

# Dentists' Opinions on Orthodontic Retention Appliances

ROBERT CERNY, BDS, MDS  
DEBORAH LLOYD, PHD, BA(Hons), Dip Ed

**T**he need for permanent retention to prevent relapse is now widely acknowledged by orthodontists.<sup>1</sup> Whether this is best achieved with permanent bonded retainers (PBRs) or removable retainers (RRs), however, is still a matter of debate. A review of the literature revealed no published studies comparing these two approaches to permanent retention.

Relapse is rare during the first five years after the end of active treatment, but within 10 years of debonding, fully one-third of orthodontic patients will have experienced severe relapse, with another third showing moderate relapse and the remaining third mild or no relapse.<sup>2,3</sup> Because



**Fig. 1** Looped-design maxillary and mandibular permanent bonded retainers (PBRs).

the relationship between patient and orthodontist typically lasts for only four years,<sup>4</sup> relapse is seldom seen by the orthodontists themselves, but more often by the patients' general dentists. The present study was undertaken to determine the opinions of general dentists on the effectiveness, durability, and other features of PBRs and RRs.

## Retainer Design

Although the participating dentists were instructed to rate any type of fixed retainers they had encountered, their primary experience was with the looped PBR used in Dr. Cerny's 30-year-old orthodontic practice in Newcastle, New South Wales, Australia (Fig. 1). The current PBR design is the product of many years of experimentation with different wire types and shapes to achieve optimal hygiene, comfort, effectiveness, and durability. A modification of Zachrisson's lingual wire retainer,<sup>5</sup> it uses .018" round Regular Plus stainless



**Dr. Cerny**



**Dr. Lloyd**

Dr. Cerny is in the private practice of orthodontics at Hunter Valley Orthodontics, 139 Scott St., Newcastle, New South Wales 2300, Australia; e-mail: rcerny@bigpond.net.au. Dr. Lloyd is a Consultant in Medical Research and Medical Education and Conjoint Academic, School of Medicine and Population Health, Faculty of Health, University of Newcastle. This research was part of Dr. Cerny's doctoral study for the Discipline of Oral Health, University of Newcastle.

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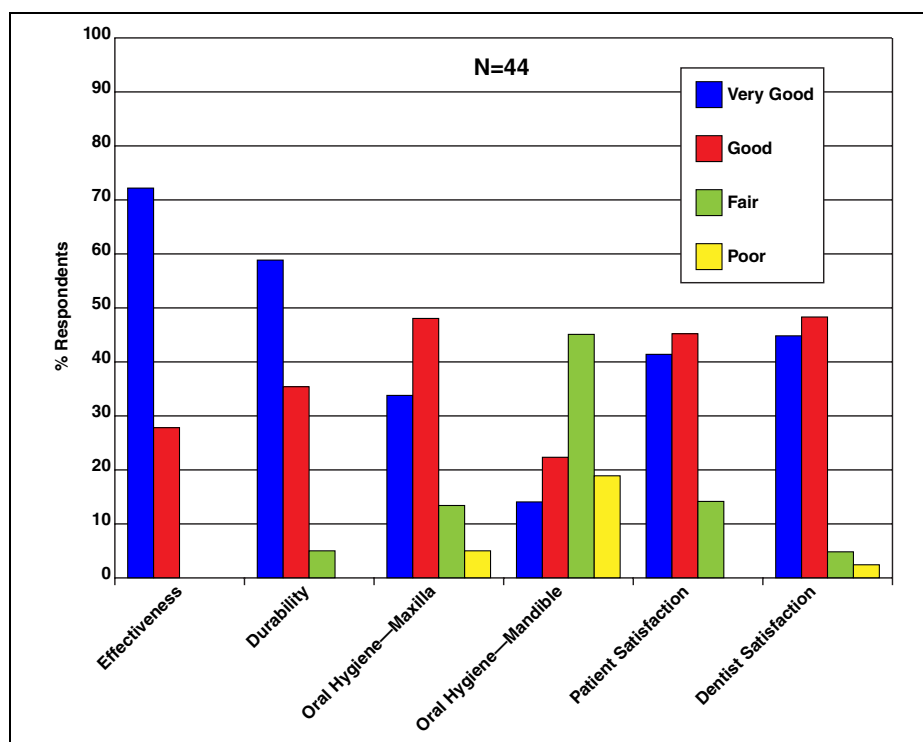


Fig. 2 Respondents' ratings of permanent bonded retainers (PBRs).

steel wire,\* which has proved to be durable, flexible, comfortable, and easy to bend.<sup>6</sup> The wire is bonded to the lingual and palatal surfaces of all anterior teeth with composite resin. Loops are added to the maxillary retainer to allow flossing and to avoid root-torque relapse. The longer span between abutment teeth increases the wire's flexibility and reduces loading stress on the composite resin, lowering the risk of composite fracture. Interincisal loops are not used in the mandibular design because of the shorter distance between the lower incisors, which makes the loops impractical and detrimental to patient comfort and oral hygiene. A five-year review of the reliability of these PBRs found that their fracture rate was less than .5%.<sup>7</sup> Calculus deposits were common around the mandibular wires, but there were no cases of caries or periodontal disease.

The RRs reviewed in this study included conventional Begg and Hawley maxillary retainers, mandibular spring aligner retainers, and the increasingly popular thermoformed retainers, which were used in both arches.

### Methodology

The initial study sample consisted of 71 dentists who had referred patients to Dr. Cerny's

practice over the previous 23 years and were familiar with both conventional RRs and the looped-design PBRs. Dentists who had been retired for more than five years, had moved away from the area, or were on leave during the survey period were excluded.

The questionnaire covered the following topics:

- Demographic information, including age, sex, and number of years in dental practice.
- Approximate number of patients treated by the orthodontist.
- Duration of observation of both PBRs and RRs.
- Ratings of both retainer types for effectiveness, durability, oral hygiene in the maxilla and the mandible, patient satisfaction, and dentist satisfaction, with four rating options: poor, fair, good, and very good.
- Reasons for any rating of poor or fair.

The dentists were also invited to provide comments at the end of the questionnaire.

The questionnaire and a cover letter were sent to the 71 dentists along with a pre-addressed, stamped return envelope. Responses were kept anonymous to encourage the dentists to answer all

\*A.J. Wilcock, 45 Yea Road, Whittlesea, Victoria 3757, Australia.

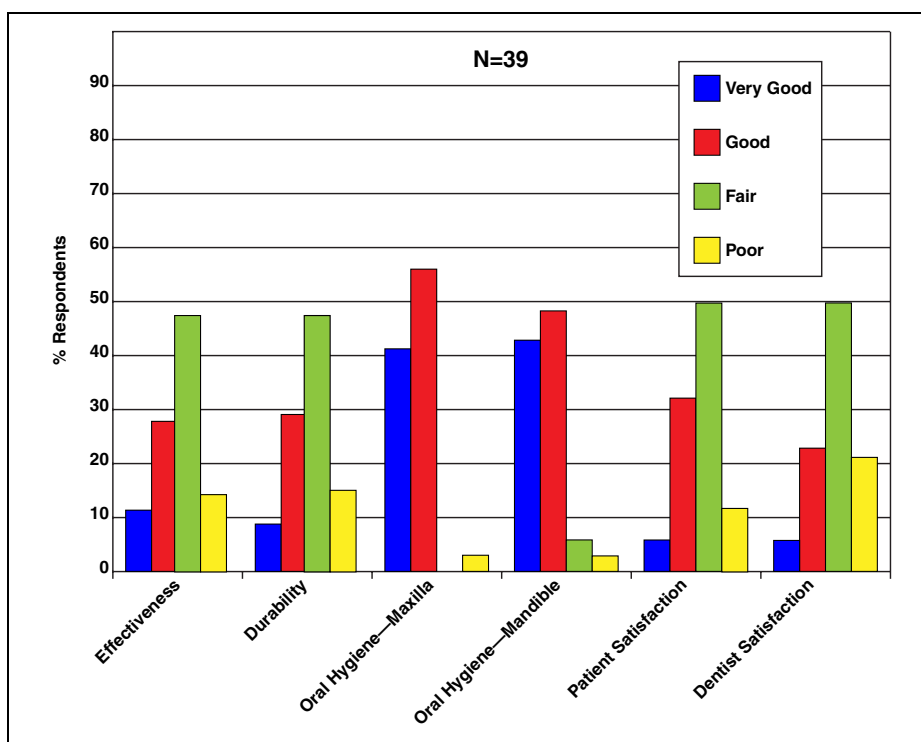


Fig. 3 Respondents' ratings of removable retainers (RRs).

questions honestly without fear of professional consequences. Two weeks after the mailing date, the dentists were telephoned by a research assistant and asked to return their completed questionnaires as soon as possible. The deadline was four weeks after the follow-up phone call.

## Results

Of the 71 dentists who were mailed questionnaires, nine had moved away, three were on leave, and one had been retired for more than five years. This left 58 eligible dentists, 45 of whom returned the questionnaires, for a response rate of 78%. These respondents were 22% female and 78% male, roughly reflecting the ratio of dentists in New South Wales. About 64% of them had been in practice for more than 20 years, and 54% had encountered more than 100 patients with PBRs.

The combined percentages of dentists who rated the PBRs very good or good were 100% for effectiveness, 95% for durability, 82% for oral hygiene in the maxilla, and 36% for oral hygiene in the mandible (Fig. 2). For patient and dentist satisfaction, the combined ratings of very good or good were 86% and 93%, respectively. No dentists rated the PBRs poor in effectiveness, durability, or patient satisfaction, and only 2% rated them poor

in dentist satisfaction. Oral hygiene was the greatest concern: 13% rated maxillary PBRs fair and 5% poor; 45% rated mandibular PBRs fair and 19% poor.

On the other hand, the percentages rating RRs very good or good were 39% for effectiveness, 38% for durability, 97% for oral hygiene in the maxilla, and 91% for oral hygiene in the mandible (Fig. 3). Patient and dentist satisfaction were rated very good or good by 38% and 29%, respectively. The percentages of dentists rating RRs fair or poor were 61% for effectiveness, 62% for durability, 62% for patient satisfaction, and 71% for dentist satisfaction. Oral hygiene was rated fair or poor in the maxilla by 3% and in the mandible by 9%.

Thirty-five respondents added comments on PBRs. Of these, 83% mentioned oral-hygiene problems, including 46% who noted the difficulty of cleaning in the mandible and 34% who were concerned about calculus buildup. Obstruction of flossing between the lower incisors was cited by 23% of the respondents. Concerns about detection and repair of broken retainer wires were raised by 17%. Nine percent noted that some patients found the PBRs irritating. Other concerns were uncertainty about how long PBRs should be worn, long-term effects and their potential contribution to

periodontal problems, interference with root-canal treatment, and gingivitis caused by nickel allergies. Forty-six percent of the remarks were positive. Representative comments included:

- “Well designed, and with good patient education, they are very good.”
- “PBRs are the only effective mechanisms we have to stop tooth relapse.”
- “Without fixed retention, teeth drift out of alignment.”
- “They are far from perfect, but they are the best available.”
- “PBRs should be fitted straight after debanding.”
- “Who should repair and maintain them?”
- “Some patients ask to have them removed.”
- “The majority of parents prefer PBRs.”
- “Zigzag wires that don't impinge work well.”
- “Can't be cleaned!”
- “Oral-hygiene education and patient education are poor.”
- “Generalized decrease in periodontal ligament width.”
- “Periodontal concerns for middle-age patients—what will happen?”
- “Research needed into how long they should be worn.”
- “Surely they can be removed after 10 years.”
- “Issues with nickel-allergy-induced gingivitis.”

Thirty-four respondents provided comments on RRs. Ninety-one percent were concerned about long-term compliance with retention. The problems of plaque and calculus accumulation on RRs were mentioned by 12%, and breakage and loss of retainers were also cited as problems. On the positive side, RRs were noted to be better than PBRs at preventing posterior crossbite relapse. Some of the responses were:

- “Superior to PBRs if worn.”
- “Compliance drops off dramatically after 12 months.”
- “Poor oral hygiene can be a problem.”
- “In 50% of cases, I see relapse.”
- “Appliances get broken and lost.”
- “After years of orthodontic treatment, patients don't want to think about this any more and discard them.”

### Discussion

These survey results showed that PBRs were regarded as superior to RRs in terms of effectiveness, durability, patient satisfaction, and dentist satisfaction. For oral hygiene, however, RRs were seen as somewhat better in the maxilla and much better in the mandible. The high patient satisfaction rate for PBRs (86%) supports the conclusions of Wong and Freer, who noted that “patients found fixed retainers more acceptable than removable retainers because of appearance and comfort.”<sup>8</sup> The high dentist satisfaction rate (93%) supports the findings of Wong and Freer on the acceptance of fixed retention by orthodontists in Australia and New Zealand, where “most respondents preferred bonded retainers.”<sup>9</sup>

The primary problem of the PBRs reviewed in this study was inadequate oral hygiene. Although the looped-wire design allows flossing between teeth, the impracticality of loops between the lower incisors makes cleaning in these areas difficult (Fig. 4). A floss threader can be used to guide the floss under the wire, and regular use of interdental



**Fig. 4** Increased accumulation of plaque and calculus around mandibular retainer compared with maxillary retainer.

brushes and toothpicks can help, but only the most diligent patients will succeed in avoiding calculus buildup around the lower incisors and retainer wire. Therefore, calculus should be professionally removed every six to 12 months, as in any patient. Moreover, dental-care providers need to stress the importance of oral hygiene and educate patients in how to achieve it. In a study on the periodontal implications of bonded and removable retainers, Heier and colleagues concluded: "Slightly more plaque and calculus were present on the lingual surfaces in the fixed retainer group. This did not result in more pronounced gingival inflammation than in the removable retainer group, within the evaluated period (six months)."<sup>10</sup>

Some respondents commented that PBRs did not prevent crossbite relapse. PBRs that have been extended to incorporate the molars have experienced problems of durability and food impaction between the wires and the teeth. Even though RRs were considered better at preventing posterior crossbite, however, such relapse does not necessarily create functional or esthetic problems.<sup>11</sup>

Questions remain about the long-term effects of PBR wear. Composite-bonded PBRs have been in use only since the early 1970s,<sup>5</sup> but observational studies to date have found no apparent harm to the dental or periodontal tissues.<sup>10,12</sup> Periodontal tissues seem to become more vulnerable to disease with increasing age,<sup>13</sup> however, and this vulnerability may be exacerbated by PBRs. Further studies are needed to determine long-term outcomes of PBR wear.

Regarding gingivitis due to nickel allergies, the .018" Regular Plus stainless steel wire shown here has been used in orthodontics for more than 50 years without apparent problems. Moreover, Kao and colleagues found that nickel-containing orthodontic metal bracket immersion medium appears to be biocompatible with oral gingival fibroblasts and human osteogenic sarcoma cells.<sup>14</sup>

The main concern about RRs was noncompliance and subsequent relapse. As one dentist wrote, "We are talking about teen-agers here; show me a 16-year-old teen-age boy who is going to wear a removable retainer for years." Such non-

compliance is virtually impossible with PBRs, which cannot be misplaced or taken off.

## Conclusion

This study found that permanent retainers were regarded as superior to removable retainers in terms of effectiveness, durability, patient satisfaction, and dentist satisfaction. The majority of respondents, however, expressed concern about oral-hygiene problems in the mandible, where cleaning is difficult and supragingival calculus buildup is common. With removable retainers, the respondents were concerned about noncompliance and subsequent relapse. Overall, the general dentists believed permanent bonded retainers to be the best currently available approach to the problem of relapse after orthodontic treatment.

## REFERENCES

1. Lenz, G.: Oral Health, Dental Health Week orthodontics for 18-25 year olds, ADA News Bull. 355:20-25, 2007.
2. Little, R.M.: Treatment outcomes/complications, 104th AAO annual session, Orlando, FL, 2004.
3. Little, R.M.: Stability and relapse: Early treatment of arch length deficiency, Am. J. Orthod. 121:578-581, 2002.
4. Gottlieb, E.L.: JCO Interviews Martin L. "Bud" Schulman on success through sharing, J. Clin. Orthod. 36:569-578, 2002.
5. Zachrisson, B.U.: Clinical experience with direct-bonded orthodontic retainers, Am. J. Orthod. 71:440-448, 1977.
6. Cerny, R.: Permanent fixed lingual retention, J. Clin. Orthod. 35:728-732, 2001.
7. Cerny, R.: The reliability of bonded lingual retainers, Austral. Orthod. J. 23:24-29, 2007.
8. Wong, P. and Freer, T.J.: Patients' attitudes towards compliance with retainer wear, Austral. Orthod. J. 21:45-53, 2005.
9. Wong, P.M. and Freer, T.J.: A comprehensive survey of retention procedures in Australia and New Zealand, Austral. Orthod. J. 20:99-106, 2004.
10. Heier, E.E.; De Smit, A.; Wijgaerts, I.A.; and Adriaens, P.A.: Periodontal implications of bonded versus removable retainers, Am. J. Orthod. 112:607-616, 1997.
11. Gesch, D.; Bernhardt, O.; Alte, D.; Kocher, T.; John, U.; and Hensel, E.: Malocclusions and clinical signs or subjective symptoms of temporomandibular disorders (TMD) in adults: Results of the population-based Study of Health in Pomerania (SHIP), J. Orofac. Orthop. 65:88-103, 2004.
12. Artun, J.: Caries and periodontal reactions associated with long-term use of different types of bonded lingual retainers, Am. J. Orthod. 86:112-118, 1984.
13. Albandar, J.M.: Periodontal diseases in North America, Periodontol. 2000 29:31-69, 2002.
14. Kao, C.T.; Ding, S.J.; Min, Y.; Hsu, T.C.; Chou, M.Y.; and Huang, T.H.: The cytotoxicity of orthodontic metal bracket immersion media, Eur. J. Orthod. 29:198-203, 2007.