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DAMON™ *System*

Low-Friction, Low-Force Orthodontics



The Science Behind The System

Clinical Abstracts, Volume 1

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Self-ligation in the year 2000, a comparative assessment of conventional ligation and self-ligation bracket systems

Berger J. *Journal of Clinical Orthodontics* 2000.

Objective A retrospective assessment of clinical studies relating to the effectiveness and efficiencies of self-ligating brackets as compared with conventionally ligated straightwire appliances.

Methodology More than twenty published articles/clinical studies were studied.

- Findings**
- w Self-ligating brackets were found to provide greater patient comfort, shorter treatment time, reduced chairtime and more precise control of tooth translation.
 - w Self-ligating brackets demonstrate dramatically less friction. Such reduction in friction can help shorten overall treatment time, especially in extraction cases.
 - w The authors of several studies reported an average of four months reduction in treatment time and a significant savings of chairtime in changing archwires.
 - w Self-ligation reduces the risks of percutaneous injury. It also protects the patient from soft-tissue lacerations and possible infections from the cut ends of steel ligatures.
 - w Elastomeric ligatures not only show a rapid rate of decay and deformation, but they are often associated with poor oral hygiene. With the elimination of ligatures, self-ligating appliances can significantly improve the hygiene of all patients.

Conclusion "As more orthodontic practices embrace the concept of self-ligation, it is becoming apparent that stainless steel and elastomeric ligatures will eventually be as outdated as full banding is today. Considering the advantages of self-ligating brackets for the clinician, staff, and patient, they (self-ligating appliances) may well become the 'conventional' appliance systems of the 21st century."

Treatment time, outcome and patient satisfaction comparisons of Damon™ and conventional brackets

Eberling JJ, Straja SR, Tuncay OC. *Clinical Orthodontics and Research* 2001; 4(4):228-234.

Objective To compare the treatment efficiency, quality of outcome and patient satisfaction of the Damon SL system with conventional brackets and ligating methods.

Methodology A total of 215 patients were treated at three different sites – one university and two private practices. Out of those patients, 108 were treated with the Damon System and 107 with conventional braces. Damon and non-Damon treatments were analyzed for frequency of appointments, treatment duration and quality of treatment outcome as determined by the ABO grading criteria. Additionally, patients in both groups were surveyed to assess their level of satisfaction with their treatment.

Results

- w Damon patients were treated in an average of 6.33 months less time than those treated with conventional twin brackets.
- w Damon patients were treated with 7 fewer appointments than those treated with conventional braces.
- w The ABO scores of the Damon group were significantly higher (7.38 mean) than those treated with conventional braces.
- w Patients treated with the Damon System reported greater satisfaction with their treatment.

Conclusion This study demonstrated that the Damon System yields significantly faster, better and more reproducible treatment results and that patient satisfaction with the Damon System is greater than with conventional braces.

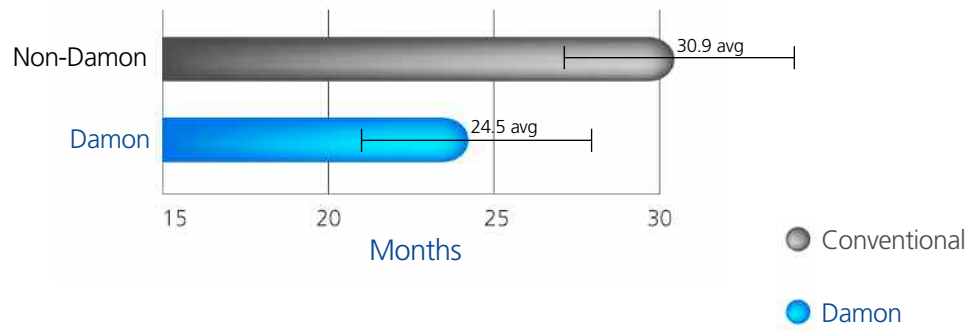
Treatment Times (in months) and Standard Deviation

Office	Brackets	Mean	SD	Avg. Tx Time Reduction with Damon
Bayonne	Non-Damon	30.38	7.85	8.05 months
	Damon	22.33	4.41	
Easton	Non-Damon	31.96	7.37	4.33 months
	Damon	27.63	6.57	
Temple	Non-Damon	26.63	10.01	9 months
	Damon	17.63	5.58	
All	Non-Damon	30.87	7.85	6.33 months
	Damon	24.54	6.45	

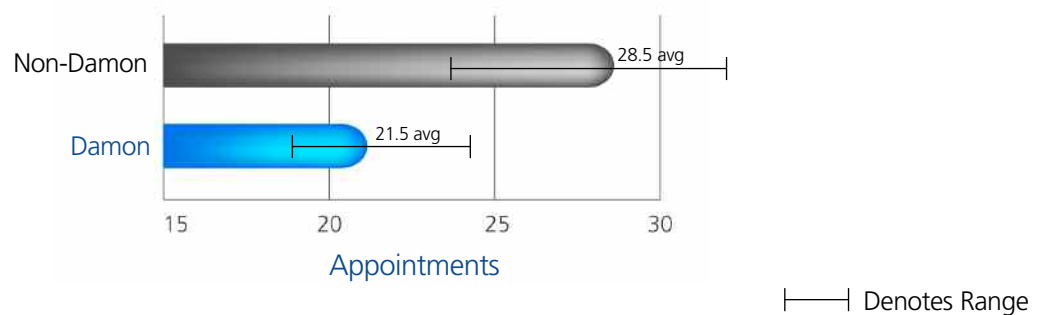
ABO Scores and Standard Deviation

Brackets	# Patients	Mean	SD
Non-Damon	107	342.31	11.38
Damon	108	349.69	8.85

Treatment Times (in months)



Number of Appointments



The Damon™ System vs. conventional appliances — a comparative study

Tagawa D. *Clinical Impressions* 2005; 15-1.

Objective To compare Damon System treatment with conventional straightwire twin bracket treatment. Treatment times, number of appointments, quality of results, and patient comfort were evaluated.

Methodology A total of 132 orthodontic patients took part in the study. Out of those patients, 66 were treated with the Damon System (the author's first Damon cases), and 66 with conventional Mini Twin ("A" Co.) braces. Patients were surveyed and evaluated at each appointment and at completion of treatment. In evaluating treatment results, all aspects of orthodontic treatment, including occlusion, alignment, facial esthetics, dental aesthetics, TMJ considerations, and periodontal health were considered.

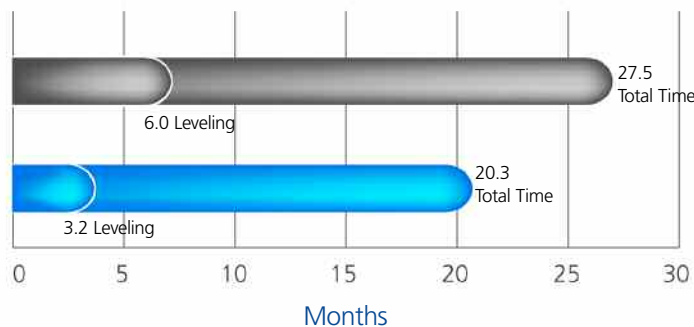
- Results**
- w Damon patients were treated in an average of 7.2 months less time than those treated with conventional braces.
 - w The Damon patients required an average of 47.8% fewer appointments than those treated with conventional braces.
 - w The amount of time required for leveling and aligning with conventional braces was 6.0 months, versus just 3.2 months for Damon, a difference of 46.7%.
 - w The Damon patients reported an average of 60% less discomfort than those treated with conventional braces.
 - w The quality of Damon results was consistently excellent, with cases averaging 3.6 on a 4-point scale (4 being the highest).
 - w Patient acceptance and enthusiasm about the Damon technique was uniformly and exceptionally positive.
 - w The combination of extended appointment intervals and shorter treatment times resulted in a reduction of the number of patients seen per day while simultaneously improving practice productivity.

Conclusion As compared with conventional bracket systems, the Damon System is faster, requires fewer appointments, and is far more comfortable. Faster treatment times and increased time between appointments affords a significant reduction in the number of patients seen per day while simultaneously improving practice profitability. The quality of results with the Damon System was shown to be consistently excellent.

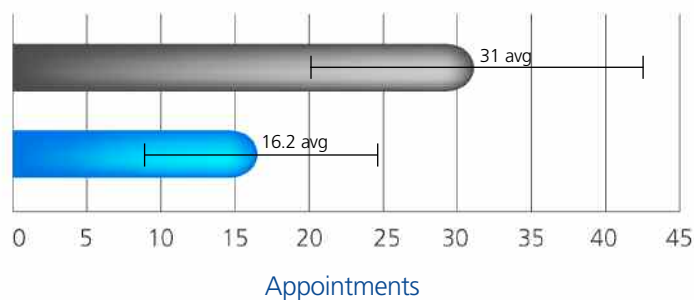
Damon Productivity Increases

	Before Damon	With Damon	Difference	Practice Growth
Patients Per Day	78	48	-38%	+14.2%

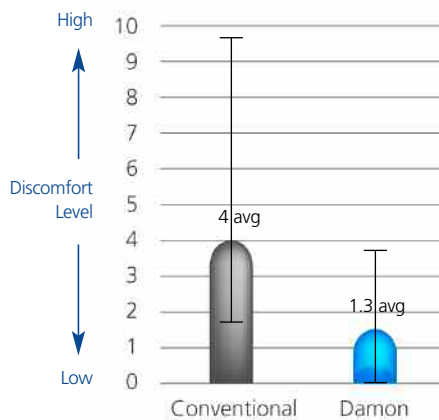
Average Arch Leveling and Total Treatment Times (in months)



Number of Treatment Appointments



Patient Discomfort



Denotes Range

Self-ligating brackets and treatment efficiency

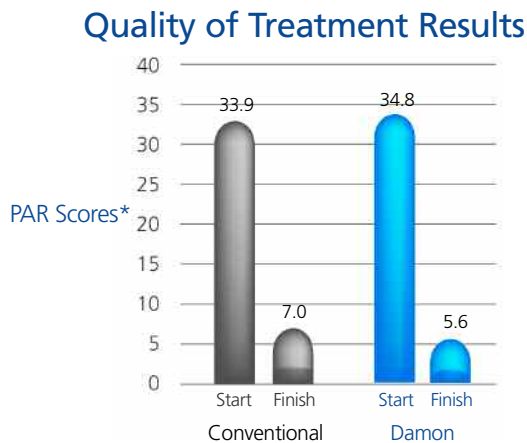
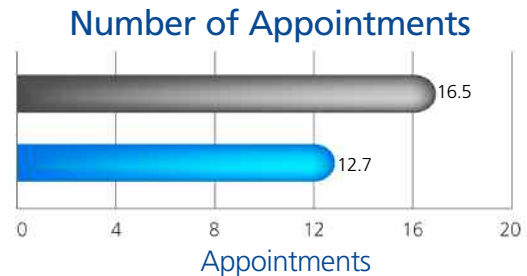
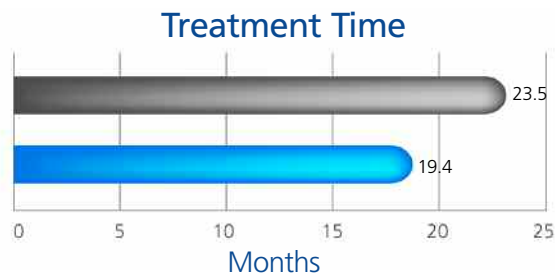
Harradine NWT. *Clinical Orthodontics and Research* 2001; 4:220-227.

Objective To compare treatment times, speed of ligation and quality of outcome in cases treated with Damon™ SL brackets versus conventional straightwire twin brackets.

Methodology A total of 60 patients were enrolled in this study. Out of those patients, 30 consecutive patients were treated with Damon SL brackets and 30 with conventional brackets. All were treated by the author utilizing conventional treatment mechanics. All cases were evaluated for treatment times, time required for wire changes, and finally, for quality of outcome as determined by the PAR* scoring method.

- Results**
- w Treatment times for the Damon patients were 4 months shorter than those treated with conventional brackets.
 - w Patients treated with Damon brackets required 30% fewer appointments.
 - w Slide opening and closing was significantly faster than conventional ligation.
 - w Starting from statistically equivalent PAR scores, Damon cases finished an average of 20% better than non-Damon cases.

Conclusion Damon treatment is faster, requires less chairtime and fewer appointments, and yields higher quality results than conventionally ligated straightwire appliances.



● Conventional

● Damon

* The peer assessment rating (PAR) index is a standardized method for quantifying abnormal occlusion. It can be used both for the initial assessment and to evaluate the amount of change after an intervention. PAR scores differ from ABO scores in that lower numbers represent higher quality results.

Comparison of resistance to sliding between different self-ligating brackets with second-order angulation in the dry and saliva states

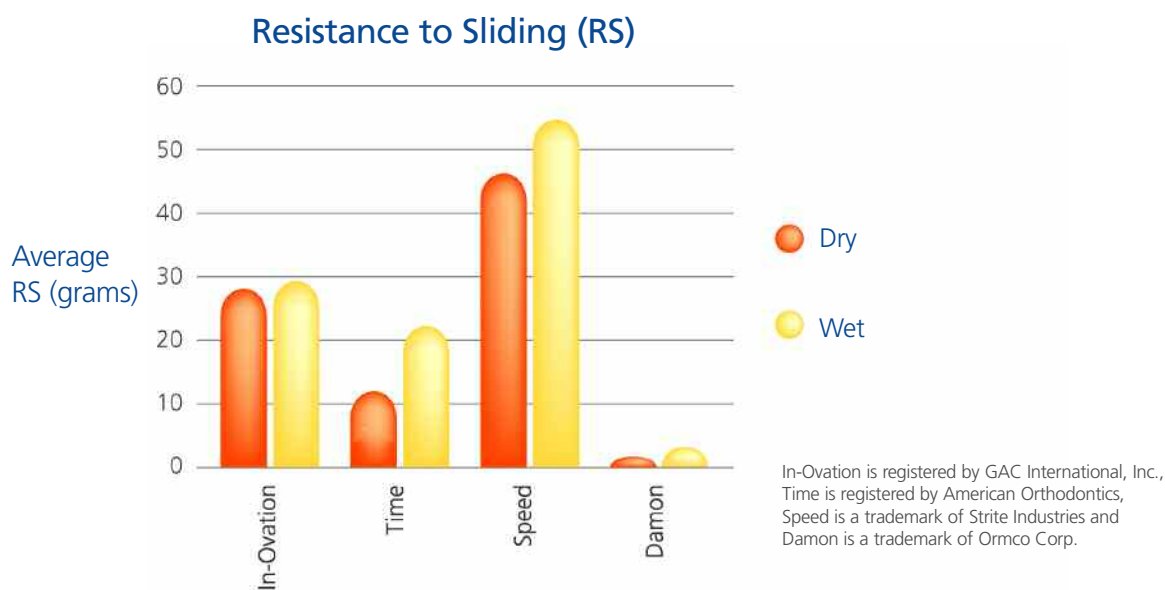
Thorstenson GA and Kusy RP. *American Journal of Orthodontics & Dentofacial Orthopedics* 2002; 121:472-482.

Objective To compare the resistance to sliding among different self-ligating brackets in dry and wet states.

Methodology Resistance to sliding was investigated for three self-ligating brackets with active clips (In-Ovation®, Time®, Speed™) and one self-ligating bracket with a passive slide (Damon™). For all cases, an .018 x .025 stainless steel archwire was drawn through each bracket at a rate of 10 mm/min over a distance of 2.5 mm. For each bracket, the resistances to sliding were measured at 14 different second-order angulations, which ranged from -9° to +9°. Both the dry and the wet (human saliva) states were evaluated at 34°C.

Results The bracket with a passive slide (Damon) exhibited negligible friction; brackets with active clips (In-Ovation, Time, Speed) exhibited frictional forces as great as 50 grams. In the passive configuration, the bracket with a passive slide exhibited small to no resistance to sliding in either the dry or wet states.

Conclusion Of all self-ligating brackets tested, the one with a passive slide (Damon), produced the least resistance to sliding in both dry and wet states.



Interactive edgewise mechanisms: form and function comparison with conventional edgewise brackets

Vourdouris JC. *American Journal of Orthodontics & Dentofacial Orthopedics* 1997; 111:119-143.

Objective To compare the frictional resistance of active versus passive twin bracket systems.

Methodology A total of 83 orthodontic patients undergoing treatment with fixed appliances took part in the study. An in vivo clinical investigation with in vitro scanning electromicroscopy was conducted to compare the frictional resistance of three different self-ligating bracket systems with 0.022 inch slots, active type A (Sigma*, American Orthodontics), passive type B (TwinLock*, Ormco Corp.), and passive type C (Damon™, Ormco Corp.) with three conventionally ligated twin counterparts, respectively types D, E, and F.

Results Active self-ligating brackets demonstrate less frictional resistance than conventionally ligated twin brackets and passive self-ligating twin brackets demonstrate far less frictional resistance than active.

With respect to the reduction in the amount of frictional resistance for various bracket types, the following was determined:

- w Active self-ligating brackets exhibited 56.7% less friction than conventional twin brackets.
- w Passive self-ligating brackets exhibited 99.5% less friction than active self-ligating and 99.8% less than conventionally ligated twins.

In regard to the manner in which archwires are secured to the brackets, the following was determined:

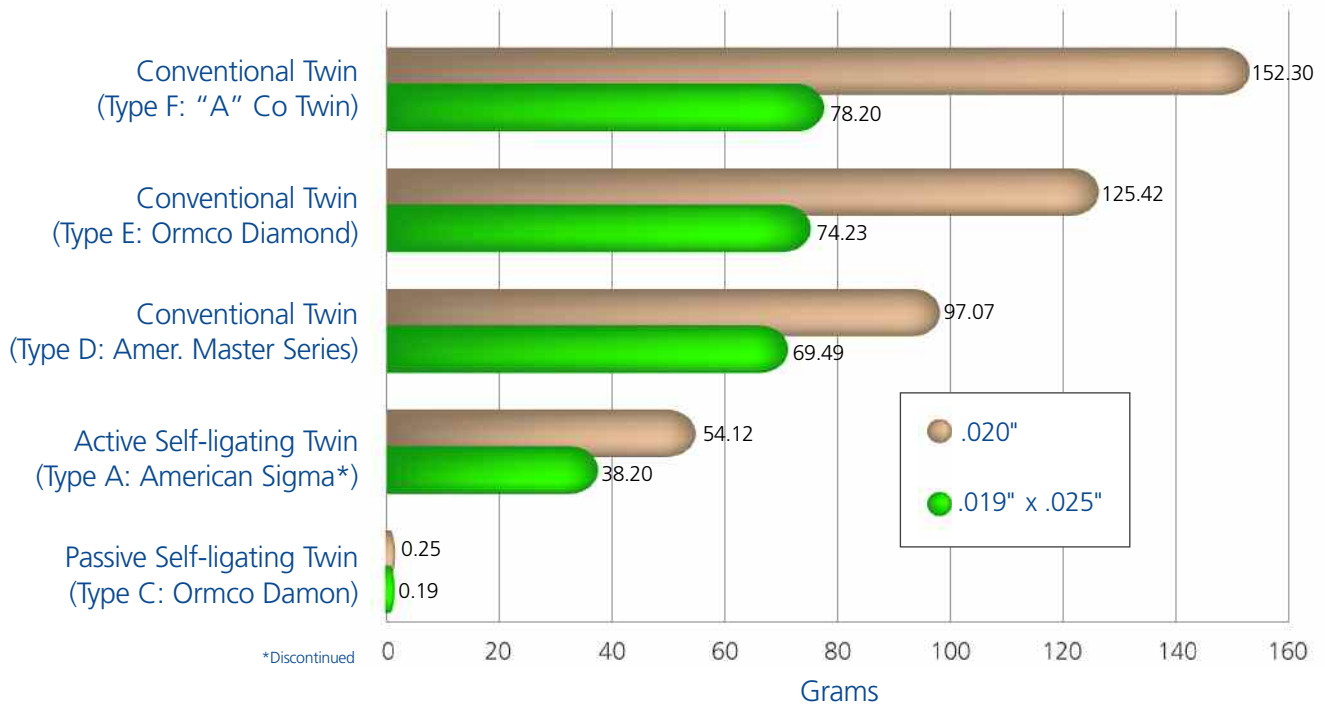
- w Elastomeric ligatures produced extremely high friction at 66.78 grams of frictional resistance.
- w Metal ties produced high friction at 53.28 grams.
- w Active self-ligation produced moderate friction at 31.0 grams.
- w Passive self-ligation produced low friction at 0.10 to 0.18 grams.

Conclusion “This investigation produced scientific and clinical evidence showing that interactive twins, including the Damon appliance, are capable of kinetically interacting in a nondegrading manner with resilient archwires and without elastomerics or metal ligatures to create a new reduced friction standard for biocompatible tooth movement.” Furthermore, this study showed the following:

- w Light clinical force application permits anchorage conservation because of low-friction properties.
- w Time savings in changing archwires reduces chairside assistance time.
- w Patient hygiene is significantly improved because of the reduction in the use of plaque-retentive elastomerics.

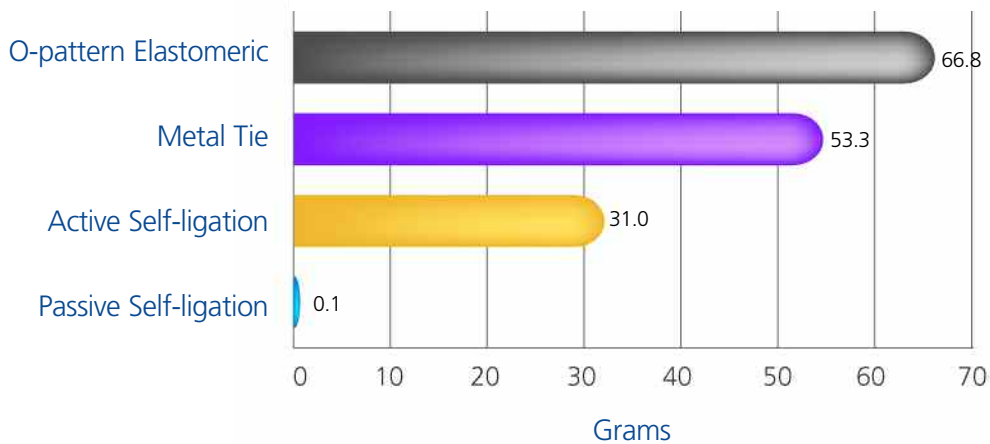
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Frictional Resistance of Various Bracket Types



Frictional Resistance of Various Ligation Methods

All bracket/archwire configurations
 slot size: 0.022-inch slot size
 archwire: 0.018-inch SS



Force decay and deformation of orthodontic elastomeric ligatures

Taloumis LJ, Smith TM, Hondrum SO and Lorton L. *American Journal of Orthodontics & Dentofacial Orthopedics* 1997; 111:1-11.

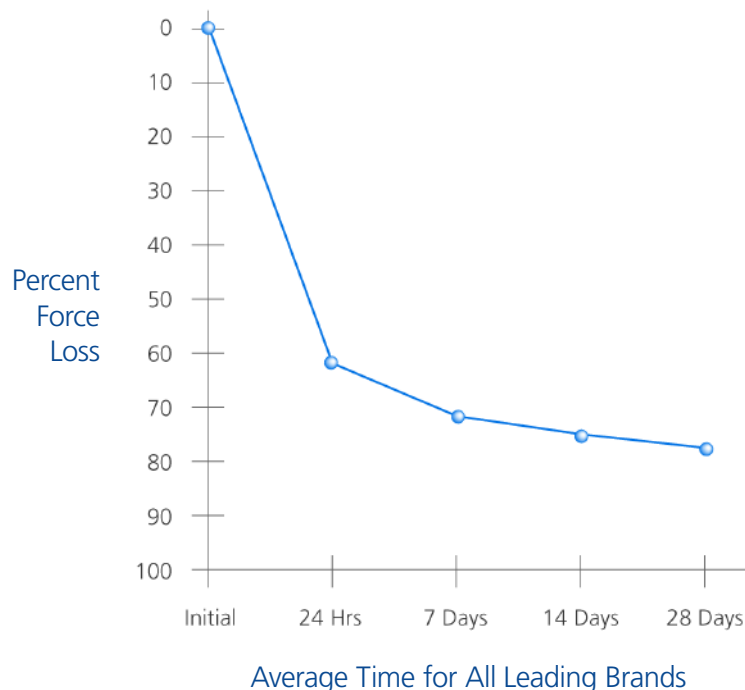
Objective For all leading brands, evaluate force decay, dimensional change and permanent deformation of molded elastomeric ligatures in a simulated oral environment.

Methodology Initial wall thickness, inside diameter, outside diameter, and force levels of each ligature were measured. Three of four test groups of ligatures were stretched over stainless steel dowels with a circumference approximating that of a large orthodontic twin bracket. Test group one was kept at room temperature and humidity for 28 days and test groups two to four in synthetic saliva baths at 37°C, pH 6.84. The residual forces and dimensional changes were measured. Force levels were tested at 28 days for test group two and at 24 hours, 7 days, 14 days, and 28 days for test group three. The fourth test group of unstretched samples was measured to evaluate dimensional changes due solely to moisture absorption at 28 days.

Results Elastomeric ligatures deform permanently when stretched, and within just 24 hours exhibit force loss of up to 68%.

Conclusion The rapid force loss and permanent deformation of these products may preclude their use for rotational and torque corrections.

Permanent Deformation of Elastomeric Ligatures



Ligature wires and elastomeric rings; two methods of ligation and their association with microbial colonization of streptococcus mutans and lactobacilli

Forsberg, Brattstrom V, Malmberg E and Nord CE. *European Journal of Orthodontics* 1991; 13:416-20.

Objective To compare the number of micro-organisms collected from fixed appliances ligated with elastomeric rings versus those ligated with steel ties.

Methodology A total of 12 orthodontic patients undergoing treatment with fixed appliances took part in the study. In all patients, elastomeric rings were used for ligation on one side of the midline; steel wires were used on the opposite side. The numbers of streptococcus mutans and lactobacilli were recorded on five occasions in samples of plaque taken from the labial surface of the upper lateral incisors, as well as from samples of saliva.

Results In the majority of patients, the incisor that was attached to the archwire with an elastomeric ring exhibited 38% more micro-organisms in the plaque than the incisor ligated with steel wire. Following insertion of fixed appliances, the number of streptococcus mutans and lactobacilli in saliva increased significantly.

Conclusion In orthodontic patients whose oral hygiene is not optimal, the use of elastomeric rings for ligation cannot be recommended, as they may significantly increase the microbial accumulation on tooth surfaces adjacent to the brackets, leading to a predisposition for the development of dental caries and gingivitis.

