

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 analyzed.

Findings

- ▶ Self-ligating brackets were found to provide greater patient comfort, shorter treatment time, reduced chairtime and more precise control of tooth translation.
- ▶ Self-ligating brackets demonstrate dramatically less friction. Such reduction in friction can help shorten overall treatment time, especially in extraction cases.
- ▶ The authors of several studies reported an average of four months' reduction in treatment time and a significant savings of chairtime in changing archwires.
- ▶ 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.
- ▶ 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concept of self-ligation, it is becoming apparent that stainless steel and elastomeric ligatures will eventually be as outdated as full banding is today.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."

Self-ligating brackets and treatment efficiency

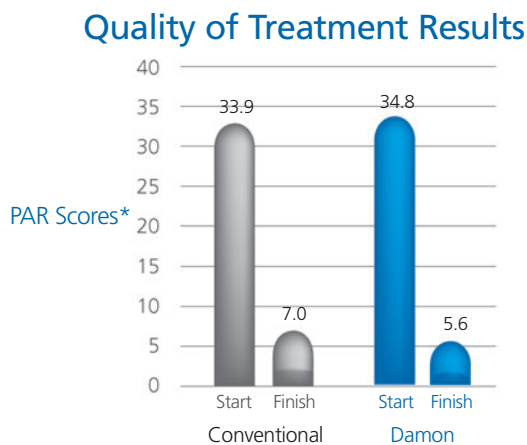
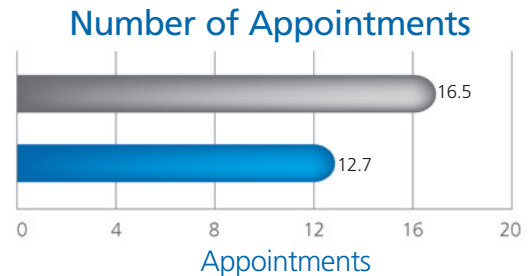
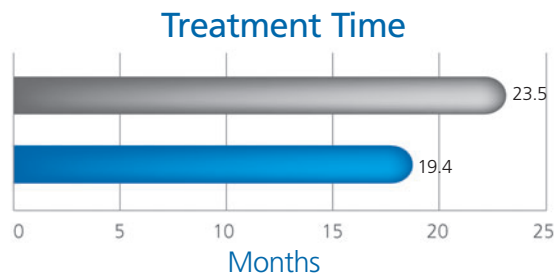
Harradine NWT. *Clinical Orthodontics and Research* 2001; 4:220-227.

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**
- ▶ Treatment times for the Damon patients were 4 months shorter than those treated with conventional brackets.
 - ▶ Patients treated with Damon brackets required 30% fewer appointments.
 - ▶ Damon bracket slide opening and closing was significantly faster than conventional bracket ligation.
 - ▶ 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.

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.

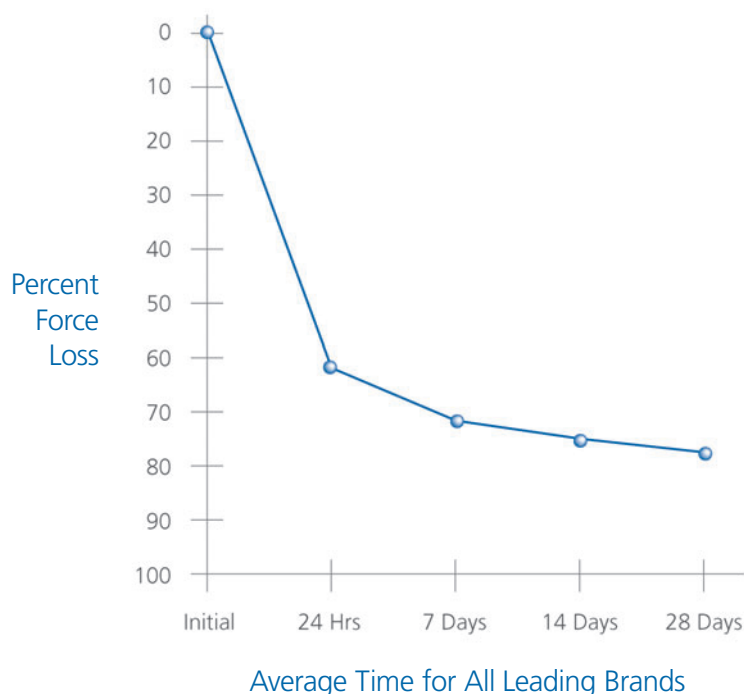
Objective For all leading brands, evaluate force decay, dimensional change and permanent deformation of molded elastomeric ligatures in a simulated oral environment.

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.

