DR. JORGE CHIRINOS HAS A MARBLE TIP-EDGE BRACKET SET IN THE FLOOR OF HIS ORTHODONTIC SCHOOL IN MEXICO CITY, MEXICO.

TIP-EDGE TODAY®

Published Quarterly In The USA

DR. & MRS. R. PARKHOUSE, NORTH WALES, AND THEIR WINNING BOAT "SIDE-WINDER" WHICH REPORTEDLY UPRIGHTS QUICKLY FROM ANY DEGREE OF TIP.

WINTER 1997-98

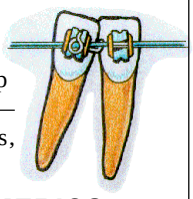
EDGELINES

TORQUING MOMENT INCREASES WITH SIDE-WINDER ACTION

M=FD>M=Fd

Analysis of the biomechanics of torque with Side-Winder springs indicates the moment increases directly with the distance between couples, Cover Story.

SWITCH BRACKETS TO CAPTURE TORQUE WITHOUT OVERTIP



Solution to mandibular lateral incisors that overtip during torquing—See Q's & A's, Page 2.

TP ELASTOMERICS WIN IN THE STRETCH

Study shows that TP thermoset elastomerics finish first, Page 4.

TIP-EDGE GRAPHIC

Since the last poll in the Spring of 1995, the use of Tip-Edge Brackets has grown most rapidly in North and South America. Sales around the world have increased 50% and are growing at 15-20% per year.

COVER STORY

Tip-Edge Torque – A Torque Out of the Ordinary

By Prof. Dr. Charles J. Bolender, Sarreguemines, France

According to Strang, the danger of torque lies not in the force itself but in the ignorance of the one who uses it.

Whichever orthodontic technique one chooses, the coronal inclination of the incisors, as described by Andrews,[1] is of major importance for an everlasting harmonious and stable occlusion. Any practitioner is therefore compelled to torque the incisors to achieve that axial orientation.

C.J. Bolender

However, the orthodontic forces necessary to achieve torque have often been considered too powerful to allow, at the very beginning of the procedure, the use of rectangular archwires filling entirely the bracket apertures. In the edgewise technique that stage generally starts with undersized wire that is progressively gaining power through an increase in cross section in order to reduce the clearance existing between the wire and the slot aperture.

Many authors have worked on that "clearance" and Andreasen[2] has thus established that for a .016″ x .016″ archwire inserted in a .022″ x .028″ slot, the "play" permits 31.5 degrees of rotation, whereas if the same wire were inserted in an .018″ x .025″ slot, the "play" drops to 8 degrees.

Once Sebanc et al.[3] had drawn attention to the fact that no orthodontic wire is of perfect rectangular section, due to the manufacturing process starting from round wire flattened between two rollers placed at a right angle, Meling et al.[4] proposed a formula for the calculation of the clearance existing between the archwire with rounded edges and the bracket slot.

Because of that roundness of the edges, the torque effect is much inferior to the one expected by the practitioner when taking into account the section of the wire.

Biomechanics of Torque

As far as biomechanics are concerned, Isaacson et al.[5] have shown for their part that a rectangular archwire inserted in a bracket slot generates a pair of equal and opposite forces called a couple, Figure 1A. That couple tends to provoke a moment expressed by the formula: M=Fd, F being the orthodontic force and d the distance separating the two points where that force is applied.

Using the Tip-Edge technique, we enter, as far as torquing is concerned, into a new era, Figure 1B. The distance between contacts between the archwires and the slot increases to D.

Please see COVER STORY next page

Figure 1A & B. **A)** In third order edgewise mechanics, a rectangular archwire inserted in a bracket slot creates a pair of parallel forces, equal and opposed, called couple. The moment M thus generated will be measured by the product of one of the forces F times the distance separating them, d. **B)** With the Tip-Edge technique the decrease of the vertical dimension of the bracket slot during stage three leads to a better setting of a rectangular archwire in the slot. The two points of contact between wire and bracket become more distant, increasing d which becomes D. The moment M increases in the same proportions.

COVER STORY

Tip-Edge Torque . . .

Continued from page 1

Therefore, the moment M increases as well.

Actually, according to the mesiodistal tipping of Tip-Edge brackets, a different vertical dimension within the archwire slots will be presented to the archwire. Therefore, between the beginning of treatment and the end of stage one, that vertical dimension will constantly increase to as much as .028″, Figure 2. That distinctive feature is due to the fact that the beveling of the slot not being symmetric, the upper and lower crests of the slot are not directly facing each other.

During the third and last stage of treatment, the axial uprighting operated under the effect of Side-Winder springs will, on the contrary, progressively reduce the vertical dimension of the bracket slot.

Thus, without any particular intervention from the practitioner, the rectangular archwire of .0215″ x .028″, even with rounded edges, will, because of the axial uprighting, progressively fill the bracket slot and

Continued on page 3

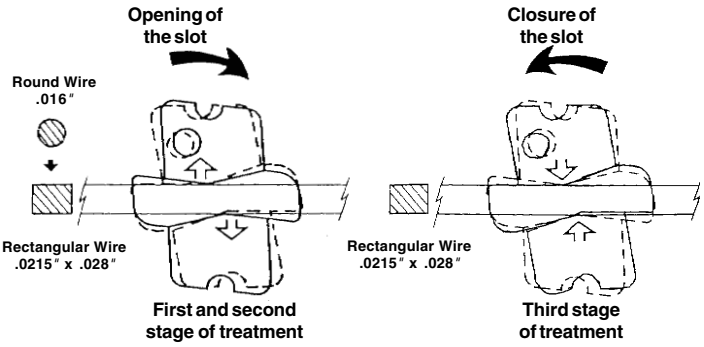


Figure 2. During stages one and two of the treatment, the vertical dimension of the bracket slot will increase progressively with the tipping of the tooth. During stage three, on the contrary, that same vertical dimension will decrease with the axial uprighting of the tooth.

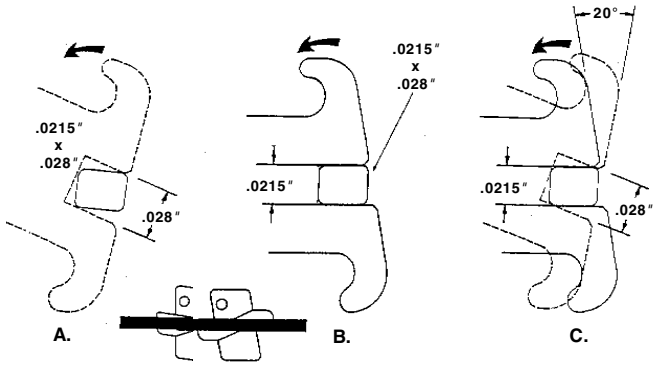


Figure 3A-C. **A)** When, at the end of stage two treatment, the practitioner wants to engage a rectangular wire of .0215″ x .028″ into the bracket slots, the operation has been made quite easy because of the opening of the slot due to the tipping of the teeth. **B)** With progressive axial uprighting of the teeth, under the effect of the appropriate springs, the slot clearance has been reduced and the resulting decrease of the clearance between archwire and bracket has induced a noticeable increase of the moment of the torque. **C)** Composite image of a and b.

Q's and A's

Q. *As far as mechanics, does the Tip-Edge bracket qualify as a "Retraction Mechanics" appliance? If it does, is this a negative feature?*

Sacramento, CALIFORNIA

A. The design of the Tip-Edge archwire slot definitely favors the retraction of teeth. This, of course, is because the teeth are free to tip distally. In this regard, I would imagine that would qualify as "retraction mechanics." This, of course, is not a negative feature because it permits rapid retraction under light forces for space closure and/or the correction of Class II or III interarch discrepancies as needed.

Q. *When using a .0215" x .028" rectangular archwire and Side-Winder springs to torque the roots of mandibular lateral incisors the teeth become overtipped. The brackets are bonded correctly. What is the problem and what can I do to avoid it?*

Hilton Head, SOUTH CAROLINA

A. The problem is caused by the 5 degree tip built into the archwire slots of mandibular lateral Tip-Edge brackets and the fact that the rectangular wire is .0215″ thick, not .022″. This permits the lateral incisors to overtip before the torque built into the bases of their brackets is fully expressed.

The solution is to bond mandibular *central* incisor Tip-Edge brackets on lateral incisors whenever edgewise wires are going to be used in stage three. The .0005″ play between the edgewise wire and the slot will result in approximately 5 degrees of mesial crown tip to spread the lateral incisor roots as desired.

If round archwires (full size .022″) are used in lateral brackets, this over-uprighting will not occur and torque can be achieved with an Individual Root Torquing (I.R.T.) auxiliary.

Q. *In the second stage the brackets on the bicuspids are more occlusal than the level of the molar tubes. How do you get the bicuspids in line with the molar tubes so you don't have to put a step down in the wire?*

North Royalton, OHIO

A. Premolar brackets should be placed so that the archwire slots are in line (level) with the occlusal, rectangular tubes on the first molars. Assuming the molar bands are not seated too far gingivally, the problem must be that the brackets are bonded too far occlusally on the premolars. Of course, once in a while it is necessary to make slight first order bends in the archwires between the molars and premolars to adjust for bonding or banding discrepancies. If such bends are not made, the teeth will be moved to different levels—usually the premolars will be depressed.

Q. *How can I achieve lingual root torque of the mandibular anteriors without the use of Deep Groove Tip-Edge brackets?*

Washington, DC

A. If you wish to torque the roots of the four mandibular incisors, a full size, .0215″ x .028″ rectangular archwire would be your best choice. If the incisors presently have lingual ***crown*** inclinations, the use of a flat archwire (no third order adjustment) in conjunction with Side-Winder springs would tend to torque the roots lingually until the teeth are in more upright positions.

If the teeth are currently upright, a pretorqued (5 degrees or 8 degrees) archwire could be used and the torque captured through the use of Side-Winder springs. Of course, if only one or two incisors require torque, you may wish to consider the use of Individual Root Torquing auxiliaries in conjunction with a .022″ round archwire.

TIP-EDGE TORQUE . . . *Continued from page 2*

increase its torquing moment as the distance d increases.

As Parkhouse[6] pointed out so rightly, Side-Winders, by indirectly reducing the vertical dimension of the bracket slot, will change themselves into torquing springs and impulse their force in the torque direction, as their uprighting action is achieved, Figure 3.

But what seems nevertheless most important, is that that action, because of the rigidity of the archwire used in the Differential Straight-Arch® Technique, has no secondary effect on proximal teeth. This is contrary to torque effects that can be observed in the conventional edgewise technique. This has been well demonstrated by Isaacson et al.[5], where the torque moments of a central incisor and that of a first premolar are active in a classic edgewise appliance, Figure 4. The opposite moments exerted by the wire on the mesial and distal sides on the lateral incisor and canine cancel each other.

This is fortunately not the case with the Tip-Edge technique, in which we enter into the era of progressive torque. This is achieved not by successively replacing rectangular archwires with larger and larger dimensions, but by a dynamic diminution of the vertical dimension of the slot, which increases progressively the torquing moment exerted by the archwire. This procedure has the advantage, not only to induce a torquing action on all teeth uprighted with a Side-Winder, but the action is not accompanied by any unwanted side effects whatsoever.

Effects of a progressive radiculolingual torque of an edgewise archwire placed in conventional edgewise slots in brackets on the teeth of the anterior sector in a, b and c.

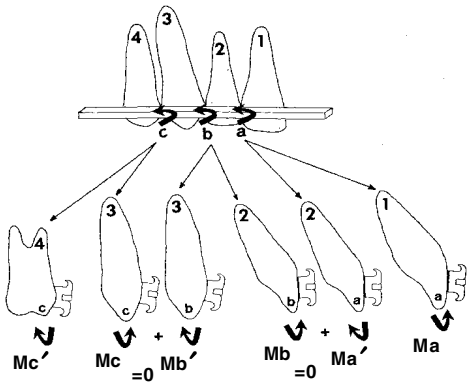


Figure 4. As moment Mb cancels moment Ma′ and moment Mc cancels moment Mb′, only moments Ma, radiculolingual on 11 and Mc′ on 14 will have the possibility to express themselves. These moments will be equal, opposed and reciprocal.

References

1. Andrews LF. Straight-wire. The concept and appliance. San Diego: LA Wells Co., 1989.

2. Andreasen GF. Comparison of freedom of tooth movement existing between three variables. Am J Orthod 1967;53:672-84.

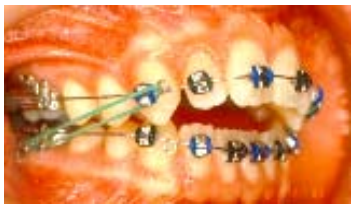
3. Sebanc J, Brantley WA, Pincsak JJ, Conover JP. Variability of effective root torque as a function of bevel on orthodontic archwires. Am J Orthod 1984; 88:43-51.

4. Meling T, Odfgaard J, Meling E. A theoretical evaluation of the influence of variation in bracket slot height and wire rounding on the amount of torsional play between bracket and wire. Kieferorthop Mitteil 1993; 7:41-8.

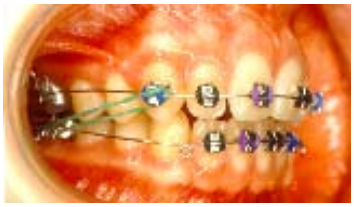
5. Isaacson RJ, Lindauer SJ, Rubenstein LK. Moments with the edgewise appliance: incisor torque control. Am J Orthod Dentofac Orthop 1993; 103:428-38.

CASE REPORT

The patient, a 14 year old female, presented a Class II, Division 1 malocclusion characterized by an anterior openbite and a history of thumb sucking and tongue thrusting. As a result, the maxillary incisors were intruded. Since there was no mandibular arch length discrepancy and the $\underline{1}$ A-Po was -1 mm, a nonextraction treatment plan including extrusion of the maxillary incisors was chosen.

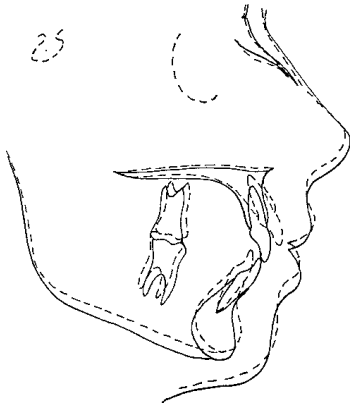


Initial .016″ Australian archwires with molar stops to prevent premolar crowding. Minimal anchor bends and 6 oz. Class II elastics for Class II correction and bite closure.



After 4 months the bite had closed. Bracket removed from mandibular canine to allow maxillary canine to pass by into Class I. Class II mechanics continued.

After bracketing and leveling premolars, a .0215″ x .028″ maxillary archwire was placed. Side-Winder springs provide uprighting and torquing power. A .022″ archwire was used in the mandibular arch.



C.C. ..... Female, 14 Years
Class II, Division 1
Nonextraction
Archwires Used 7 (3U, 4L)
Adjustments ..... 15, **Time:** 20 Months
Retention ..... Upper Retainer

Cephalometric Changes:

	Start-Dotted	Finish-Solid
$\underline{1}$ **A-Po**	-1.0 mm	+3.0 mm
Wits	+3.5 mm	.0 mm
SN-MP	30.0°	31.0°
SNA	87.0°	85.0°
SNB	79.0°	78.0°
ANB	8.0°	7.0°
$\underline{1}$**-SN**	104.5°	90.0°

Postgraduate Training at K.L.E.S. Institute Leads To Indian Tip-Edge Society

Orthodontic faculty members of the K.L.E.S. Institute of Dental Sciences, Belgaum, Karnataka University, India. Prof. S. B. Shetye, head of the department, front row center.

K.L.E.S. Institute of Dental Sciences, Belgaum, India has the honor of being the first postgraduate curriculum in India to teach Tip-Edge. Head of the Orthodontic Department, Prof. S. B. Shetye started teaching the technique in 1992.

Initially the postgraduate students get a formal typodont training with theory and practice. During the 2-1/2 years of the clinical course, students are able to start and finish many Tip-Edge cases.

Because of their fascination with Tip-Edge brackets and the Differential Straight-Arch Technique, the postgraduate students have formed an "Indian Tip-Edge Society" under the able guidance of Dr. S. B. Shetye. The noble vision is to share their knowledge and experience with Tip-Edge to their colleagues all over the country.

Gent Goes Tip-Edge

The orthodontic department of the University of Gent, Belgium has elected to teach Tip-Edge as their primary fixed appliance technique. Faculty members plan to receive additional training from Dr. R. Parkhouse at Glan Clwyd Hospital in Wales.

TP Elastomerics Pull To A First Place Finish

A recent article in the prestigious journal, SEMINARS IN ORTHODONTICS,* confirms the effectiveness of TP's E-Chains—and E-Links®.

The authors tested elastomeric chains from six leading orthodontic companies. They measured several important parameters, i.e. initial force delivered, residual force at various time intervals up to 28 days and percentage of starting force delivered up to 28 days. Their findings included:

1. TP's E-Chain delivered the highest force initially over all other chains, 280 g. force.
2. After 28 days of soak/stretch testing, TP's E-Chain still delivered 240 g. force. In comparison, other companies delivered less—one only 100 grams.

These results are significant especially for those orthodontists using the Differential Straight-Arch Technique and seeing their patients once every six weeks. TP's E-Links are made of the same thermoset elastomeric as their E-Chains and can be expected to deliver relatively similar initial and residual force values. This relates to shorter stage twos and, therefore, reduced overall treatment times.

Editor's Note:

Thermoset elastomerics of the type tested are only available in gray or clear.

*Josell SD, JB Leiss, Rekow ED. Force degradation in elastomeric chains. Sem in Orthod 1997;3:189-97.

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