Full coverage restorations. *The Journal of Prosthetic Dentistry*, 12(2):317–325.
- Nair, M., Jeevanandan, G., R, V., EMG, S. 2018. Comparative evaluation of post-operative pain after pulpectomy with k-files, kedo-s files and mtwo files in deciduous molars -a randomized clinical trial. *Brazilian Dental Science*, 21(4):411.
- Nash, D. A. 1939. The nickel-chromium crown for restoring posterior primary teeth. *Journal of the American Dental Association*.
- Overton, J. D., Sullivan, D. J. 2012. Early Failure of Class II Resin Composite Versus Class II Amalgam Restorations Placed by Dental Students. *Journal of Dental Education*, 76(3):338–340.
- Packiri, S. 2017. Management of Paediatric Oral Ranaula: A Systematic Review. *Journal of Clinical and Diagnostic Research*, 11(9):6–09.
- Panchal, V., Jeevanandan, G., Subramanian, E. G. 2019. Comparison of instrumentation time and obturation quality between hand K-file, H-files, and rotary Kedo-S in root canal treatment of primary teeth: A randomized controlled trial. *Journal of Indian Society of Pedodontics and Preventive Dentistry*, 37(1):75.
- Ramakrishnan, M., Bhukri, M. 2018. Fluoride, Fluoridated Toothpaste Efficacy And Its Safety In Children Review. *International Journal of Pharmaceutical Research*, 10(4):109–114.
- Ravikumar, D., Jeevanandan, G., Subramanian, E. M. G. 2017. Evaluation of knowledge among general dentists in treatment of traumatic injuries in primary teeth: A cross-sectional questionnaire study. *European Journal of Dentistry*, 11(02):232–237.
- Sachdeva, A., Punhani, N., Bala, M., Arora, S., Gill, G., Dewan, N. 2015. The prevalence and pattern of cavitated carious lesions in primary dentition among children under 5 years age in Sirsa, Haryana (India). *Journal of International Society of Preventive and Community Dentistry*, 5(6):494.
- Scholtanus, J. D., Huysmans, M.-C. D. 2007. Clinical failure of class-II restorations of a highly viscous glass-ionomer material over a 6-year period: A retrospective study. *Journal of Dentistry*, 35(2):156–162.
- Sharna, N., Ramakrishnan, M., Samuel, V., Ravikumar, D., Cheenglembi, K., Anil, S. 2019. Association between Early Childhood Caries and Quality of Life: Early Childhood Oral Health Impact Scale and Pufa Index. *Dentistry Journal*, 7(4):95.
- Somasundaram, S., Ravi, K., Rajapandian, K., Gurunathan, D. 2015. Fluoride content of bottled drinking water in Chennai, Tamilnadu. *Journal of Clinical and Diagnostic Research: JCDR*, 9(10):32–36.
- Subramanyam, D., Gurunathan, D., Gaayathri, R., Priya, V. V. 2018. Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries. *European Journal of Dentistry*, 12(01):067–070.
- Tikku, A., Chandra, A., Bharti, R. 2010. Are full cast crowns mandatory after endodontic treatment in posterior teeth? *Journal of Conservative Dentistry*, 13(4):246.
- Uribe, S. 2009. Early childhood caries – risk factors. *Evidence-Based Dentistry*, 10(2):37–38.
- Warren, J. J., Levy, S. A., Kanellis, M. J. 2002. Dental Caries in the Primary Dentition: Assessing Prevalence of Cavitated and Noncavitated Lesions. *Journal of Public Health Dentistry*, 62(2):109–114.