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Clinical observation of Dyract eXtra restorations

Nowadays Dyract eXtra is the most technologically advanced compomer. It was made on the basis of Dyract and Dyract AP and 10 years' clinical and experimental studies (1, 10–12). Dyract eXtra is a compomer of the third generation, which has decreased abrasiveness and increased mechanical resistance, and very good adaptation to the tooth tissues. It connects with a dentin through dental adhesive systems and its physico-mechanical and esthetic properties are similar to composites. Dyract eXtra is an universal dental material for esthetic fillings in permanent teeth ensuring the effective cariostatic protection. It also combines possibilities of compensation of the polymerization shrinkage with a resistance characteristic of composite resins (2, 4, 9, 14). Dyract eXtra is available in 8 Vita colours and 2 opaquers.

The aim of the study was an assessment of Dyract eXtra restorations made in carious and non-carious cavities.

MATERIAL AND METHODS

The clinical evaluation was made on 77 fillings of Dyract eXtra, (Dentsply DeTry, Konstanz, Germany) which were placed in 40 patients, 18 men and 22 women in age range 17–79 years. Before filling the cavities all patients were fully informed of the study, examined and asked about their habits which can influence fillings esthetics. Carious cavities were prepared with a technique saving healthy tooth tissues, but non-carious lesions were only cleaned using non-fluoride prophylaxis paste (without any mechanical preparation). As a base there was used glass-ionomer (42 cavities), among them, in 9 cases with *caries profunda* calcium hydroxide liner was additionally used. In 26 cavities there was not used any base/liner. The study material is presented in Table 1.

The clinical assessment of restorations was made directly after finishing (baseline) and after 12 months. It was done in artificial light using dental mirror and probe. The pulp reaction on ethyl chloride was correct in all cases of vital teeth. The evaluation of dental fillings was made using the Ryge's scale considering the following parameters: filling surface, anatomical shape and marginal adaptation (15). Also the modified USPHS criteria by van Dijken (3,16) were used to assess Dyract eXtra restorations:

Colour match: 0 – very good colour match, 1 – good colour match, 2 – slight mismatch in colour, shade or translucency, 3 – obvious mismatch, outside the normal range, 4 – gross mismatch.

Marginal discoloration: 0 – no discoloration evident, 1 – slight staining, can be polished away, 2 – obvious staining cannot be polished away, 3 – gross staining.

Anatomical form: 0 – the restoration is continuous with tooth anatomy, 1 – slightly under- or over-contoured restoration; marginal ridges slightly under contoured; contact slightly open (may be self-correcting); occlusal height reduced locally, 2 – restoration is under-contoured, dentin or base exposed; contact is faulty, not self-correcting; occlusal height reduced; occlusion affected, 3 – restoration is missing or traumatic occlusion; restoration causes pain in tooth or adjacent tissue.

Marginal adaptation: 0 – restoration is continuous with the existing anatomic form, explorer does not catch, 1 – explorer catches, no crevice is visible into which explorer will penetrate, 2 – crevice at margin, enamel exposed, 3 – obvious crevice at margin, dentin or base exposed, 4 – restoration mobile, fractured or missing.

Caries: 0 – no evidence of caries contiguous, with margin of the restoration, 1 – caries is evidently contiguous, with the margin of the restorations.

Surface roughness: 0 – smooth surface, 1 – slightly rough or pitted, 2 – rough, cannot be refinished, 3 – surface deeply pitted, irregular grooves.

Table 1. Number of evaluated Dyract eXtra fillings

Type of hard tissue cavities	Class of cavities according to Black	Number of fillings	
		n	%
Carious cavities	I	3	3.90
	II	14	18.18
	III	1	1.30
	IV	1	1.30
	V	23	29.87
Non-carious cavities	erosio	8	10.39
	abrasio	27	35.06
Total		77	100.00

RESULTS AND DISCUSSION

The clinical assessment was made on all 77 Dyract eXtra fillings inserted into 42 carious cavities (54.55%) and 35 non-carious cavities (45.45%). Directly after finishing all 77 fillings received score 0 in all categories of the Ryge's scale. After 12 months, 73 restorations (94.81%) had smooth surface without discolorations and in correct colour (score 0). Four fillings (5.19%) had slightly rough surface (score 1) what was corrected by polishing. The anatomical shape and marginal adaptation of restorations after 12 months of observation were assessed very well (score 0). These results are presented in Table 2.

Dyract eXtra fillings were also clinically evaluated using the USPHS criteria according to van Dijken. In a baseline 100% of restorations received the highest scores in all the examined categories. Clinical evaluation after 12 months showed that for match color 74 fillings (96.10%) received score 0 and 3 fillings (3.90%) score 1. Similar results were noticed during assessment of surface roughness – 73 fillings (94.81%) received the highest score 0 (smooth surface) but 4 fillings (5.19%) were slightly rough (score 1). The rest of the USPHS examined parameters (anatomical form, marginal adaptation, marginal discolouration) received the best notes (score 0) in all cases after 12 months' observation.

Table 2. Clinical evaluation of Dyract eXtra fillings after 12 months' observation according to the Ryge's scale

Scores	Filling surface		Anatomical shape		Marginal adaptation	
	n	%	n	%	n	%
0	73	94.81	77	100	77	100
1	4	5.19	0	-	0	-
2	0	-	0	-	0	-
3	0	-	0	-	0	-
Total	77	100.00	77	100.00	77	100.00

Table 3. Clinical evaluation of Dyract eXtra fillings after 12 months' observation according to the van Dijken's USPHS criteria

Scores	Match colour		Marginal discoloration		Anatomical shape		Marginal adaptation		Caries		Roughness surface	
	n	%	n	%	n	%	n	%	n	%	n	%
0	74	96.10	77	100.00	77	100.0	77	100.00	77	100.00	73	94.81
1	3	3.90	0	-	0	-	0	-	0	-	4	5.19
2	0	-	0	-	0	-	0	-	0	-	0	-
3	0	-	0	-	0	-	0	-	0	-	0	-
4	0	-	0	-	0	-	0	-	0	-	0	-
Total	77	100.00	77	100.00	77	100.00	77	100.00	77	100.00	77	100.00

Compomers of the first generation were mainly used in cavities of classes III and V according to Black, non-carious cavities and in all cavities in deciduous teeth (1, 10, 11, 12). *In vitro* studies showed that a bonding power of compomers with milk tooth tissues was similar or even higher than in permanent teeth, whereas composites showed less adhesion to milk tooth tissues (5, 6, 10).

In the available literature there were found a few papers concerning Dyract eXtra (4, 9, 14). Kusiak et al. assessed handling properties of the described compomer during inserting into cavity and directly after finishing (9). They used 3 degrees criteria such as easiness of inserting material, possibility of precise finishing of filling and easiness of match colour. Material was assessed as the best of finishing procedures. Authors paid attention to some difficulties concerning filling cavities of classes III and V according to Black and non-carious cavities. This difficulties were caused by too much sticking of material to the surface of metallic dental instruments. But it is difficult to compare their results with ours because they did not use the Ryge's or van Dijken's scale. In Hickel's *in vitro* examination of Dyract eXtra it was showed that it has the higher resistance to loading than Dyract or Dyract AP (4).

Our results are similar to the other long-term observations of different compomers – Dyract and Compoglass Flow (7, 8, 17). Kasiak et al. made the 5-year clinical assessment of Compoglass Flow, the second generation compomer used to fill carious and non-carious cavities (7). According to Ryge's scale it received the best scores for the following criteria: anatomical shape – 82.05% (score 0.1), retention – 82.05% (score 0.1) and filling surface – 76.92% (score 0.1). Wagner et al performed a clinical observation of Dyract after 2 years (17). They noticed an ideal marginal adaptation in 86% cases and correct colour in 95% of fillings. Kierklo et al. in their 3-year examination of Dyract gave the highest scores for marginal adaptation – 90.6% and correct colour – 85.4% (8).

As a result of Dyract modification there was made Dyract AP (Anterior – Posterior) used in restorations of cavities in anterior and posterior teeth. It has better mechanical properties and releases more fluoride. During 4-year observations of Dyract AP according to USPHS criteria, Miazga et al.

observed that 94.4% of fillings received score 0 for smooth surface but 5.6% received score 1. 80.6% of restorations had an ideal anatomical shape and 86,1% of filling had an ideal marginal adaptation – score 0 (13). In this examination Dyract AP was assessed as an universal medium-term restorative material.

CONCLUSIONS

After 12 months' observation and clinical assessment according to Ryge's and van Dijken's criteria it can be said that Dyract eXtra compomer fulfils expectations of dental material used in all cavities in permanent teeth.

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SUMMARY

The assessment of Dyract eXtra fillings insert into carious and non-carious cavities was performed. The Ryge's scale and van Dijken criteria were used in the clinical evaluation. After 12 months the anatomical shape and marginal adaptation received the highest score 0 in Ryge's scale and 4 fillings (5,19%) had slightly rough surface – score 1. According to van Dijken criteria the following parameters: anatomical shape, marginal adaptation and marginal discolouration received the best assessment (score 0). After 12 months' observation mentioned they were accepted in 100% cases. On the basis of the carried out examinations it can be said that Dyract eXtra compomer fulfills expectations of dental materials used in restoration of all cavities in permanent teeth.

Obserwacje kliniczne materiału Dyract eXtra

Ocenie poddane zostały wypełnienia wykonane z materiału Dyract eXtra firmy Dentsply DeTrey, założone do ubytków próchnicowych wszystkich klas wg Blacka oraz ubytków niepróchnicowego pochodzenia. W ocenie klinicznej wypełnień zastosowano skalę Ryge'a oraz kryteria USPHS wg van Dijkena. Kształt anatomiczny i przyleganie brzeżne wypełnień po 12 miesiącach uzyskały najwyższą ocenę 0 w skali Ryge'a, a 4 wypełnienia (5,19%) miały powierzchnię lekko chropowatą (ocena 1). Spośród rozpatrywanych kryteriów skali USPHS wg van Dijkena najlepiej zostały ocenione: kształt anatomiczny, przyleganie brzeżne, brak przebarwień brzeżnych. Wymienione parametry były akceptowane w 100% przypadków po 12 miesiącach obserwacji (ocena 0). Na podstawie przeprowadzonych badań można stwierdzić, że materiał kompomerowy Dyract eXtra spełnia wymagania stawiane materiałom stosowanym do wypełnień wszystkich klas ubytków w zębach stałych.