CHAPTER 4

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# The Damon System - Simplified Mechanics

Low friction means more than just a passively ligated bracket, it's a whole philosophy that embraces mechanics, forces, biology and the high-tech materials to aid in accomplishing superior results.

To achieve consistently high standards, the fundamentals of a low friction system have to be fully understood. This is something we all struggle with in the early stages of using a passively ligated system, but if the Damon System philosophy is followed from the outset; these superior more efficiently treated cases can be obtained by all orthodontists.

I came from an .018 system before I switched to The Damon System, primarily because I have always been an advocate of lighter forces. My thought being that forces delivered through a small slot would be lower than those delivered through a larger one. This indeed is not the case, and proved to be a great learning experience when I proceeded to test this phenomenon. I decided to perform a tightly controlled, split mouth study on randomly selected, yet similar cases, using The Damon System on one side of the arch and conventional .018 on the other.

The results were indisputably in favour of the Damon System, by the fact that the Damon side moved teeth twice as fast as the conventional side.

This is due to two main factors; 1 - reduced friction by the removal of an elastic or stainless steel tied ligature, 2 – the increased wire-to-lumen ratio that reduces the binding and friction between the bracket and the wire. These factors enable more efficient levelling and aligning during the early stages of treatment and more efficient sliding mechanics during the later stages. It must also be noted that even torquing and rotational tooth movements occur more rapidly when the low friction, passive Damon System is utilized.

My treatment planning has been greatly impacted by the use of The Damon System, and it is something for all clinicians to be aware of. The low forces allow the Damon archwires, together with the passively ligated brackets, to work more in harmony with the patient's individual biology. This has the effect of providing posterior transverse arch development without the use of expanders. Space is created but in a way that is more "biologically friendly" and the arch form is not pre-determined by an orthodontist or archwire form. This, in my view, must be a more stable way in treating cases, and this has been reflected within my practice. I have also seen a dramatic reduction in the need for extractions, which is a definite plus for my referring practitioners, but more importantly I, along with a vast number of other Damon users, see such a positive effect on the patient's midface. The smiles are broader, the midfaces are fuller and aesthetics are exponentially improved. If, however, extractions will help the profile of the patient, such as bimaxillary protrusive cases, tooth size discrepancies or missing teeth, then I will extract. Facial aesthetics is the primary determining factor.

Anchorage is always a great concern with conventional appliances, but when the Damon System and the protocol is followed, this is not an issue to consider. The anchorage demands of the Damon System is far lower than conventional systems due to the considerably reduced friction offered by the passive lumen all Damon brackets possess. I have virtually abandoned the use of transpalatal arches and Nance holding arches within my practice, I find them now more of a hindrance. If the molars are bound together by these appliances, then the posterior arch development I want to achieve with the Damon System is prevented and other means of gaining space have to be considered.

I have found by using The Damon System and simplifying my mechanics, I can now breakdown my treatments into three main phases of treatment –

Phase I - Levelling and aligning

Arch development is initiated by the use of .014 Damon Copper NiTi or .013 Damon Copper NiTi if severe rotations or periodontal issues are present. The aim of this phase is to resolve 90% of the rotations which should be accomplished in 10-20 weeks. As I routinely have 10 weeks between appointments during this stage, this equates to 1 or 2 visits. It is essential that archwire stops are used to prevent wire sliding distally from the buccal tubes, always place these anterior to crowding.

Phase II - High tech edgewise

Leveling and aligning is completed and all remaining rotations are resolved. Torque control is initiated together with anterior space consolidation. Arch development is still progressing.

The wires generally utilized are 14x25 then 18x25 Damon Copper NiTi. If a deep bite division 2 cases a 17x25 or 19x25 Damon reverse curve NiTi is also a good option.

A panorex is very often taken so I can see if any brackets need to be repositioned. The duration of this phase is usually from 10-20 weeks, but now I have 8 weeks in between appointments.

Only move onto the next phase when a stainless steel wire can be inserted passively.

Phase III - Major mechanics and finishing

Torque control is completed and all posterior space is consolidated by using tie backs which also prevent posterior space from re-opening.

This is the time to fully coordinate the upper and lower archforms by copying the lower archform already present and making the upper archwire 1-2 mm larger all around the arch. If slightly more arch width is required, for example in some cross-bite cases, then the archwire may be expanded slightly at this point. Our testing has shown that by using this technique, the forces are still kept to a very low level. The duration of this phase is anything from 20-40 weeks with 6 week appointment intervals for the major mechanics and 4 week intervals for the finishing. This enables maximum time management in your practice and to treat patients in the shortest duration possible. I often find that 80% of my cases are 80% complete in 8 months, giving me the time to finish to a high standard without excessively prolonging the treatment.

I would like to highlight some of the key benefits of the Damon System's low force, low friction mechanics by sharing with you two cases that I would have definitely resorted to extraction and perhaps surgery, if I had been using my conventionally ligated bracket system.

## CASE REPORT

### 1. TM

Age: 17 years

Clinical Observations: Severe crowding, active periodontal breakdown, flat profile, poor oral hygiene, Class I, small maxillary lateral incisors, midline deviation and something else to consider, a large nose.

Patient's chief complaints: crowded teeth, does not want extractions (family members had extraction treatment and did not look as good as before treatment had started!)

Treatment plan: Start non-extraction, if periodontal condition worsens extract OR discontinue treatment.

Initial Bonding Case 1 - 8/21/02

As for 80% of my cases, the initial wire utilized is a Damon .014 Copper NiTi. This archwire delivers the optimum force levels and allows the ideal wire-to-lumen ratio to produce minimum binding. What is also interesting about this wire is the surface finish considerably smoother than the majority of NiTi wires, to further reduce the friction and therefore the force levels.

Archwire stops have been placed between the lower central incisors and the upper canine and 1st bicuspid. This allows the maximum range of movement for the archwire without impeding tooth movement or causing excessive wire pokes.

5 Months (3rd visit)

Dramatically improved periodontal situation and the expected levelling and alignment after the .014 wire. 16x25 Damon Copper NiTi placed in the upper, 14x25 in the lower. The difference between upper and lower wire dimensions reflects the decreased inter-bracket distance that is present in the lower arch. This causes the relative stiffness of the wire to be increased in the lower, thus producing increased force levels which is something we strive to avoid.

The lateral development can be seen, especially in the bicuspid region. This has allowed the crowding to be relieved BUT the anterior teeth have not dramatically flared. The light forces of the wire have allowed the muscle pressure of the cheeks, tongue and lips, to balance their position.

8 1/2 Months (4th visit)

Upper 19x25 posted stainless steel, lower 16x25 posted steel. If all torques in the lower seem correct, there is no need to select a 19x25 stainless steel wire, I often finish with 16x25 in the lower, again keeping the forces as low as possible.

Midline improving and vertical dimension is ideal. The periodontal tissue again seems much improved from the pre-treatment photos.

10 Months (5th visit)

Maintain 19x25 and 16x25 posted stainless steel wires. Midline now coincidental and the planning of post treatment cosmetic bonding of upper lateral incisors begins.

12 Months (6th visit)

Debonding. Good periodontal situation and vertical relation

### 2. CF

Age: 18 years

Clinical Observations: Class III anterior open bite, bilateral cross bite, negative overjet, severe crowding present in the upper, mild in the lower, low tongue position

Patients chief complaints: Strong lower jaw, cannot bite into food (open bite), he has been told that he requires surgery, very much against the idea. Leaving the area in 20 months.

Treatment plan: Follow the Damon protocol, motivate patient the essential need for elastic wear, which will also help to disarticulate the bite. Consider surgery if unsuccessful.

Initial Bonding Case 2 – 11/02/03

Again to use the optimal tooth moving forces, .014 Damon Copper NiTi was utilized. I started running light cross-bite elastics on the left side (A). I have found by disarticulating in cross-bite cases, primarily using a Gelb appliance, or in this case letting the cross-elastics do the bite propping, I can correct cross-bites faster and more efficiently. To ensure the lower molars would not super erupt during initial levelling, the archwire was not engaged into these brackets.

2 1/2 Months

First visit back. The left cross-bite has been corrected. It is worth noting the maxillary left first bicuspid has super erupted, this is due to the gingival position of the bracket. The upper crowding has started to work out nicely and the maxillary arch development can be seen. All molars now engaged and cross elastics started on the right as well

5 Months (3rd visit)

Cross-bite corrected but still a strong Class III remains. Class III elastics are now started, together with anterior box elastics. The low force mechanics are providing the ideal conduit to allow treatment to proceed with minimal intervention.

14 Months

Class III and cross-bite is now corrected. Damon tie-back modules are now placed and posterior box elastics are now started. Also at this visit the maxillary bicuspids are now repositioned.

17 Months

The bite continues to improve. Box elastic wear is maintained. Note the better position of the upper left first bicuspid.

20 Months

Completion of treatment.

# Case report 1

## Initial Photos








## During the treatment








# Case report 1

## During the treatment





## Final Photos








# Case report 2

## Initial Photos






# Case report 2

During the treatment



























# Case report 2

## Final Photos