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Research Article

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Pulpotomy versus Extraction of Primary Molars in Children with Congenital Heart Diseases (CHD)

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Abstract

Introduction: *Dental management of a child with CHD is a procedure that requires special considerations due to predisposition to infective endocarditis (IE). The incidence of bacteremia can be induced by variable dental procedures, such as teeth extractions, root canal treatment, pulpotomies, interproximal fillings and application of rubber dam or stainless steel crowns (SSC). Pediatric dentists in the past decades, tend to perform extractions rather than pulpotomies of the deep carious primary molars to prevent possible infection of those teeth that may induce IE. The aim of the present study was to evaluate the presence of bacteremia in children with CHD who received dental extractions or pulpotomies of the primary molars under general anesthesia (GA).*

Patients and Methods: *A total of 60 patients with CHD (age 2-7 years old) from Prince Sultan Cardiac Centre (PSCC) and PSMMC in Riyadh were evaluated by pediatric cardiologist for complete blood count (CBC), blood culture and Echocardiography. The patients received prophylactic antibiotics prior to dental treatment under GA. All patients were low to moderate risk to IE. The patients were randomly divided into two groups: 30 patients received formocresol pulpotomies (FP) and SSCs and 30 patients had extractions of primary molars with vital deep carious lesions.*

Results: *The mean age of patients was 3.9 years from FP group and 4.8 years from extractions group. Fifty eight patients were low risk to IE and 2 patients were at moderate risk. Following dental rehabilitation in the follow up visits over a three years period, there were no vegetation or signs of IE. The clinical and radiographic findings for pulpally treated teeth showed no signs of dental abscesses or apical lesions.*

Discussion and Conclusion: The present study showed that there was no vegetation in echocardiogram between the two groups of patients who received either pulpotomy or extractions of primary molar teeth in patients with (CHD). In addition, pulpotomy is not a risk factor to induce IE in patients with CHD. However, all patients received antibiotic prophylaxis prior dental rehabilitation.

Background

Advances in cardiac surgery have meant that CHD is today viewed as a treatable condition. Children with CHD are going to live long and productive lives with an improvement in their quality of lives [1]. Although the exact rate of CHD in Saudi Arabia is not available, regional study in Al-Qassim province has reported that the incidence of severe CHD is 5.4 per 1000 live births [2]. The incidence of early childhood caries (ECC) in Saudi Arabia has reported to be one of the highest rates in the world with approximate 85% of children below 6 years of age are affected with ECC [3]. Dental management of a child with CHD is a procedure that requires special considerations due to predisposition to infective endocarditis (IE) which can be induced by dental procedures, poor oral health, reduced tolerance to stress induced by dental treatment [4]. A review study by Garrocho-Rangel et al., (2017), stated that the incidence of bacteremia following diverse dental procedures in primary teeth induce bacteremia in patients with CHD (Table 1).

Table 1: Incidence of bacteremia following diverse dental procedures on primary teeth [5]

Oral procedure	%
Baseline rate	9
Intraligamentary injection	96.6
Multiple extractions (e.g. 4)	51
Single extraction	39
Mucoperiosteal flap	39
Tooth brushing	38.5
Matrix band placement with wedge	32
Rubber-dam placement	29.4
Ultrasonic scaling of teeth	25
Polishing teeth	24.5
Slow-speed drill	13
High-speed drill	4

The apparent risk of endocarditis (and possible complications) has led to more extensive approach towards the management of caries in these patients. Therefore, most practitioners achieve traditional protocol of extracting all pulpally involved teeth to minimize a possible risk of developing IE [4,5]. The major reason behind that, because of the evidence that manipulation of dental tissues may result in transient bacteremia [6]. It has been reported that, while the evidence against the risk of transient bacteremia has led to a change in the way the medical profession views IE risk in patients with CHD there was no evidence of a change in dental practitioners' perceptions of the risk in CHD [7]. This view seems to be true for dentistry in general, and pulp therapy of primary teeth in particular. The purpose of the present study was to evaluate the presence of bacteremia in children with CHD who received dental extractions or pulpotomies of the primary molars under general anesthesia (GA).

Research Design

Ethical approvals were obtained from the Institutional Review Board (IRB) of Prince Sultan Military Medical City (PSMMC) and Prince Sultan Cardiac Center (PSCC) in Riyadh. Informed consents were obtained from parents or guardians following full explanation of the procedures, objectives, and benefits of the research.

Patient' Selection

The selected patients were 2-7 years of age with CHD. All patients were evaluated by pediatric cardiologists for complete blood count (CBC), blood culture and Echocardiography. Patients who were free from IE were referred to pediatric dental clinic for dental treatment under GA. Patients were thoroughly examined by pediatric dentists for dental caries or abscesses. Intraoral radiographs of the primary molars that showed no apical periodontitis have been selected for the study.

A total of 60 patients who met the criteria for the study received prophylactic antibiotics prior to dental treatment under GA.
All patients were randomly divided into two groups:

1. Pulpotomy group: 30 patients received formocresol pulpotomy (FP) of carious primary molars with reversible pulpitis followed by placement of zinc-oxide-eugenol (ZOE) and stainless steel crowns (SSCs).
2. Extraction group: 30 patients underwent extractions of all pulpally involved decayed molars

The data samples were evaluated by pediatric dentists for clinical and radiographic examination of each patient 1 month following the procedure and then every 3-6 months follow up for 3 years. All patients were followed up routinely by pediatric cardiologists with Echocardiogram yearly for 3 years.

Results

Sixty children with CHD, received dental treatment under GA. From pulpotomy group, there were 19 males and 11 females patients with mean age 3.9 years. Only two patients were diagnosed as moderate risk to IE while the other 28 patients were considered to be low risk to IE. In the extraction group, there were 21 males and 9 female patients with mean age 4.8 years. All patients were diagnosed as low risk to IE (Table 2). Throughout cardiac follow up visits, it has been demonstrated that all patients from both groups were free from vegetation or signs of IE clinically and in the Echocardiogram. The clinical and radiographic findings for pulpally treated teeth showed that there were no signs of dental abscesses or apical lesions in 3 years intervals. Figure 1a and b demonstrate an example of one of the pulpally treated teeth.

Table 2: Outcome for Dental Treatment with either Pulpotomies and SSCs or Extractions in Patients with CHD

Categories	Pulpotomies and SSCs	Extractions
Number of patients	30	30
Number of males and females	19 M and 11 F	21 M and 9 F
Mean of age in years	3.9	4.8
Number of patients with low risk to IE	28	30
Number of patients with moderate risk to IE	2	0
Clinical examination and Echocardiogram yearly for 3 years	No vegetation or sign of IE in all patients	No vegetation or sign of IE in all patients
Dental examinations and radiographs every 3-6 months for 3 years	No signs of infections or abscesses in all pulpotomised teeth	Sockets healed well without complications in all patients

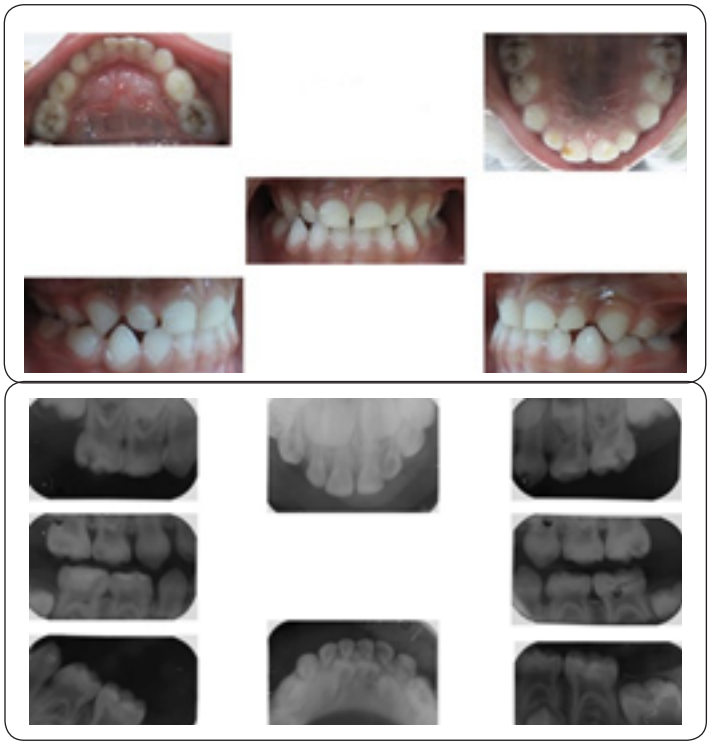

Figure 1a: Intraoral and dental radiograph images before treatment

Figure 1b: Intraoral and dental radiograph images 1 year after treatment

Discussion

The incidence of IE is very uncommon with reported annual incidence ranging from 2 to 8 per 100,000 individuals per year [8]. It has been reported that the cumulative bacteremia of non-prophylaxis procedures such as tooth brushing and mastication present similar or higher risk to that of the prophylaxis procedures such as tooth extraction [6,9,10]. In a review study by Wilson and his colleagues (2007) about the effectiveness of antibiotic prophylaxis for dental procedures, it has been reported that only very small number of cases of IE might be prevented by antibiotic prophylaxis and therefore it should be limited only to selected dental procedures that need gingival manipulation in high risk patients only [7]. On the other hand, in the present study, antibiotic prophylaxis were given to all patients prior the procedure even though 97% of the cases were at low risk to IE. The purpose behind that was not only to prevent IE as a result of dental procedures but also from intubation and other possible complications that may arise from GA. There was no specific recommendation by the AAPD for the type of therapy in pulpally involved primary teeth in children with CHD [11]. In a survey distributed by the AAPD to the members regarding the treatment of choice for teeth with reversible pulpitis. Most of the respondents chose to perform pulpotomy regardless of the medical conditions of the patients [4]. However, many pediatric dentists prefer extractions of pulpally involved teeth in CHD patients when perform treatment under GA to avoid possible treatment failure (dental abscesses) and thus increase susceptibility to IE. The present study showed that there was no vegetation in echocardiogram between the two groups of patients who received either pulpotomy or extractions of primary molar teeth over a period of three years. In a recent study by Ansari and colleagues (2018), it has been demonstrated that the success rate of form cresol pulpotomy (FP) in a primary teeth was100% [12]. Likewise, the present study showed similar success rate that FP in primary molars was successful in all cases as all patients had no apical lesions or pathological root resorption in three years follow up. This result demonstrates that the old fear of treatment failure is not a concern and keeping teeth in the dental arch restore function, preserve the space for permanent teeth to erupt and prevent psychological trauma in these children.

Conclusion

Pulpotomy treatment for reversible pulpitis in primary molar teeth is not a risk factor to cause IE in children with CHD, providing that all patients received antibiotics prophylaxis. Further studies with larger group of patients with CHD are required to investigate the possible risk of pulpotomy in primary molars to cause IE.

References

1. Matsuda M, Takemura H, Yamashita A, Matsuoka Y, Sawa T, et al. (2019) Post-surgical chronic pain and quality of life in children operated for congenital heart disease. Acta Anaesthesiol Scand 63: 745-750.
2. Al-Mesned A, Al Akhfash AA, Sayed M (2012) Incidence of severe congenital heart disease at the province of Al-Qassim, Saudi Arabia. Congenit Heart Dis 7: 277-282.
3. Khan SQ, Khan NB, Arrejaie AS (2013) Dental caries. A meta analysis on a Saudi population. Saudi Med J 34: 744-749.
4. Dunlop RM, Sanders BJ, Jones JE, Walker LA, Caldwell RL (2013) Pulp therapy in pediatric patients with congenital heart disease: survey of American Academy of Pediatric Dentistry members. J Dent Child (Chic) 80: 139-144.
5. Garrocho-Rangel A, Echavarría-García A-C, Rosales-Bérber M-A, Flores-Velázquez J, Pozos-Guillén A (2017) Dental management of pediatric patients affected by pulmonary atresia with ventricular septal defect: A scoping review. Med Oral Patol Oral Cir Bucal 22: e458–e466.
6. Lockhart PB, Brennan MT, Sasser HC, Fox PC, Paster BJ, et al. (2008) Bacteremia associated with toothbrushing and dental extraction. Circulation 117: 3118-3125.
7. Wilson W, Taubert KA, Gewitz M, Peter B Lockhart, Larry M Baddour, et al. (2007) Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. Circulation 116: 1736-1754.
8. Chen PC, Tung YC, Wu PW, Wu LS, Lin YS, et al. (2015) Dental Procedures and the Risk of Infective Endocarditis. Medicine (Baltimore) 94: e1826.
9. Dajani AS, Taubert KA, Wilson W, AF Bolger, A Bayer, et al. (1997) Prevention of bacterial endocarditis recommendations by the American Heart Association. Circulation 128: 1142-1151.
10. Al-Karaawi ZM, Lucas VS, Gelbier M, Roberts GJ (2001) Dental procedures in children with severe congenital heart disease: a theoretical analysis of prophylaxis and non-prophylaxis procedures. Heart 85: 66-68.
11. American Heart Association. Dental care and heart disease guidelines. Available at: http://www.heart.org/heartorg/con-

ditions/congenitalheartdefects/theimpactofcongenitalheartdefects/infective-endocarditis_UCM_307108_Article.jsp.Accessed May 31, 2012.
12. Ansari G, Morovati SP, Asgary S (2018) Evaluation of Four Pulpotomy Techniques in Primary Molars: A Randomized Controlled Trial. Iran Endod J 13: 7-12.