Handling Characteristics of Precoated and Operator-Coated Brackets

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Adhesive Precoated (APC) brackets* were introduced in 1991 to save the clinician the time spent in preparing the adhesive for direct bonding and applying it to the bracket.[1] The APC brackets, which are packaged in individual capsules for ease of identification and infection control, are applied with finger pressure.[2] A uniform factory precoating purportedly ensures an even amount and consistency of composite beneath each bracket. Any excess composite is expelled in a thick consistency from the bracket margins, so that it is easily identified and can be removed without altering the bracket position.[3,4] Unlike chemically cured adhesives, the APC system provides virtually unlimited positioning time, because the adhesive does not set until it is light-cured.

The improved control of the APC bracket and adhesive has been shown to make bond strength more reliable and reduce bond failures.[5,6] The composite is a modified form of Transbond XT,* whose viscosity was increased in the original APC and reduced for the APC II. A less viscous adhesive may flow more evenly on the tooth surface and integrate more completely into the undercuts of the bracket mesh, thus improving mechanical retention.

Light-cured composites differ in handling characteristics, such as the pressure needed to seat the bracket and the amount of bracket mobility during the removal of excess composite. To our knowledge, no studies have been carried out on the handling characteristics of APC brackets. This article reports the results of such an investigation.

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Materials and Methods

Three groups of 30 brackets each were tested:

1. Original APC brackets
2. APC II brackets
3. Victory Series* brackets, manually coated with Transbond XT by an experienced dental assistant

Two experienced operators placed an equal number of each group of brackets on 45 premolars, without knowing which adhesives were being used. All brackets were light-cured with an Ortholux XT* Visible Curing Light.

Each operator then filled out a questionnaire, and the results were tabulated as reported below.

Results and Discussion

1. Amount of pressure needed to seat the bracket (Fig. 1)

This was the only question for which a statistically significant difference ($p < .01$) was found with the Kruskal-Wallis test. There were significant differences between little pressure and increased pressure required to seat the brackets, as well as between just right and increased pressure.

In total, the two operators thought the amount of pressure needed to seat 72% of the brackets was just right. More of the original APC brackets (33%) than of the other groups were found to require an increased amount of pressure

*Trademark of 3M Unitek Corporation, 2724 S. Peck Road, Monrovia, CA 91016.

	Q1	APC 1	APC 2	V
Operator 1	1 2 3 4	0 1 6 8	0 3 10 2	1 6 7 1
Operator 2	3 4	13 2	14 1	15 0

Fig. 1 Amount of pressure needed to seat bracket (1 = too little; 2 = little; 3 = just right; 4 = increased; 5 = substantial).

	Q2	APC 1	APC 2	V
Operator 1	1 2 3 4	0 0 9 6	0 4 8 3	1 5 6 3
Operator 2	3 4	0 15	2 13	2 13

Fig. 2 Amount of adhesive used for coating bracket base (1 = too little; 2 = little; 3 = just right; 4 = increased; 5 = substantial).

Yes 1 No 0	Q3	APC 1	APC 2	V
Operator 1	0 1	13 2	14 1	12 3
Operator 2	0	15	15	15

Fig. 3 Bracket sliding.

Easy 1 Undetermined 2 Difficult 3	Q4	APC 1	APC 2
Operator 1	1 2	15 0	14 1
Operator 2	1	15	15

Fig. 4 Ease of use of adhesive.

APC 1 1 APC 2 2 Transbond manual 3 Undetermined 4	Q5	APC 1	APC 2	Victory
Operator 1	1 2 3 4	10 2 3 0	4 6 4 1	1 4 10 0
Operator 2	1 2 3 4	6 4 0 5	3 4 2 6	1 1 8 5

Fig. 5 Adhesive used.

to seat, testifying to the added viscosity of the adhesive.

Operator 1 felt that the amount of pressure needed to seat almost all of the original APC brackets was either excessive or just right, but that a more appropriate amount of pressure was required for the APC II brackets. Operator 2 generally thought that a correct amount of pressure was needed to seat all three bracket types.

2. Amount of adhesive used to coat the bracket base (Fig. 2)

There was more variability between the two operators in the answers to this question than for any other, implying that the amount of adhesive required may be a more subjective judgment. Of the total brackets, 59% were thought to have an excessive amount of adhesive. Operator 1, however, tended to believe the original APC brackets had too much adhesive on the bases compared to the other two bracket types. Operator 2 felt there was an increased amount of adhesive used on 91% of all brackets.

3. Bracket sliding (Fig. 3)

Bracket sliding after adhesive removal was rarely a problem in any of the three groups. Operator 1 observed slightly less sliding with the APC II than with the other two bracket types. Operator 2 did not notice sliding with any of the brackets.

4. Ease of use of the adhesive (Fig. 4)

Overall, all three adhesives were deemed easy to use. Only two brackets out of the 90 (one APC II and one Victory Series) were rated as "undetermined", both by Operator 1.

5. Which adhesive was used (Fig. 5)

Neither operator was able to guess consistently which adhesive he was using under the blind testing conditions. Only 49% of the adhesives were identified correctly, including 60% of the manual Transbond XT (Victory Series), 53% of the original APC, and 33% of the APC II. Operator 1 was slightly more accurate than Operator 2, who was more likely to select "undetermined".

Conclusion

Both operators showed a tendency to prefer the APC II and manually coated brackets over the original APC in terms of the pressure required and the amount of adhesive used. Bracket sliding almost never occurred in any of the three groups, and all three adhesives were described as easy to use.

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