

## Letters to the Editor

Sir

I read with interest the paper on the evaluation of the clinical performance of the Transcend orthodontic bracket (Årtun, 1997). Professor Årtun considered the failure rate of the brackets themselves during the course of treatment, and the problems with debonding with subsequent enamel cracks and enamel tear-out.

The difficulties encountered are indeed alarming and would discourage the use of these ceramic brackets. Similarly, I have been recording the clinical performance of the Transcend ceramic bracket with microcrystalline bases for mechanical retention. I have applied these brackets on the six upper anterior teeth only and have systematically recorded 66 consecutive cases last year. The comparative figures for my patients were (Professor Årtun's study in parentheses):

Number of patients 66 (19);  
 Number of brackets bonded 373 (344);  
 Bond failure during treatment  $5/373 = 1.3\%$  (3.2%);  
 Bracket fracture during treatment  $4/373 = 1.1\%$  (7.8%);  
 Bracket removal by grinding  $2/373 = 0.5\%$  (9%);  
 Enamel tear-out  $0/373$  (1/344). I have not examined the teeth systematically for enamel cracks and had only been aware of one obvious enamel crack.

I believe these variations may be due to the following factors:

1. All brackets were placed with a lightly filled composite resin: Phase 2.
2. Brackets were removed strictly with debonding pliers applied on the mesial and distal, not on the occlusal–gingival, with much less consequent bracket fracture and likely enamel damage.
3. Ceramic brackets were limited to the upper six anterior teeth.

The reports on the level of enamel cracks are

indeed of concern, although I have only clearly seen one enamel crack following bracket removal. I had not found the manufacturer's recommended technique appropriate for the removal of the brackets and therefore applied the debonding pliers on the mesial and distal. I believe most of the problems would be surmounted by the use of the newer designs, and a glass ionomer cement for bonding as described by Wright *et al.* (1996). I believe there is an important place in orthodontics for ceramic brackets as they make treatment more acceptable to many who would otherwise feel unable to cope with a more unaesthetic bracket, and indeed reduce the self-consciousness of patients during the course of appliance therapy. The clinical handling of the brackets themselves requires considerable care by the individual orthodontist.

R. T. Lee

Department of Orthodontics  
 Royal London Hospital  
 Turner Street  
 Whitechapel  
 London E1 1BB

### References

- Årtun J 1997 A post-treatment evaluation of multibonded ceramic brackets in orthodontics. *European Journal of Orthodontics* 19: 219–228
- Wright A B, Lee R T, Lynch E, Young K A 1996 Clinical and microbiological evaluation of a resin modified glass ionomer cement for orthodontic bonding. *American Journal of Orthodontics and Dentofacial Orthopedics* 10: 469–475

Sir

To allow meaningful testing for differences in bond failure rate, information on when the failures occurred during the course of the treatment and number of failures in each patient, which allows use of a log rank test, is necessary. The failure rate of 1.3 per cent reported by Dr Lee may turn out not to be different from the 3.2 per cent reported in my study. However, the differences in frequency of bracket fracture

during treatment and at time of appliance removal are striking. Dr Lee suggests explanations for the differences between his and my findings, and I would like to respond in the following way:

1. For each patient in my study the brackets on one side were assigned at random to be bonded with a heavily filled (approximately 80 per cent) composite material with a particle size of approximately 8  $\mu\text{m}$ , while the brackets on the other side were bonded with a heavily filled (approximately 80 per cent) composite material with a particle size of approximately 1.5  $\mu\text{m}$ . I did not detect any differences for any of the parameters measured between teeth or brackets bonded with the two materials. Dr Lee attributes any differences between his fillings and mine to be partly due to the fact that he used Phase 2 as bonding material, which according to him is a lightly filled composite resin. However, the filler content of Phase 2 is between 70 and 80 per cent, and the particle size is about 0.3  $\mu\text{m}$ . A reduction in filler size tends to reduce bond strength, which in turn may reduce the forces necessary for debracketing. This may reduce the risk of bracket fracture during bracket removal, but will not affect bracket wing fracture during the course of treatment. Considering the fact that I did not find any differences in bracket fracture using adhesives with filler size 8 and 1.5  $\mu\text{m}$ , the slight reduction to 0.3  $\mu\text{m}$  not likely to explain the difference in bracket fracture. Also, use of Phase 2 is unlikely to reduce the risk of bond failure.
2. I did not detect any difference in frequency of

bracket fracture during removal between brackets with chemical retention using a torsional rotation debonding wrench and brackets with mechanical retention using tensile debonding pliers. It is possible, though, that use of debonding pliers applied on the mesial and distal surfaces of the brackets, as suggested by Dr Lee, allows force distribution in such a way that it can explain the differences in bracket fracture. However, the assumption that this technique tends to reduce the risk of enamel damage is purely speculative, since Dr Lee did not examine formation of enamel cracks.

3. I did not detect any differences between anterior and posterior teeth, and between teeth in the maxilla and the mandible.

I definitely agree that the risk of formation of enamel cracks during removal of ceramic brackets is a significant concern. However, use of newly developed ceramic brackets with a vertical groove in the bracket base may reduce this risk. The mechanism may be that the mesial and distal halves of the brackets split along this groove, allowing formation of a peel force in the bracket–adhesive interface on removal. We are currently testing this hypothesis in the clinic.

Jon Årtun  
Department of Orthodontics  
School of Dentistry  
University of Washington  
D-569 Health Sciences  
Box 357446  
Seattle, WA 98195-7446  
USA