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A Clinical Evaluation of a Plastic Temporary Filling Material (Dura Seal[®])

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Summary

Recently Dura Seal, a kind of plastic, has been marketed as a temporary filling material. This clinical study was done to determine whether or not Dura Seal has the properties advertised by the manufacturer. A total of 135 teeth, including 110 vital teeth and 25 pulpless teeth, were prepared for metal inlay cavities. The prepared cavities were sealed with Dura Seal for an average of 12.0 days. Dura Seal was found to be easily removable, to show no pulp damage, and to have considerable mechanical strength.

Introduction

Many kinds of materials are used for temporary fillings, and zinc oxide-eugenol cement in particular is used widely. The properties required of temporary filling materials have been enumerated, but no material has been found having all of these properties¹⁾. Zinc oxide-eugenol cement is one of the better materials, but it has deficiencies in both mechanical strength and ease of removal^{2,3)}. Recently Dura Seal[®], a kind of plastic, has been marketed as a temporary filling material. The manufacturer advertises Dura Seal as having the following merits : no irritation to the dental pulp, simple filling procedure and easy removal, and no deformation under the force of mastication. Many general practitioners are now using Dura Seal in dental clinics.

This clinical study was done to know whether or not Dura Seal has the properties claimed by the manufacturer.

Materials and Methods

This study involved 135 teeth (110 vital and 25 pulpless) of 90 patients (27 male and 63 female) who came to the clinic of Matsumoto Dental College between October 1987 and May 1988 (Tables 1 and 2). Dura Seal, a product of Reliance Co., was brushed into the prepared cavities as a temporary

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sealer. No special consideration was given to shielding the dental pulp from any stimulus produced by the sealer. Occlusal adjustment and correction of the shape of the filling were performed after it was firmly set. At the beginning of the next appointment, data on the condition of the temporary filling were obtained by verbal questioning of the patient's progress, and by visual examination of the condition of the seal, of evidence of abrasion, deformation, and food impaction. The sealing periods ranged from 2 to 64 days, and the average was 12.0 days.

On 71 out of 110 vital teeth, an electric pulp test using a C A Analyser[®] was done, and the readings for the initial and following appointments, were compared to determine any change in the pulpal threshold.

Results

1. Irritation to the pulp, interdental papilla, and marginal gingiva.

Unfavorable symptoms were reported for 39 (35.5%) out of all 110 vital teeth treated, and for 15 (23.8%) of the 63 vital teeth which were judged to have been well sealed during the term of temporary filling. The complaints included pain on mastication, reactions to hot and cold water and to sweets, and a generalized feeling of strangeness. Table 3 lists the frequencies reported both for teeth that had been well sealed and those that were not ; for both types, two or more unfavorable symptoms were reported for some teeth.

Of the 71 teeth employed in the electric pulp test, 45 teeth (63.4%) showed no change between

Table 1 : Distribution of patients according to age and sex

Age \ Sex	10s	20s	30s	40s	50s	60s	70s or over	Total
Males	1	5	7	5	9	0	0	27
Females	4	19	22	9	4	5	0	63
Total	5	24	29	14	13	5	0	90

Table 2 : Distribution of teeth according to type of teeth and jaw

Tooth type \ Jaw	1st premolar	2nd premolar	1st molar	2nd molar	3rd molar	Total
Maxillary	11	15	21	11	0	58
Mandibular	7	16	23	27	4	77
Total	18	31	44	38	4	135

Table 3 : Unfavorable symptoms reported at the next appointment (vital teeth)*

Cold water pain	22 (6)**
Hot water pain	8 (3)
Pain on mastication	17 (9)
Reaction to sweets	2 (1)
Strange feeling	2 (1)
Hypersensitive dentin	4 (0)
Asymptomatic teeth	71 (48)

* N=110. Some teeth had two or more symptoms.

**Numbers in parentheses are the frequencius for the 63 teeth judged well sealed.

Table 4 : Change in pulpal threshold after temporary filling as measured with a CA Analyser

Increased	9
Unchanged	45
Decreased	17
Total	71

the values of the initial and the following appointments, 17 teeth (23.9%) showed a decrease in value, and 9 teeth (12.7%) showed an increase (Table 4).

Inflammation of the dental papilla and marginal gingiva was observed in two teeth (out of the 124 in the sample having a cavity in a gingival wall). In one, redness, swelling, and tenderness had been caused by a fragment of the temporary filling that had broken off. Minor redness only was observed in another tooth with an unbroken temporary filling.

2. Marginal sealing

Sealing around the margins of the preparation was judged excellent when, at the following appointment, no gaps, curled edges, or fractures were observed. When one of these faults was found, but only around part of the perimeter, the seal was judged as fairly good. It was judged poor when a fault was seen around the entire margin. The results of these observations are given in Table 5. Of the cases judged as poor, six had a gap around the perimeter, two teeth each had fractures and curled edges, and one tooth each had distorted or completely lost fillings.

Discoloration was recognized on the cavity wall in 10 teeth, and on the inner surface of the temporary filling in four teeth. Food impaction into the marginal gap was also found in four teeth.

3. Ease of removal

Removal was judged excellent when the temporary filling material could be dislodged from the cavity in a single mass by an explorer or a spoon excavator. It was judged fairly good when removal took more time, but could be accomplished without a rotary cutting instrument. Removal was judged as poor when rotary instruments were required. In 97 teeth, or 72.4% of the total, removal was excellent; in 37 teeth (27.6%) it was fairly good; in no teeth was it found poor (Table 6). The single tooth in which the filling had been lost was excluded from these data.

4. Mechanical strength

Evidence of abrasion was found in 12 teeth whose average temporary filling time was 11.8 days. Fractured fillings were observed in two teeth with cuspal protection cavities, which had been filled for 8 and 15 days. Bending was seen in a single tooth filled for 64 days (Table 7).

5. Food impaction

Of 121 teeth having proximal cavities food impaction was seen in two teeth.

Table 5: Quality of the marginal seal

Results	Status of the pulp		
	Vital teeth	Pulpless teeth	Total
Excellent	63	7	70
Fairly good	38	15	53
Poor	9	3	12
Total	110	25	135

Table 6: Ease of removal of temporary filling

Excellent	97
Fairly good	37
Poor	0
Filling lost	1
Total	135

Discussion

Regarding pulpal irritation induced by Dura Seal, 71 (or 65.5%) out of 110 vital teeth indicated no clinical symptoms, but 39 teeth (34.5%) reported some discomfort. Of these 39 teeth, 9 had good marginal sealing and no deep place at the cavity floor. Eight of these 9 teeth were included in the electric pulp test. A drop in the threshold was seen in two of these teeth at 12 days and 25 days, but there were no changes in the other teeth.

These symptoms of discomfort, and the drop in the pulpal threshold, were considered signs of pulpitis induced not by the chemical irritation of Dura Seal, but rather by its defective mechanical properties. Owing to the elasticity of Dura Seal, the material may bend enough during mastication to make a gap between the filling and the cavity wall, thus allowing oral fluid to penetrate into the gap. Or perhaps the temporary filling is rubbed or pressed against the cavity wall so as to irritate the pulp.

Regarding marginal sealing, 70 teeth (51.9%) were evaluated as excellent by the naked eye, but it was considered that on account of Dura Seal's elasticity, marginal leakage probably occurred in as many teeth as reported by Hotta et al⁴⁾. Accordingly, this material can not be used to seal a root canal dressing⁵⁾.

With regard to ease of removal, in no instance was Dura Seal evaluated as poor. Accordingly, it may be considered superior to zinc oxide-eugenol cement in that it is removed more easily and in less time, and gives less pain to the patient.

When data on the mechanical strength of Dura Seal in teeth with cuspal protection cavities are examined (Table 7), it can be seen that resistance to abrasion is reasonably good: only 8 out of 45 these teeth, or 17.8%, exhibited small amounts of wear. Whereas this was not as favorable as the results for internal cavities, for which abrasion was observed in only 4 (4.5%) of 89 teeth, it is thought nevertheless that Dura Seal could be used as a temporary filling for cuspal protection as well as for internal cavities. The mechanical strength of Dura Seal is not as high for cuspal protection cavities as is methylmethacrylate, as seen from clinical results for the latter material, but it has the benefits of being easier to use, and can thus shorten chair time.

Conclusions

Dura Seal, a plastic temporary filling material, was used to seal the prepared cavities of 135 teeth, and its clinical usefulness was evaluated. The sealing periods ranged from 2 to 64 days and

Table 7: Deterioration of temporary fillings observed at the next appointment

	Simple (n=3)	Types of Cavity Compound* (n=86)	Cuspal Protection* (n=46)	Total* (n=135)
Abrasion	1	3	8	12
Curled edge	0	7	4	11
Gap	0	9	6	15
Fracture	0	0	2	2
Bending	0	1	0	1
Loss of filling	0	0	1	1
Unchanged	2	68	26	96

*More than one of the conditions listed was observed for some of the fillings.

the average was 12.0 days. The results obtained are as follows.

1. Concerning the ease of removal of the temporary filling, Dura Seal was found superior to zinc oxide-eugenol cement.
2. Dura Seal was used in cavity preparations made in 110 vital teeth, with no serious problems regarding its marginal sealing properties as a temporary filling material for normal use.
3. Pulp damage due to irritation by Dura Seal was not observed in this short term study.
4. The mechanical strength of Dura Seal, especially as measured by its resistance to abrasion, was extremely superior to zinc oxide-eugenol cements.

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