In-Ovation®

A self-ligation bracket system demonstrates fewer office visits and shorter treatment times compared to twin bracket systems with elastomeric ties. A study comparing two samples of consecutively started patients.

White Paper by
Straty Righellis, DDS

Dentsply Sirona Orthodontics

Straty Righellis, DDS

Dr. Righellis lectures nationally and internationally to orthodontists on the subjects of treatment excellence and efficiency. He is a graduate of the UCLA School of Dentistry and received his orthodontic specialty certification from the University of California at San Francisco. Dr. Righellis is a Diplomate of the American Board of Orthodontics and an Associate Clinical Professor at the University of the Pacific and the University of California at San Francisco. He is past president of the Northern California Edward H. Angle Society, a referee to the American Journal of Orthodontics, and a visiting faculty member at the Roth-Williams International Teaching Centers. Dr. Righellis maintains an active private practice in Oakland, California.

In-Ovation®, a self-ligation bracket system demonstrates fewer office visits and shorter treatment times compared to twin bracket systems with elastomeric ties. A study comparing two samples of consecutively started patients.

by Straty Righellis, DDS

Introduction

In 2007 only 18% of United States orthodontists used self-ligation brackets exclusively in treating orthodontic patients.[1] While changing bracket systems in an orthodontic office can be disruptive during the transition, when the treatment results are analyzed, the benefits to the patients and the practice have been shown to be enormous!

The results of this study support the change from elastomeric ties with twin brackets to a self-ligation bracket (In-Ovation® R). The change in bracket systems proved to be positive for both my patients and the practice. The patients benefited from a reduction in chairtime per visit, fewer office visits, and shorter treatment time than originally estimated with conventional pre-adjusted wide twin brackets. The qualitative analysis of the results, using the ABO grading system, showed high-quality treatment outcomes as well.

Self-ligation in general has always made intuitive sense to me. Removing and replacing elastomeric ties is time consuming. In addition, the force level reduction with elastomeric ties after wire placement is inefficient, requiring frequent patient office visits.[2]

Previous self-ligation bracket systems had the problems of not functioning predictably, inefficient self-ligation mechanisms, and/or ineffective positioning of the teeth when compared to the twin brackets used at that time.

While there are many self-ligation systems in the marketplace, I selected GAC's In-Ovation R (Fig. 1) with its compound contoured base, center of slot in the center of the base[3], and interactive clip.[4] This interactive feature allows smaller wires to work in a relatively friction-free environment during the leveling stages, allowing for rapid tooth movement. As the interactive clip engages into the archwire, control of angulation and inclination of the teeth can easily be achieved.[5]

(Fig. 1)
Small, round wire (left image) show relatively friction free wire-slot interaction. As wire sizes gradually increase (right image), earlier interaction begins to control inclination and angulation of the individual teeth.

This control is critical for optimal tooth positioning in, for example, an extraction case. This unique passive-interactive feature of In-Ovation R simply has the best of both worlds, relative passiveness in the early stages of tooth movement and interactive or active features for precise control of tooth positions earlier in orthodontic treatment than with totally passive self-ligation systems. In addition, this bracket system maintains the unique bracket slot-base features.

This study demonstrates that In-Ovation R works more efficiently with less chairtime per office visit, fewer office visits, and shorter treatment times. In addition, treatment outcomes are of high quality.

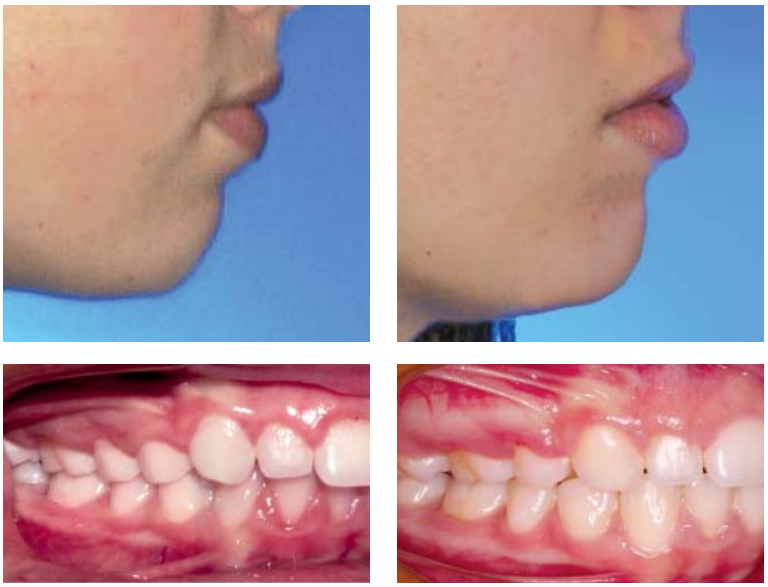
Method and Materials

The sample for twin bracket system with elastomeric ties consisted of 88 consecutive patients started in January, 1997. The In-Ovation R self-ligation system sample consisted of 97 consecutive patients started in January, 2004. Exclusion criteria included transfer in-out patients, impacted cuspids, adults, and partial treatment cases. Sample similarities were the same operator, diagnostic protocol, and identical bracket prescription - .022 Base Rx* with same bracket slot-base features as in original Andrews design.Pre-treatment and post-treatment photos using In-Ovation R are shown (Fig. 2, 3, and 4) to demonstrate the author's goals in tooth positioning for functional occlusion, dento-gingival aesthetics, and facial balance.[6,7,8,9,10,11]

The data for treatment efficiency was collected by the author and the ABO measurements for treatment outcomes were scored and graded independently by Dr Chad R. Sears. The grader was calibrated by viewing the ABO's instructional DVD.

*Dentsply Sirona Orthodontics Base Rx has prescription values that are equivalent to the Roth prescription. ROTH is a registered trademark of Roth Licensing, LLC. All rights reserved.

(Fig. 2)
15 office visits with four premolar extractions to improve facial balance, functional occlusion and dento-gingival aesthetics.



(Fig. 3)
16 office visits with two upper premolar extractions only.

(Fig. 4)
Result in 15 office visits...non surgical, no rapid palatal expansion.

Hypothesis

With In-Ovation R, high-quality treatment outcomes can be maintained with less chairtime, fewer office visits and shorter treatment times.

Results

ON-TIME RESULTS

91% of the cases that started were finished "on time". The nine cases that did not finish on time were delayed either to 2nd molar impactions (2 patients), over five missed scheduled appointments (3 patients) or Class II correction challenges (4 patients).

LESS CHAIRTIME

Our timing studies show that elastomeric ties with two people (four hands) can remove and replace elastomers in 2 minutes 38 seconds, while opening and closing the In-Ovation R clips requires only one person and takes only 1 minute and 18 seconds. The efficiency of In-Ovation R clips results in savings of over one minute per patient per two archwire changes while utilizing only one staff member to do the wire change.[12] Furthermore, if the patient is already in finishing wires, no tie removal and re-ties are needed!

FEWER OFFICE VISITS

Fig. 5 shows two fewer office visits per active case.

SHORTER TREATMENT TIMES

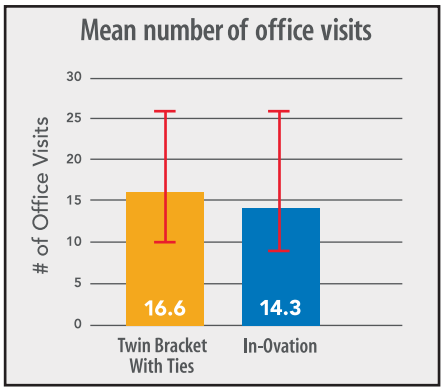
Fig. 6 shows a reduction in sample treatment time by almost four months!

Fig. 7 separates the sample into sub-samples: non-extraction and extraction cases. The non-extraction sub-sample, as expected, required fewer office visits and less treatment time.

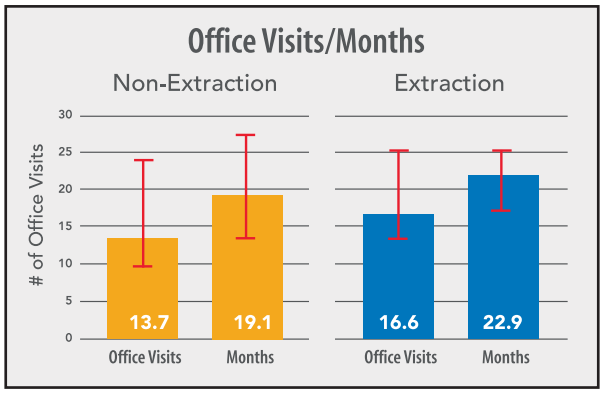
Fig. 8 demonstrates in this sample an increase in non-extraction treatment solutions by 24%.

TREATMENT OUTCOME SCORES

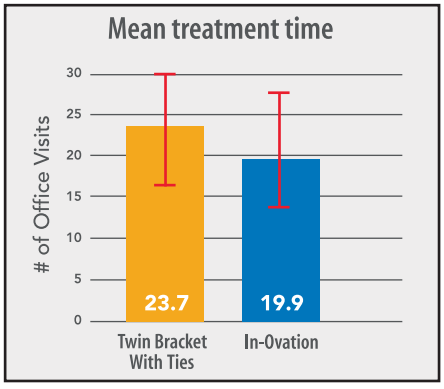
45% of the completed cases scored less than 19 (ABO Grading System) and another 43% scored between 20 and 25. The remaining cases that scored greater than 25 usually consisted of diagnoses and treatment plans in which dental compensation was planned in patients with underlying skeletal problems–typically Class II correction



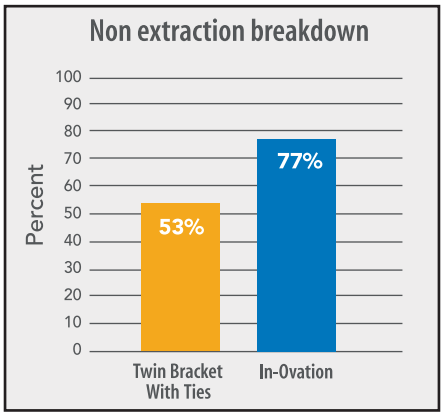
(Fig. 5)



(Fig. 7)



(Fig. 6)



(Fig. 8)

challenges and anterior open-bite corrections that should ideally be treated with a surgical solution.

Discussion:

FEWER OFFICE VISITS

With the In-Ovation R system, the progression from flexible, small, round wires to larger, thermally activated wires (BioForce®) creates a relatively friction-free system. As wire sizes increase, the interactive clips are more efficient than elastomeric ligation because they provide a constant, continuous force which interacts with the archwire for efficient tooth movement between treatment visits.

SHORTER TREATMENT TIMES

Previously, cohort studies of the author's cases over the last 17 years showed that previous diagnostic and treatment protocol changes made in office procedures reduced office visits and improved the quality of the treatment outcomes, but did not reduce chairtime or treatment time significantly.[13]

The interactive clip feature of In-Ovation R combined with the compound contoured bracket system allows for earlier engagement of the wire into the bracket slot for more efficient tooth movement. Tooth movement can be achieved with the gentle, constant, interactive clip mechanism, and the results are of the highest quality in a shorter period of time.

Conclusion

Practically, the effects of In-Ovation R have exceeded my expectations. Over the last three years my annual starts have been constant, but with the reduced chairtime, less frequent office visits, and shorter treatment times, the overall case load of active patients in treatment was reduced by 20%. The net effect amounts to one less doctor day per month.

While the bracket system change has been extremely positive, each case still requires a complete and accurate diagnosis with all diagnostic tools available.[14,15,16,17] Measurable treatment goals for each and every patient must still be the standard in diagnosing and treating our patients.

Further research to improve treatment efficiency

While this study showed spectacular results, further improvement can be made with changes in wire sizes as we further understand the bracket slot-wire interplay. This study used similar wire sequencing in both samples. We are analyzing ribbon archwires as the spring clip engages earlier in treatment than did the elastomeric ties.

References

1. "U.S. Markets for Orthodontic Appliances 2007" Millennium Research Group, Toronto, ON, 2006
2. Thomas S, Sherriff M, Birnie D: "A Comparison in Vitro Study of the Frictional Characteristics of Two Types of Self-Ligating Brackets and Two Types of Pre-Adjusted Edgewise Brackets Tied with Elastomeric Ligatures" Eur J Orthod June, 1998
3. Andrews, L Straight Wire – The Concept and Appliance LA Wells Co San Diego, Ca Copyright 1989
4. Voudouris, J "Interactive Edgewise Mechanisms: Form and Function Comparison withConventional Edgewise Brackets," AJO February, 1977
5. Thorstenson G, Kusy, R "Comparison of Resistance to Sliding Between Different Self-Ligating Brackets with 2nd Order Angulation in the Dry and Wet States" AJO May, 2002
6 Andrews , L "Six Keys to Normal Occlusion" AJO Sept, 1972
7. Roth, RH "Functional Occlusion for the Orthodontist" Parts I,II,III JCO 1981, Vol 15 pages 32-51; 100-123; 174-198
8. Janzen, E K A Balanced Smile: A most important treatment objective. AJO, 1977

9 Rufenacht CR Fundamentals of Esthetics" Quintessence, 1990

10. Moore, Southard, Casko, et all "Buccal Corridors and Smile Esthetics" AJO Feb, 05
11. Hulsey, CM An Esthetic Evaluation of Lip: Teeth relationships present in a smile AJO 1970
12. Authors personal video timing procedures

13 Jaul, D. E H Angle Society Thesis in partial fulfillment for Active Membership, 2004 (unpublished)

14. Shildkraut M, Wood DP, Hunter S. "The CR/CO discrepancy and its effect on cephalometric measurements" Angle Orthodontist September, 1994
15. Utt and Meyers "3 dimensional comparison of condylar changes between CR and CO using MPI" AJO, 1995
16. Wood DP and Korne PH "Centrically Related Cephalometrics" AJO 1977, 71:156-172

17. Wood DP and Elliot EW, "Reproducibility of centric relation bite registration techniques" Angle Orthodontist, 1994

Dentsply Sirona Orthodontics

The Dental Solutions Company

Dentsply Sirona is the world's largest manufacturer of professional dental products and technologies. We create industry-leading positions and platforms across consumables, equipment, technology, and specialty products. We are committed to introducing new, innovative products and complementary, end-to-end solutions to drive better, safer and faster dentistry.

To learn more, visit us online at dentsplysirona.com.

Dentsply GAC International
One CA Plaza, Suite 100
Islandia, NY 11749

0280-MM-120-089-03 Rev. 04