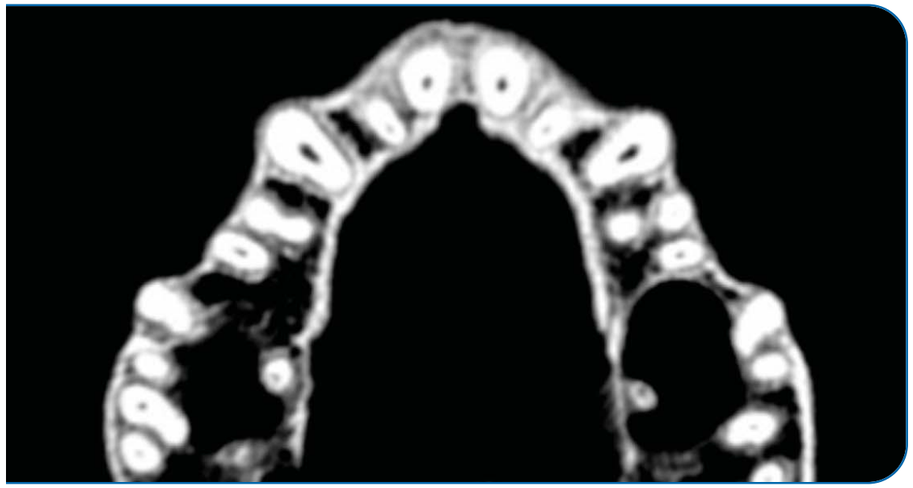
DAMON® SYSTEM
More than straight teeth™



The Science Behind The System

Clinical Abstracts, Volume 2

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Comparison of frictional forces during the initial leveling stage in various combinations of self-ligating brackets and archwires with a custom-designed typodont system

Kim TK, Kim KD, Baek SH. Am J Orthod Dentofacial Orthop 2008; 187:e15-e24.

Objective

To compare the frictional force generated by different self-ligating brackets, archwires and alloy types, and to measure the amount of displacement during the initial leveling phase of orthodontic treatment.

Methodology

Study involved use of a custom-designed typodont system composed of resin teeth and metal frame that could be moved up, down, forward and backward to produce malocclusions while stimulating initial leveling phase and measuring levels of frictional force.

The following brackets were tested: Damon 2, Damon 3, In-Ovation® R, Speed™, Time® 2, SmartClip™, Clarity™ and Mini-Diamond™. Data involving SmartClip was discarded, because the SmartClip bracket could not grip the archwire firmly during the test.

For initial leveling and alignment, .014 and .016 austenitic nickel-titanium and copper-nickel titanium archwires were tested with each bracket.

Results

- There were significant differences in frictional force depending on bracket, wire alloy and size, and the amount of displacement in the maxillary and mandibular typodonts.
- In the maxillary typodont, Damon 2 and Damon 3 brackets produced "significantly" lower frictional force than all other brackets even though the degree of malocclusion was increased.
- In the mandibular typodont, Damon and In-Ovation brackets produced lower frictional force. However, the authors note that when an archwire contacts the clip or slides of an active bracket like In-Ovation, frictional force increases and can result in little or no tooth movement.
- The slide of Damon passive self-ligating brackets does not change the lumen size of the bracket slot when closed. In contrast, the clip of active self-ligating brackets can reduce slot depth and the dimension when closed, creating friction when the archwire comes into contact with the slot.

Conclusion

Damon brackets displayed lower frictional force than all other brackets. Passive slide designs such as Damon brackets "might be the most effective with respect to friction."

A comparison of maxillary arch width and molar tipping changes between rapid maxillary expansion and fixed appliance vs. the Damon System

Mikulencak D. Am J Orthod Dentofacial Orthop 2007; 132:562.

Objective To investigate changes in arch width development using the Damon System and whether the amount of molar tipping is comparable with that seen using RPEs.

Methodology Retrospective study involved investigation of 30 patients who underwent maxillary arch development treatment using the Damon System.

Measurements included maxillary intermolar, interpremolars and intercanine widths as well as maxillary molar angulation.

Results

- Clinically and statistically significant changes in arch width dimensions were observed in the molar and premolar areas after treatment.
- No significant changes were observed in the canine area.
- An inverse relationship exists between pretreatment molar arch width and change in molar angulation with the Damon System.
- The findings were compared with previously published RPE studies, and no difference in the amount of molar tipping was found.

Conclusion The Damon System provides comparable arch width development to RPEs with no difference in the amount of molar tipping.

Self-ligating vs. conventional brackets in the treatment of mandibular crowding: A prospective clinical trial of treatment duration and dental effects

Pandis N, Polychronopoulou A, Eliades T. Am J Orthod Dentofacial Orthop 2007; 132(2):208-215.

Objective To investigate the duration of mandibular-crowding alleviation using self-ligation compared with conventional appliances.

Methodology Study involved 54 patients who underwent nonextraction treatment and had eruption of all mandibular teeth, no spaces in the mandibular arch, irregularity index greater than 2 in the mandibular arch, and no therapeutic intervention planned with extraoral or intraoral appliances.

Patients were randomly assigned to two groups: One group received treatment using the Damon System, while the second group was treated using a conventional edgewise appliance with .022 slots.

Measurements included changes in intercanine and intermolar widths.

Results

- The Damon System corrected moderate crowding in patients (irregularity index 5) 2.7 times faster than the conventional brackets.
- The group treated with the Damon System showed a statistically greater intermolar width increase than the conventional group.
- No difference in increased proclination of the mandibular incisors was observed between groups.

Conclusion Treatment using the Damon System results in greater intermolar width than conventional treatment with no difference in the amount of mandibular incisor proclination.

Periodontal effects of rapid maxillary expansion with tooth-tissue-borne and tooth-borne expanders: A computed tomography evaluation

Garib D, Henriques J, Janson G, Freitas M, Fernandes A. Am J Orthod Dentofacial Orthop 2006; 129(6):749-758.

Objective To evaluate periodontal changes using two different types of RPEs.

Methodology Study involved eight female patients ranging from 11 to 14 years old with Class I or Class II malocclusions with unilateral or bilateral posterior crossbites.

Half of the patients were treated with tooth-tissue-borne Haas-type expanders while the remaining patients were treated with tooth-borne Hyrax expanders.

CT images were taken before expansion and after a three-month retention period when the expander was removed.

The high precision of quantitative analyses involving CT images contributes to the reliability of the outcomes and makes the small sample size acceptable.

Results

- Expanders reduced the buccal bone plate thickness of supporting teeth 0.6 to 0.9 mm and increased the lingual bone plate thickness 0.8 to 1.3 mm.
- The increase in lingual bone plate thickness of maxillary posterior teeth was greater in the tooth-borne expansion group than in the tooth-tissue-borne group.
- The expanders induced bone dehiscences on the anchorage teeth's buccal aspect, especially in subjects with thinner buccal bone plates.
- The tooth-borne expander produced greater reduction of first premolar buccal alveolar bone crest level than did the tooth-tissue-borne expander.

Discussion The intense force delivered on the supporting teeth during activation of a rapid palatal expander leads to hyalinization of the periodontal ligament.

First premolars are located in an area that becomes narrower upwards and, when there is bodily buccal movement, the root can perforate the alveolar bone.

A study by Vanarsdall found that 20% of patients treated with RPEs had gingival recession eight to 10 years after expansion, compared with only 6% for patients treated with edgewise appliances only.

Conclusion RPEs reduce buccal bone plate thickness and the buccal alveolar crest level, as well as induce dehiscences on the buccal aspect.

Maxillary incisor torque with conventional and self-ligating brackets: A prospective trial

Pandis N, Strigou S, Eliades T. Orthod Craniofacial Res 9, 2006; 193-198.

Objective To test the hypothesis that the engagement mode of wire to bracket affects the buccolingual inclination of maxillary incisors in extraction and non-extraction treatment with self-ligating and conventional brackets.

Methodology A randomized clinical trial employing a random distribution of variables among the studied populations.

105 private practice patients were divided into two groups based on the inclusion of extraction in the treatment planning. These groups were further divided in two subgroups each, one receiving a self-ligating bracket and the other treated with a conventional edgewise appliance of the same slot size and prescription.

The difference in the buccolingual inclination of maxillary incisors was measured before and after treatment with the two appliances across the two treatment groups, extraction and non-extraction.

Outcome measure – Angular measurements of the Sella-Nasion and Nasion-A point to maxillary incisor axis.

Results

- No difference was found in the mean difference of the two angles measured for the two bracket groups studied.
- No statistically significant effect of extractions or bracket is shown.

Conclusion Self-ligating brackets seem to be equally efficient in delivering torque to maxillary incisors relative to conventional brackets in extraction and non-extraction cases.

Treatment efficiency of conventional vs. self-ligating brackets: Effects of archwire size and material

Turnbull NR, Birnie DJ. Am J Orthod Dentofacial Orthop 2007; 131(3):395-399.

Objective The relative speed of archwire changes was assessed with self-ligating brackets and conventional elastomeric ligation methods as well as in relation to the stage of orthodontic treatment represented by different wire sizes and types.

Methodology The time taken to remove and ligate archwires for 131 consecutive patients treated with either self-ligating or conventional brackets was prospectively assessed.

The study was carried out in the orthodontic department of a district general hospital in the United Kingdom.

The main outcome measure was the time to remove or place elastomeric ligatures or open/close self-ligating brackets for two matched groups of fixed appliance patients: Damon 2 self-ligating brackets and a conventional mini-twin bracket (Orthos™).

The relative effects of various wire sizes and materials on ligation times were investigated.

The study was carried out by one operator experienced in the use of self-ligating and conventional brackets.

Results

- Damon brackets had a significantly shorter mean archwire ligation time for both placing ($P < .001$) and removing ($P < .01$) wires compared with the conventional elastomeric system.
- Ligation of an archwire was approximately twice as quick with the self-ligating system.
- Opening a Damon bracket slide was on average one second faster per bracket than removing an elastic from the mini-twin brackets, and closing a slide was two seconds faster per bracket.
- This difference in ligation time between the Damon and the conventional mini-twin brackets became more marked for larger wire sizes used in later treatment stages.

Conclusion The type of bracket and the size of wire used are statistically significant predictors for speed of ligation and chairside time. The Damon System offered faster and arguably more efficient wire removal and placement for most orthodontic treatment stages.

Periodontal and microbiologic evaluation of two methods of archwire ligation: Ligature wires and elastomeric rings

Sousa R, Magnani M, Nouer D, Silva C, Klein M, Sallum E, Goncalves R. Am J Orthod Dentofacial Orthop 2008; 134(4):506-512.

Objective To assess possible periodontal and microbiologic changes resulting from the use of two methods of orthodontic archwire ligation: elastomeric rings and steel ligatures.

Methodology Plaque index, gingival bleeding index, probing depth, and biofilm samples from the maxillary second premolars and the mandibular lateral incisors were evaluated in 14 subjects without clinical signs of gingival inflammation before treatment and six months into treatment.

Each orthodontic arch was fixed with elastomeric rings on one side of the midline, and steel ligatures were used on the opposite side.

Polymerase chain reaction analysis was used to detect Porphyromonas gingivalis, Tannerella forsythia, Actinobacillus actinomycetemcomitans, Prevotella intermedia, and P nigrescens.

Results

- Elastomeric rings had a higher score for plaque index and bleeding than steel ligatures, as well as many positive sites of T forsythia and P nigrescens ($P < 0.05$).

Conclusion Elastomeric rings were associated with periodontopathogens and adverse gingival conditions.

Case Study: Transverse posterior adaptation with the Damon System

A growing body of scientific evidence demonstrates that orthodontic forces should be just high enough to stimulate tooth movement without cutting off the vascular supply to the periodontal ligament. Effective forces – such as those employed when using the Damon System – enable transverse posterior adaptation to resolve crowding without auxiliary appliances like RPEs and with far less need for extractions.[1]

A study conducted by Mikulencak found that the Damon System provides arch development comparable to that of high-force RPEs with no difference in molar tipping.[2] (pg.2) RPEs can reduce buccal bone plate thickness and the buccal alveolar crest level, as well as induce dehiscences on the buccal aspect.[3] (pg.4) In addition, patients treated with RPEs often experience greater gingival recession[4] as well as significant expansion relapses.[5]

Compared with conventional brackets, the Damon System has been shown to provide greater intermolar width increases in the mandibular arch with no difference in incisor proclination.[6] (pg.5)

The following case demonstrates that the minimally invasive Damon System helps convert anterior crowding into posterior adaptation of bone, muscle and soft tissues. Treatment with the Damon System significantly increased posterior arch width without the use of an RPE, distalizer, headgear or surgery.

Patient: A.H.
Age: 16 years, 5 months
Diagnosis: Class II, bilateral posterior crossbite with severe maxillary anterior crowding
Treatment Time: 22 months, 3 weeks
Clinician: Dr. Dwight Damon

Initial

13 Months

Final

[1] Damon D. Three keys to non-extraction therapy. Ortho Tribune 2006; 1(3).

[2] Mikulencak D. A comparison of maxillary arch width and molar tipping changes between rapid maxillary expansion and fixed appliance vs. the Damon system. Am J Orthod Dentofacial Orthop 2007; 132:562.

[3] Garib DG, Henriques JFC, Janson G, de Freitas MR, Fernandes AY. Periodontal effects of rapid maxillary expansion with tooth-tissue-borne and tooth-borne expanders: A computed tomography evaluation. Am J Orthod Dentofacial Orthop 2006; 129(6):749-758.

[4] Vanarsdall RL Jr. Periodontal/orthodontic interrelationships. In: Graber TM, Vanarsdall RL, editors. Orthodontics: current principle and techniques. 2nd ed. St Louis: Mosby; 1994. p. 712-49.

[5] Ferris T, Alexander RG, Boley J, Buschang PH. Long-term stability of combined rapid palatal expansion-lip bumper therapy followed by full fixed appliances. Am J Orthod Dentofacial Orthop 2005; 128(3):310-325.

[6] Pandis N, Polychronopoulou A, Eliades T. Self-ligating vs. conventional brackets in the treatment of mandibular crowding: A prospective clinical trial of treatment duration and dental effects. Am J Orthod Dentofacial Orthop 2007; 132(2):208-215.

ARCH DEVELOPMENT – EFFICIENCY
QUALITY OF RESULTS – SAFETY

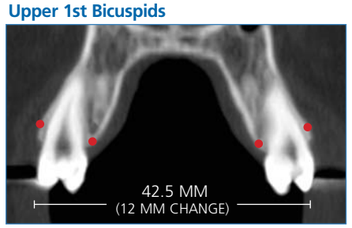
CT Scans

CT scans on hundreds of finished patients like A.H. demonstrate that the Damon System provides lateral arch adaptation while keeping teeth upright and centered in bone. This ability to achieve stable arch development helps minimize the need for invasive procedures like RPEs, tooth extractions and surgery.

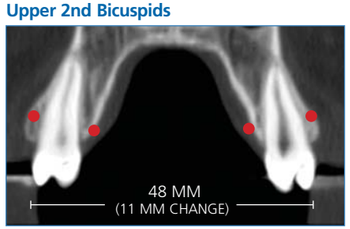
Maxillae

- Presence of bone on buccal and lingual sides of roots.

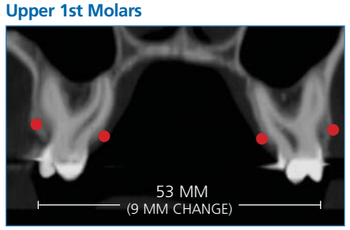
Upper 1st Bicuspids



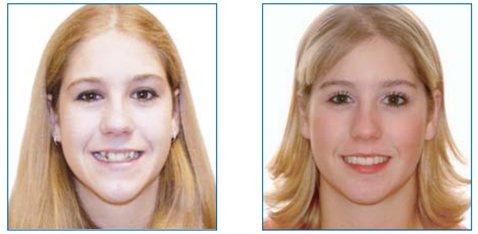
Upper 2nd Bicuspids



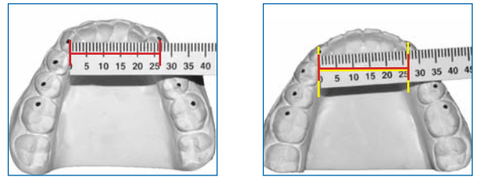
Upper 1st Molars



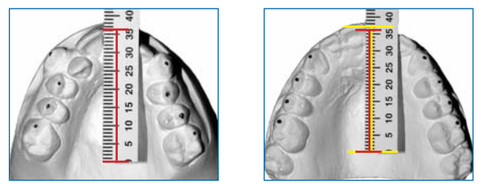
Initial **Final**



Initial inter-molar distance increased from 44 mm to 53 mm, an expansion of 9 mm.



The mandibular inter-cuspid distance was maintained at 27 mm, indicating no tipping to resolve crowding.



The distance from 1st molars to labial of incisors is nearly identical, indicating no molar distalization occurred.

Initial to Final (Composite)

The final position of incisors indicates the anteriors were not flared to resolve crowding.

T.B.
Severe crowding, openbite, posterior crossbite, narrow palate

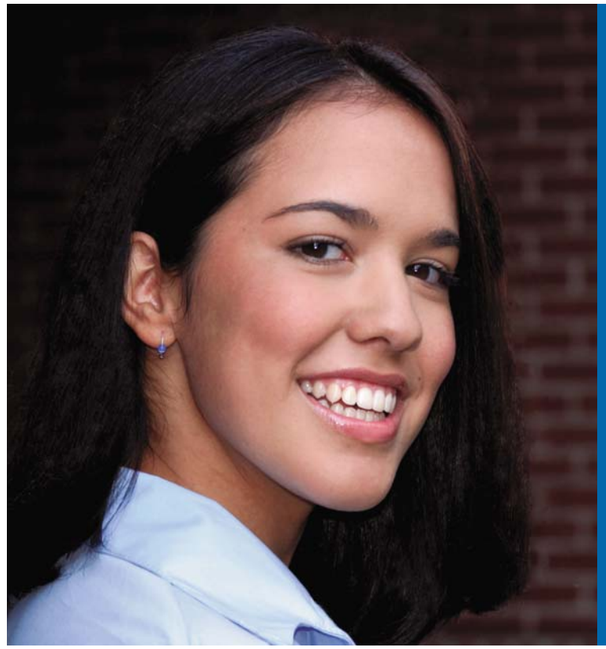
Progress – 6 *Appointments (12 months)*

Final – 8 *Appointments (16 months)*

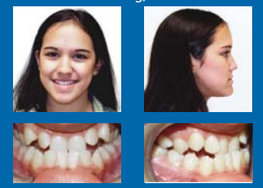
T.B.-M.
Class II Division 2 Nonextraction

Progress – 6 *Appointments (12 months)*

Final – 10 *Appointments (18 months)*



R.J.
Class III Skeletal – moderate crowding, midface deficient



Progress – 6 *Appointments (14 months)*

Final – 12 *Appointments (22 months)*

J.F.
Class I – Severe crowding, high cuspids, crossbite, nonextraction

Progress – 12 *Appointments (22 months)*

image to come | image to come

Final – 8 *Appointments (16 months)*