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Endodontic follow up of proximal restorations in primary molars

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Abstract

Proximal restorations in primary molars were assessed according to surface, teeth affected, and the need for subsequent follow up. All primary molars demonstrated a similar incidence of proximal surface restorative intervention, but the distal surface of the first primary molar and the mesial surface of the second primary molar showed the highest incidence of proximal restorations. The patient's age at initial restorative intervention did not appear to influence the need for subsequent endodontic treatment in restored teeth, indicating that early diagnosis and treatment of the carious lesion was critical for long-term pulpal health.

Introduction

In a climate of increasing emphasis on prevention in most developed countries, a generation of children has emerged that shows a decline in dental caries experience. Not only has there been a decrease in the average amount of caries, but also, the pattern of disease has changed significantly, with proximal surfaces demonstrating the greatest percentage reduction (Graves and Stamm 1985).

Despite this decline in caries experience, certain features of the primary molars render them inherently susceptible to proximal lesions. The low, broad contact points make clinical detection with a probe difficult, and consequently, lesions may not be diagnosed until the thin enamel and dentin layers have been penetrated extensively (Luke and Reisbick 1982). When these features are compounded with a proportionally large pulp, delayed detection may result in the need for more complicated dental treatment. As the primary pulp ages similarly to the permanent pulp, it would seem likely that a younger tooth would be at greater risk of pulpal involvement following caries attack and the subsequent placement of a restoration.

The aim of this study was to assess the distribution of proximal restorations and to determine the incidence for endodontic follow-up of the restored primary molars with respect to the patient's age and the site of intervention.

Materials and Methods

Participants for this study were selected from the patient records at the University of Queensland Dental School. All patients involved in this study lived in a nonfluoridated area, and the use of fluoride supplements varied greatly in the population. One hundred and thirty patients were found to have primary molars with Class II restorations. Five hundred and forty-three Class II restorations were recorded. A one-page survey was designed that recorded the patient's name, date of birth, medical history, charting of teeth and restorations, and the relevant history of each restoration. The history included the date of initial intervention, the type of base and restorative material used, and any further treatment or sequelae. Clinical protocol supported the endodontic treatment of pulpally involved teeth in preference to extraction, except where teeth appeared to be close to exfoliation. Any teeth that showed pulpal pathology close to exfoliation were not included in the group of restored teeth that required endodontic treatment, since the cause of pulpal pathology could not be determined. The sample was divided into early intervention (1–5 years old), midintervention (6–10 years old), and late intervention (>10 years old) groups. The early intervention group was studied over two to eight years and the mid- and late-intervention groups over two to five years. All restored teeth were followed for a minimum period of two years. Teeth were assessed at semi-annual intervals by clinical examination, history of reported symptoms, radiographs, and vitality testing. Teeth affected by new lesions were not included in this study. Pulpotomies were performed on mildly symptomatic teeth with "vital" pulp tissue such as those affected by dentin sensitivity. Pulpectomies were performed on teeth where pulps were nonvital and where

radiographs showed pulpal pathology.

Results

One hundred and thirty patients were found to have a total of 543 Class II restorations in the primary molars. Table 1 shows the distribution of these restorations in maxillary and mandibular first and second primary molars. These results demonstrate that all primary molars were affected to a similar degree.

TABLE 1. Distribution of Class II restorations

Teeth	First primary molar		Second primary molar		Total
	Maxillary	Mandibular	Maxillary	Mandibular	
N (%)	145 (26.7)	147 (27.1)	125 (23.0)	126 (23.2)	543 (100)

For the early intervention group, more first primary molars required treatment than second primary molars. These findings were consistent for maxillary and mandibular teeth. The incidence of intervention for the first primary molar was maintained in the midintervention group, with an increase in the incidence of intervention for the second primary molar (Table 2). The >10 years-old group demonstrated comparatively lower incidence of intervention than the other two groups.

TABLE 2. Distribution of Class II restorations according to the age of initial intervention

Age (years)	First primary molar		Second primary molar		Total
	Maxillary N(%)	Mandibular N(%)	Maxillary N(%)	Mandibular N(%)	Groups N(%)
1–5	60 (41.4)	76 (51.7)	37 (29.6)	41 (32.5)	214 (39.4)
6–10	79 (54.5)	69 (46.9)	83 (66.4)	72 (57.1)	303 (55.8)
> 10	6 (4.1)	2 (1.4)	5 (4.0)	13 (10.4)	26 (4.8)

The distribution of restorations on proximal surfaces is recorded in Table 3 (see next page). The distal surface of the first primary molar and the mesial surface of the second primary molar were the most restored proximal surfaces. There were 10 times more distal surface restorations than mesial surface restorations on the first primary molar, while the incidence of mesial surface restorations was two to three times that recorded for the distal surface on the second primary molar. These findings were consistent for maxillary and mandibular primary molars. The figures for mesio-disto-occlusal restorations also have been included (Table 3).

Of the 543 primary molars restored, 100 subsequently required endodontic treatment (pulpotomy or pulpectomy). Twenty-three per cent of maxillary first primary molars required endodontic therapy. These results are double those of the maxillary second primary molar (Table 4, see next page).

The need for endodontic treatment following restoration of the distal surface of the first primary molar and the mesial surface of the second primary molar is shown in Table 5 (see next page). Twenty-three per cent of first primary molars with distal restorations, and 13.5% of second primary molars with mesial restorations, required subsequent endodontic treatment. The results of this study show that the patient's age at the initial restorative intervention did not influence the need for subsequent endodontic treatment (Table 6, see next page).

Discussion

The degree of carious involvement when proximal lesions are detected is more important than the patient's age at the onset of caries. However, it has been reported in previous studies that the patient age when placing a proximal restoration is critical, and that the later the onset of caries, the better the prognosis of the restoration (Holland et al. 1986).

Proximal caries experience in the primary dentition is generally low where spacing exists, and increases progressively as contacts develop (Parfitt 1956). The higher incidence of treatment for the first primary molar in the 1–5-years-old age group, and the increasing incidence of treatment of the second primary molar in the 6–10-years-old age group, reflect the different stages of the dentition at these ages. The first primary molar has a 12–18 month period of longer exposure in the oral environment than the second primary molar, and both its mesial and distal surfaces are potential sites for proximal caries attack. The increase in treatment required by the second primary molar in the 6–10-years-old group may be due to the effect of this lag period and the establishment of the contact point upon eruption of the first permanent molar.

As shown by other studies, the distal surface of the first primary molar and the mesial surface of the second primary molar were the most restored proximal surfaces (Parfitt 1956; Arnim and Doyle 1959; Kramer and

TABLE 3. Distribution of Class II restorations according to proximal surface

Restored surface	First primary molar		Second primary molar	
	Maxillary N(%)	Mandibular N(%)	Maxillary N(%)	Mandibular N(%)
Mesio-occlusal	12 (8.3)	12 (8.2)	94 (75.2)	77 (61.1)
Disto-occlusal	117 (80.7)	122 (83.0)	29 (23.2)	39 (31.0)
Mesio-disto-occlusal	16 (11.0)	13 (8.8)	2 (1.6)	10 (7.9)

TABLE 4. Distribution of restored teeth requiring endodontic follow-up

	First primary molar		Second primary molar		Total
	Maxillary N=145	Mandibular N=147	Maxillary N=125	Mandibular N=126	N=543
	33	31	15	21	100
% of N	23%	21%	12%	17%	18%

TABLE 5. Comparison of the susceptibility to pulpal involvement of the distal surface of the first primary molar with the mesial surface of the second primary molar

Pulpal involvement	First primary molar distal restoration (N=239)	Second primary molar mesial restoration (N=171)
N	55	23
%	23.0	13.5

TABLE 6. Distribution of teeth requiring endodontic follow-up according to initial age of intervention

Age (years)	Class II restoration N	Requiring endodontic treatment N (%)
1–5	214	42 (19.6)
6–10	303	56 (18.3)

Ireland 1959; Varpio 1981; McDonald and Avery 1987). The difference in the incidence of mesial and distal restorations for the first and second primary molars may be due to coronal morphology, the difference in shape and size of the interdental spaces, and the buffering effect of saliva, or a lack of saliva.

It is of great concern that approximately 20% of the restored teeth studied required subsequent endodontic treatment. The authors agree that this may be a conservative estimate, as not all teeth were followed until exfoliation. This high incidence of pulpal involvement can be attributed somewhat to the well-documented anatomical characteristics that make the primary molars inherently more susceptible than their permanent successors, such as thinner enamel and dentin layers, proportionally larger pulps, marked cervical constriction and low, broad contact points (Law et al. 1966; Stoner 1967; Luke and Reisbick 1982; Kennedy 1986; Mathewson et al. 1987; McDonald and Avery 1987). Less bulk of tooth structure between the coronal pulp and enamel surface (Kramer and Ireland 1959) may increase the susceptibility of the first primary molar to subsequent pulpal involvement compared with the second primary molar (Mathewson et al. 1987). Material failure and an error in operative technique may contribute to the development of pulpal pathology. However, our clinical procedures are intended to minimize the need for endodontic follow-up.

Conclusions

All primary molars demonstrated a similar incidence of proximal surface restorative intervention. More first primary molars required initial restorative intervention in children 1–5 years old, and second primary molars required initial restorative intervention predominantly in children 6–10 years old. The distal surface of the first primary molar and the mesial surface of the second primary molar demonstrated the highest incidence of proximal restorations. Restorations on the distal surface of the first primary molar exceeded those of the mesial surface by 10 times, while restorations of the mesial surface of the second primary molar exceeded those of the distal surface by 2–3 times. The age of initial restorative intervention did not appear to influence the need for subsequent endodontic therapy. However, more first primary molars required follow-up endodontic therapy than second primary molars.

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Sleep on your back

Sleeping on your side or stomach can wear on your teeth, according to researchers who studied 2,000 tooth grinders.

The researchers found that dental patients who most often show symptoms of bruxism, or tooth grinding, tend to be side sleepers who alternate from side to side. Morning jaw pain was located on the sleeping side for 95% of patients.

Patients who sleep on their stomachs can cause even more grinding damage and have more neck pain and stiffness as well, the study found.

The least "tooth stressful" sleeping position is on one's back, with neck and knee support. The patients who cannot tolerate the back-sleeping position should be encouraged to adopt an improved side posture—a contoured pillow under the face with a second pillow placed to support the arm and shoulder.