SELF-LIGATION(SL) ORTHODONTIC

BRACKET

Prescription

- Andrews
- Roth

Ligation

- Conventional
- Self ligation

Material

- Metal (SS)
- Plastic
- Ceramic

Self Ligation

- Active
- Passive

Slot

- 18X22
- 22X25

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INTRODUCTION TO SLB : FRICTIONLESS TECHNIQUE

EVOLUTION OF BRACKET

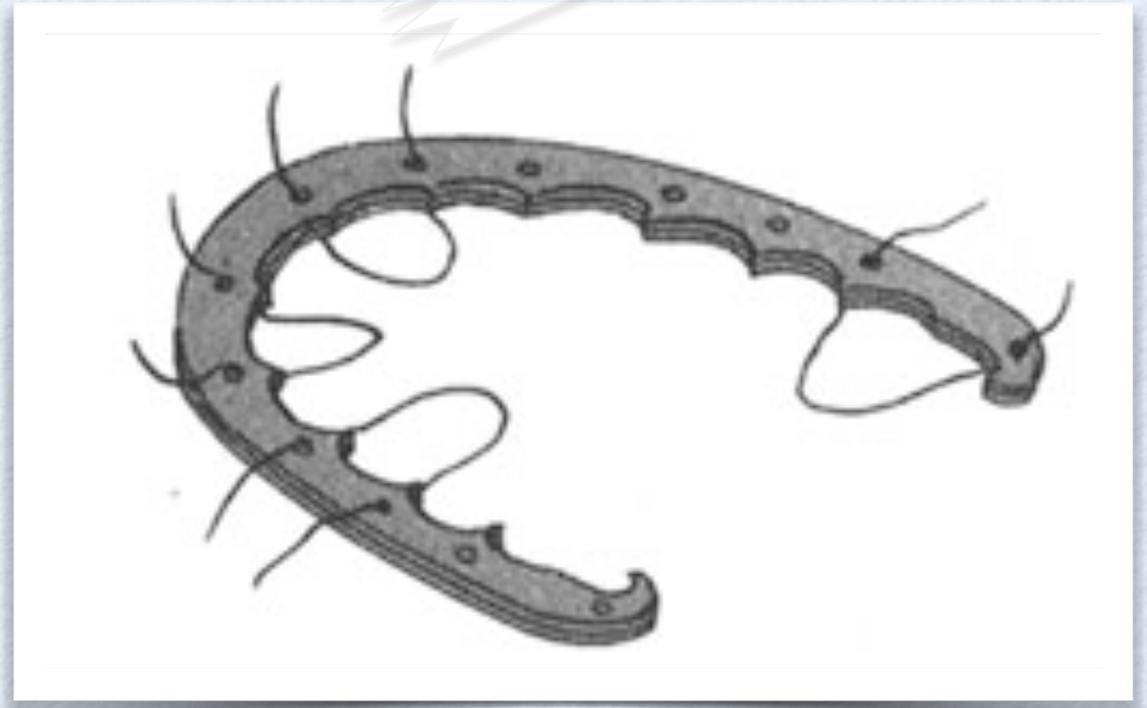
Bracket Design

+

Ligation Type

LIGATION EVOLUTION

EARLY LIGATURES

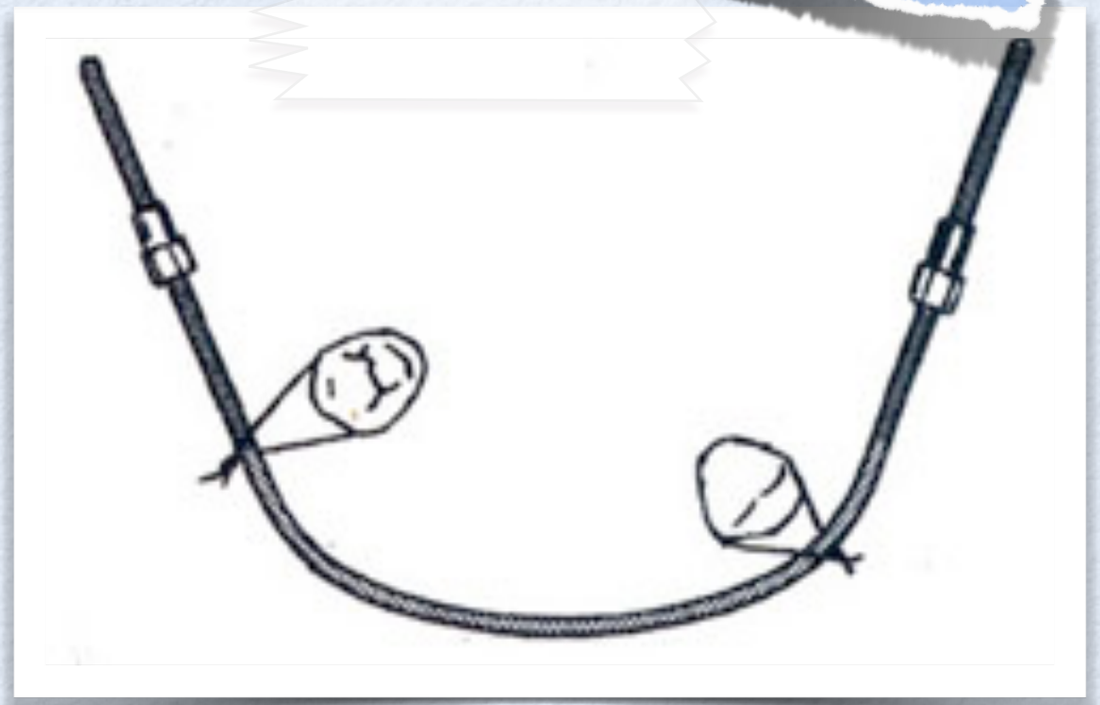


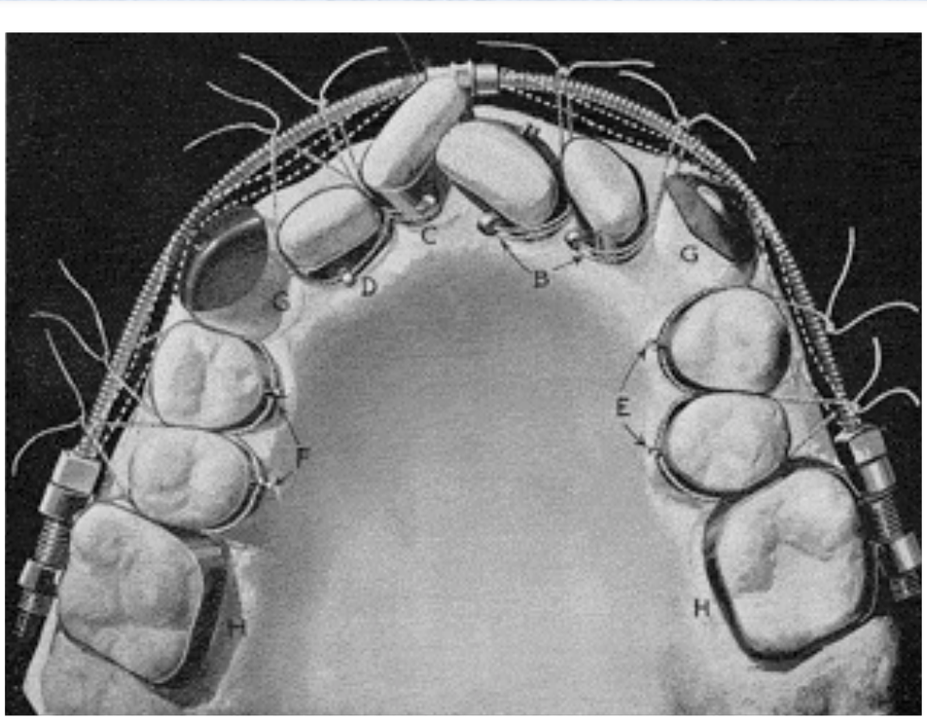
Fauchard's expansion arch.

LIGATION EVOLUTION

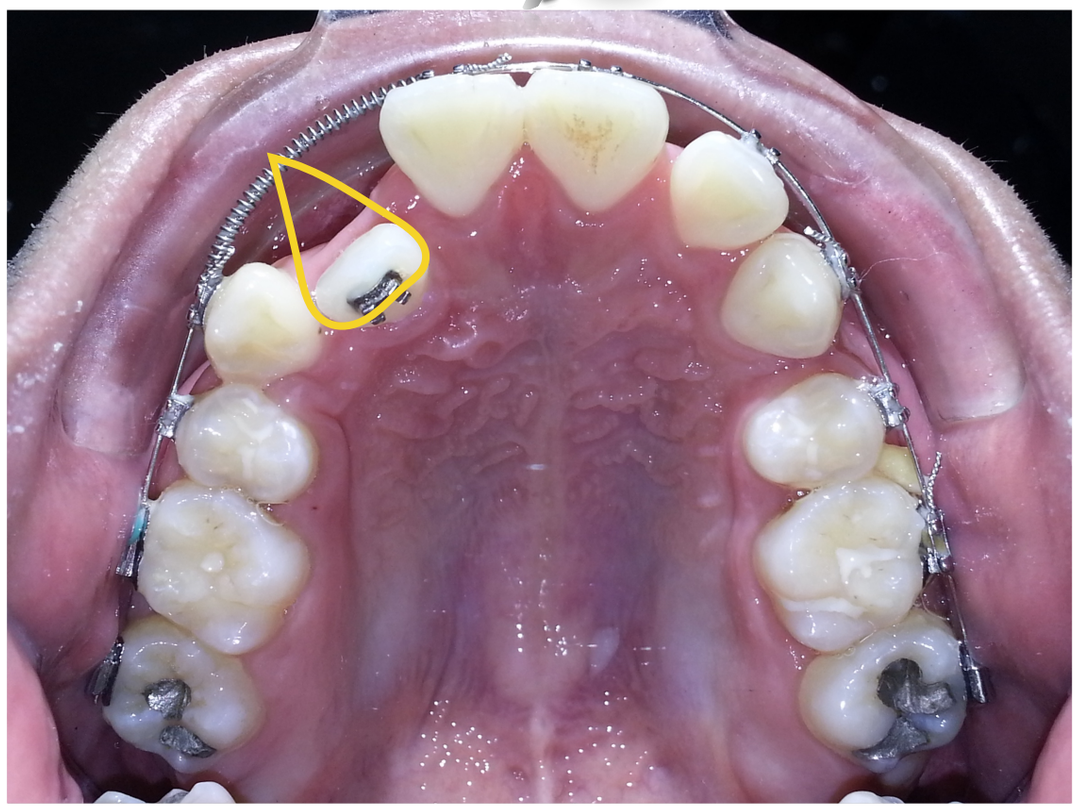
SILK

Angle's E Arch 1887



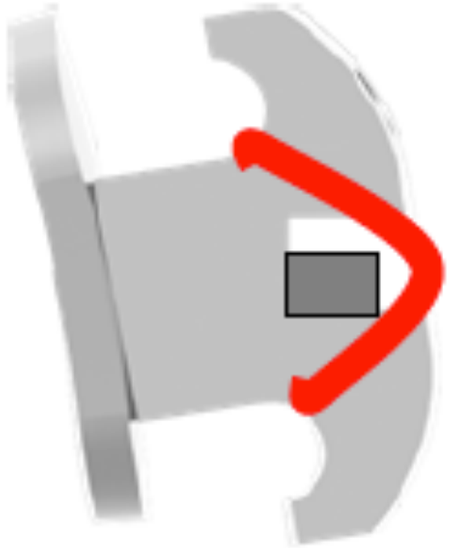


LIGATION EVOLUTION



LIGATION EVOLUTION

STAINLESS STEEL LIGATURES



Ligature secures archwire in bracket slot

Advantages

-cheap
-robust
-free from corrosion
-applied tightly or loosely to the arch wire (Strength &Friction).
-good oral hygiene

STAINLESS STEEL LIGATURES

Disadvantage

- Take time place and remove the ligatures.
- Soft tissue laceration and infection from the cut end of ligature ties

LIGATION EVOLUTION

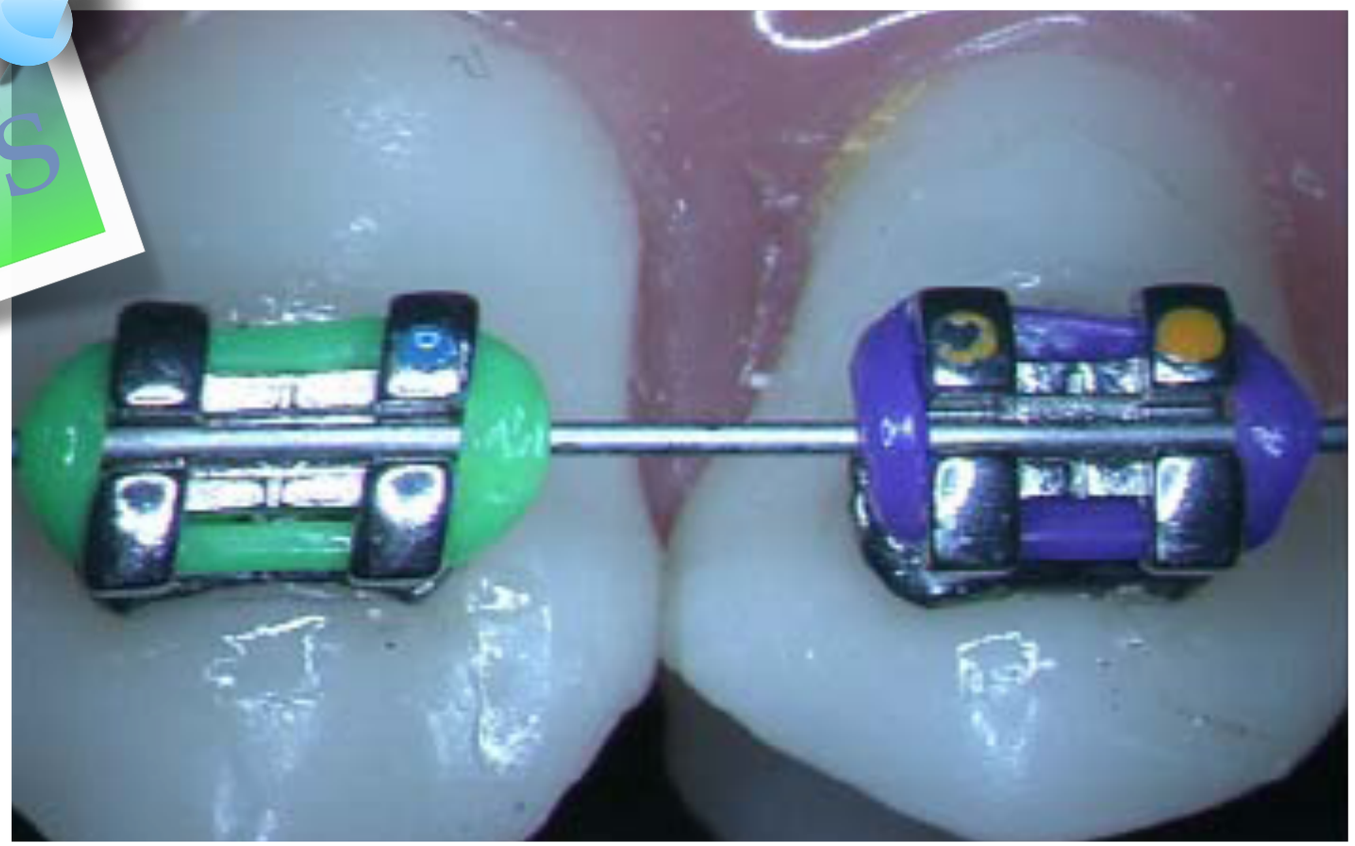
กุลิสรา จินดาสวัสดิ์ 58-2251

STAINLESS STEEL LIGATURES

ELASTOMERIC LIGATURES

1960s

Advantages



The ease of use and speed of placement
Its colourful of O-ring make treatment desirable

ELASTOMERIC LIGATURES

Disadvantage

the substantial degradation

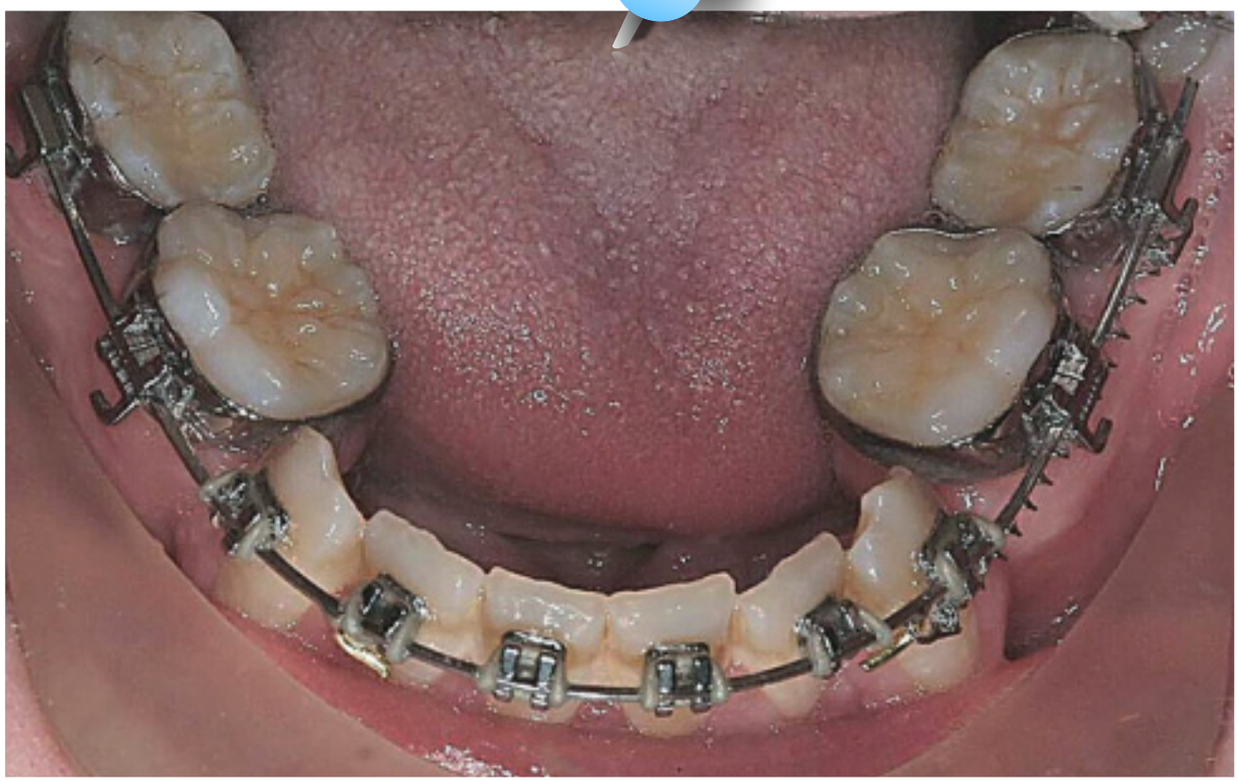
Unreliable arch-wire control

Figure of 8 O-ring

High friction compares to wire ligation,SL

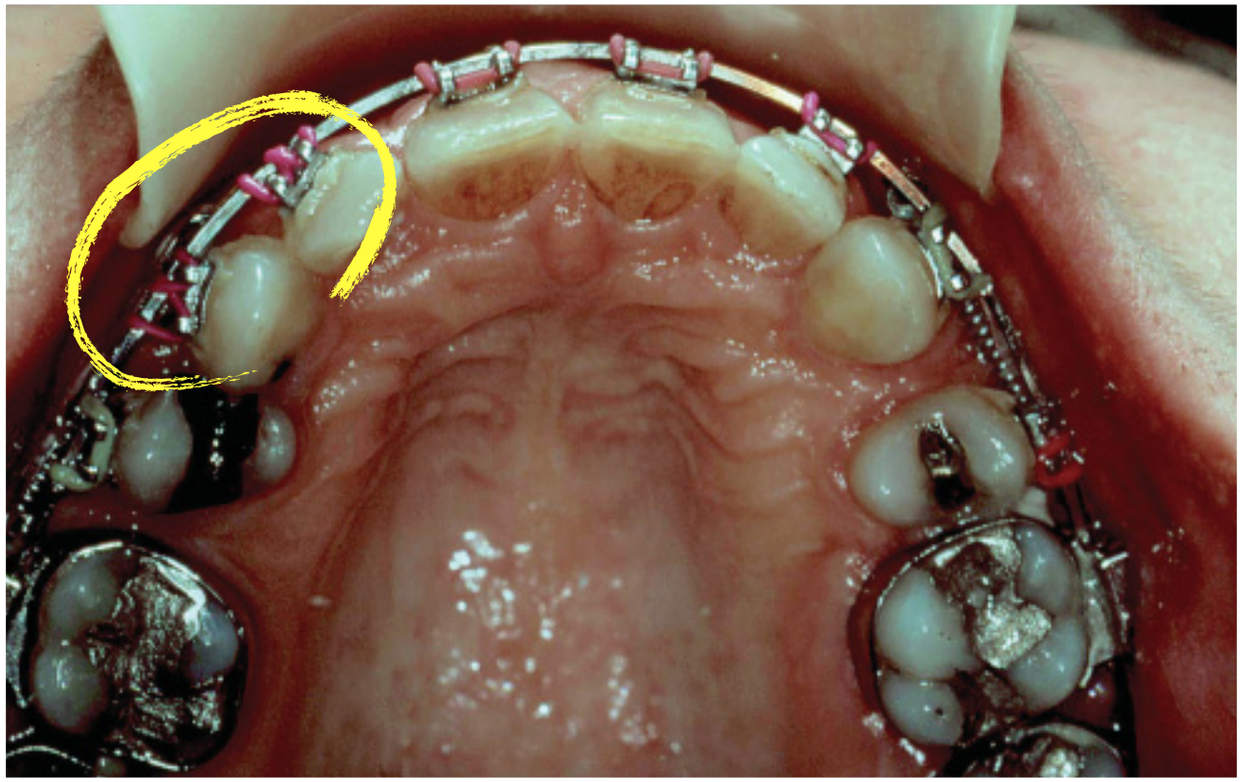
oral hygiene challenge

ELASTOMERIC LIGATURES



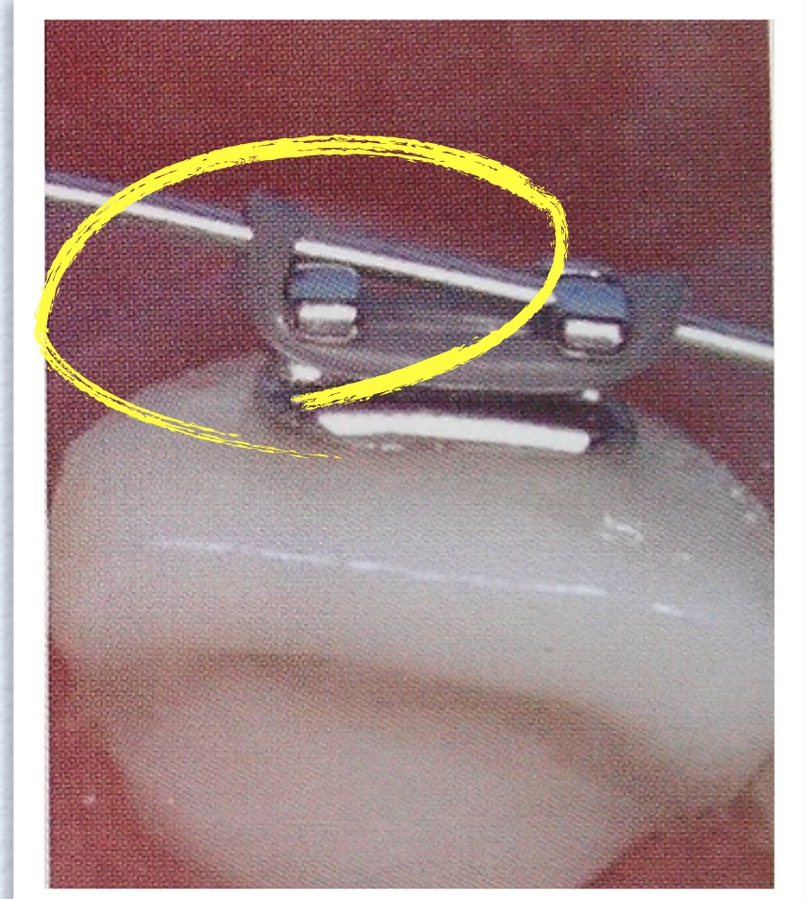
Conventional elastomeric ligatures failing to maintain full bracket engagement on three of the six ligated teeth.

ELASTOMERIC LIGATURES



UNRELIABLE ARCH WIRE CONTROL

LOSS OF ROTATIONAL CONTROL BY ELASTOMERIC



LIGATION & FRICTION

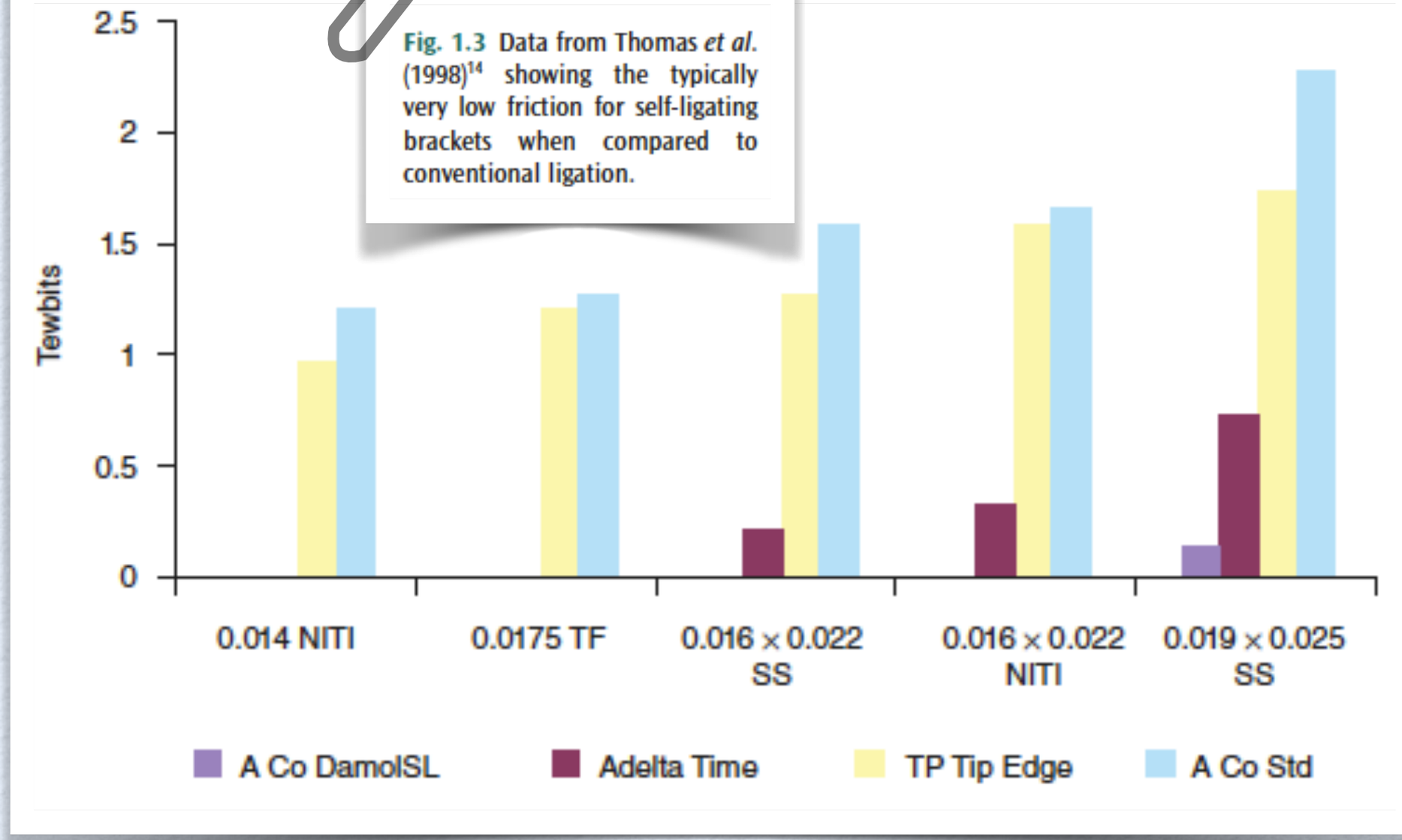
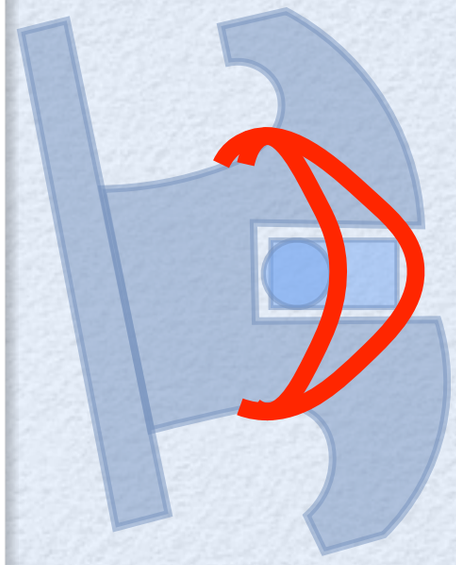
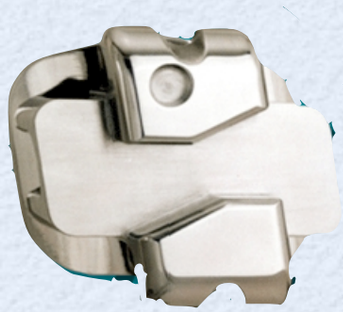


Fig. 1.3 Data from Thomas *et al.* (1998)[14] showing the typically very low friction for self-ligating brackets when compared to conventional ligation.





FRICTION

SmartClip™ Bracket

0g

Friction

In-Ovation™ C Bracket

55g

Friction

Victory Series™ Bracket w/ Module

145g

Friction

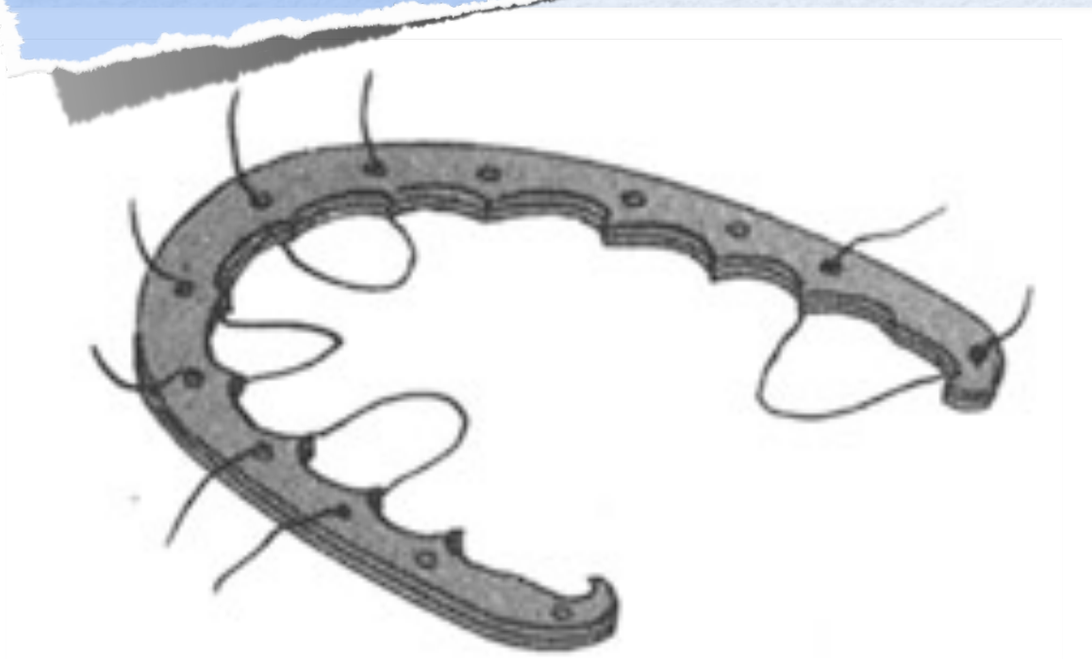
LIGATION COMPARISON

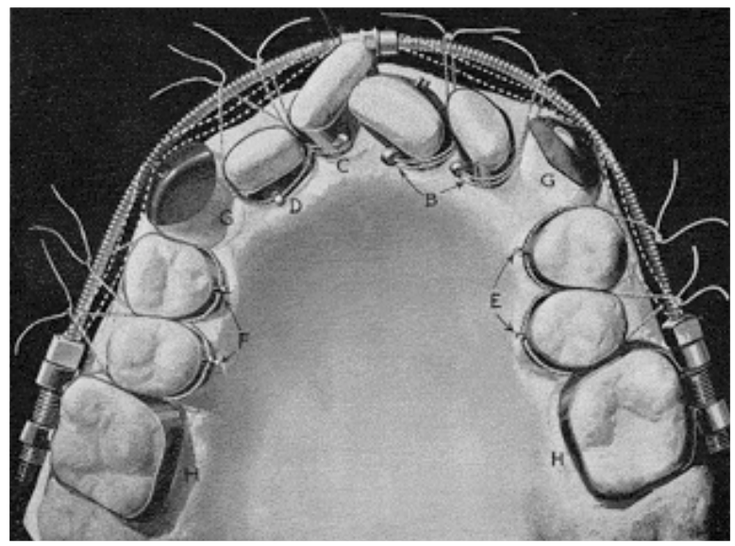
	Ligature wire	Elastomeric	self ligation
Hygiene	Good	Bad	Good
Time	Slow	Quick	Quick
Engagement	Good	Not as good	100%
Friction	Less	More	Smallest
Easy to use	Bad	good	better
secure & robust	Good	poor	good

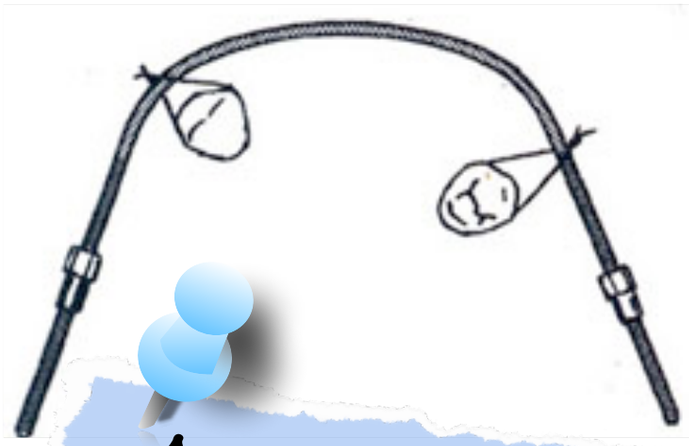
BRACKET DESIGN EVOLUTION

BRACKET DESIGN EVOLUTION

Fauchard's expansion arch.



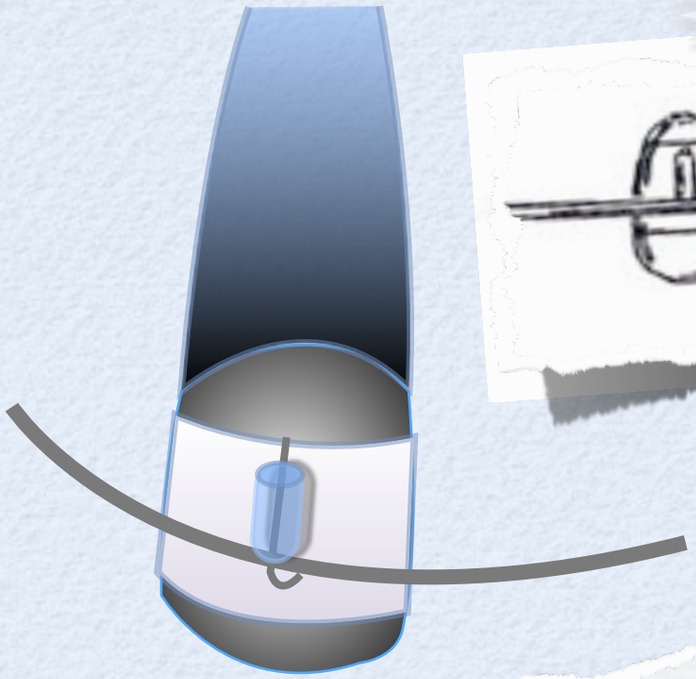


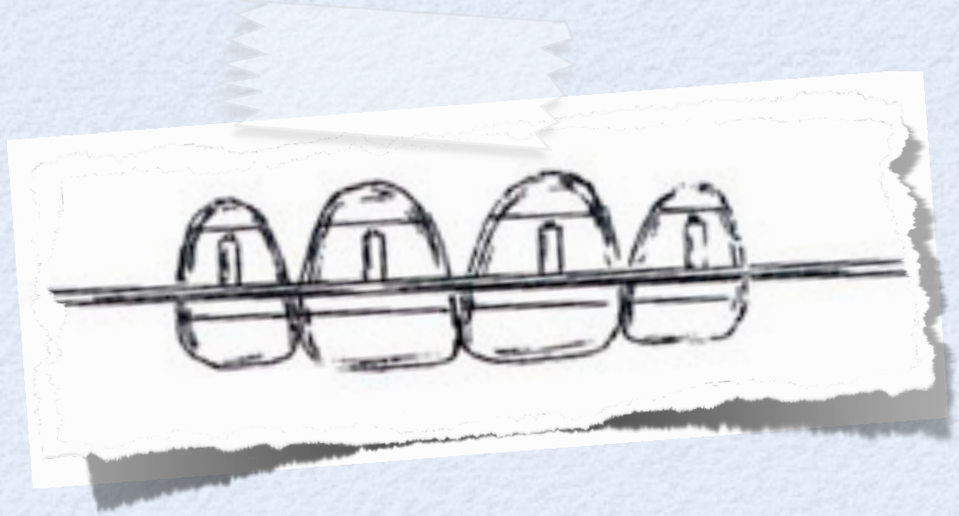


Angle's E Arch 1887

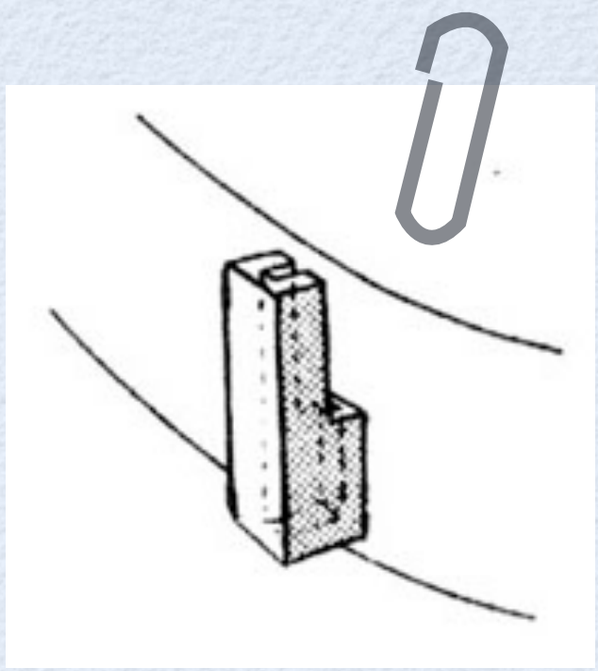
BRACKET DESIGN EVOLUTION

Pin and tube appliance 1911

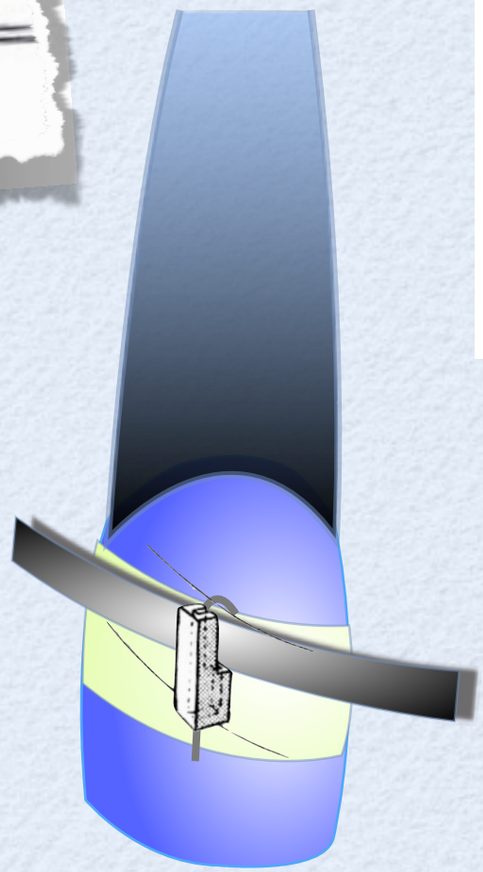




Ribbon arch 1916

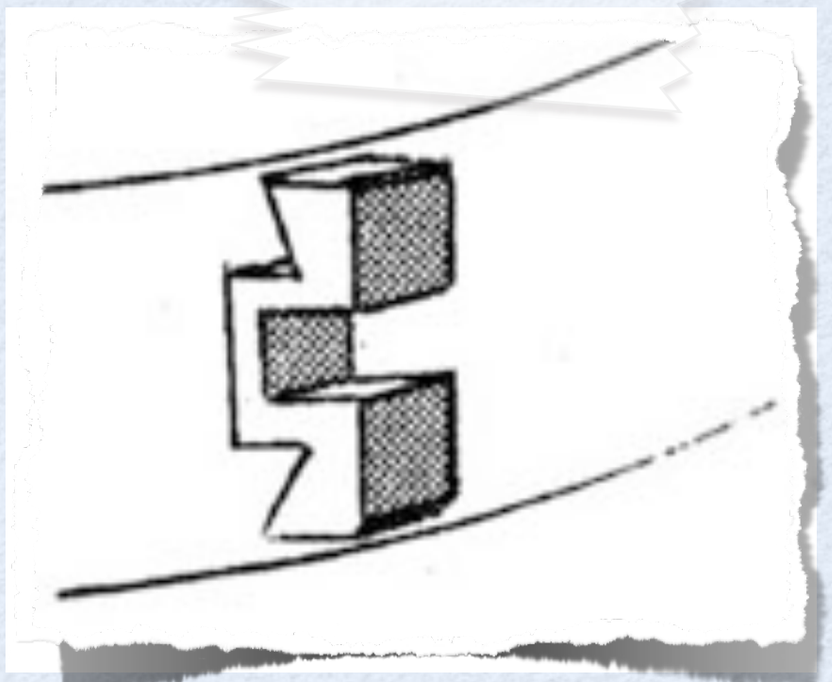


Ancestor to modern bracket



BRACKET DESIGN EVOLUTION 1928

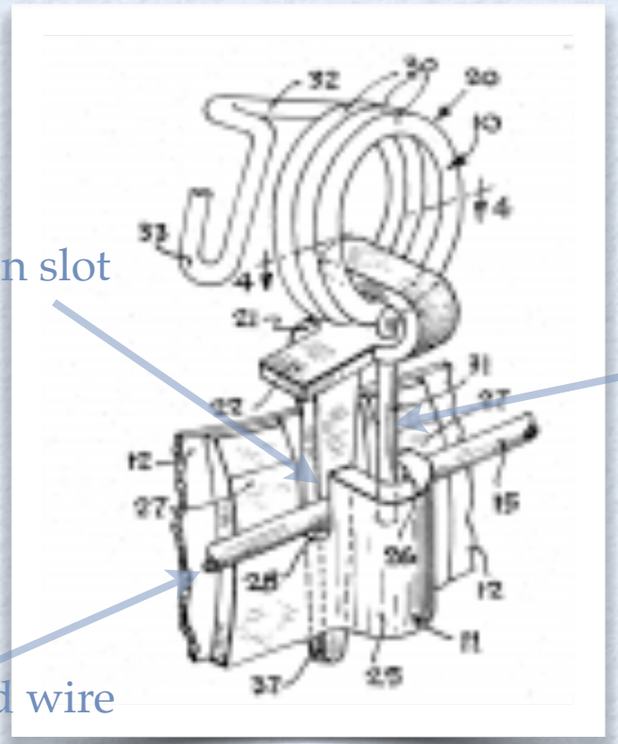
Angle's 447 edgewise bracket
1928

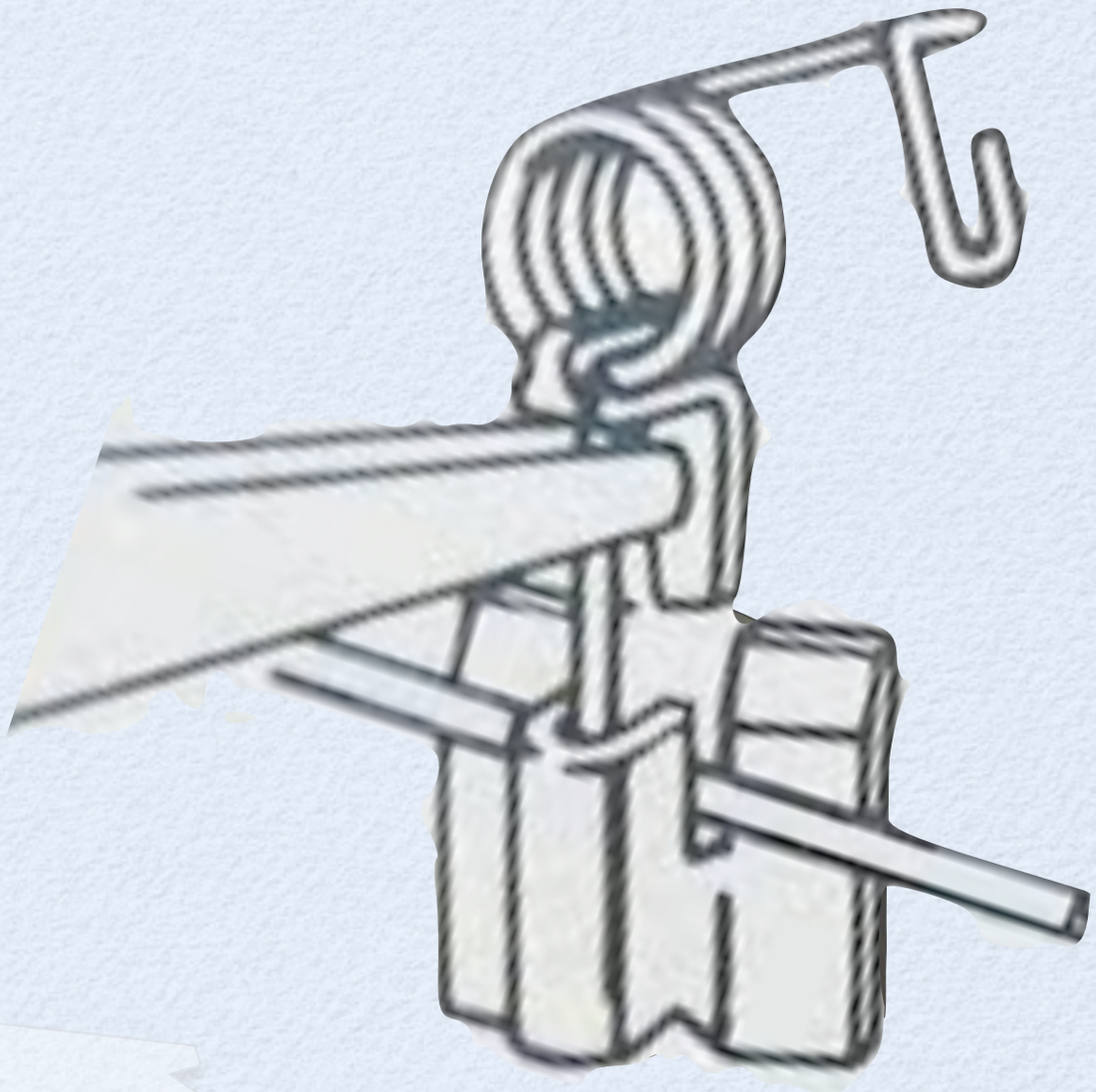


"THE LATEST AND BEST IN ORTHODONTIC MECHANISMS".

BRACKET DESIGN EVOLUTION

Brass pins ligation
1950s

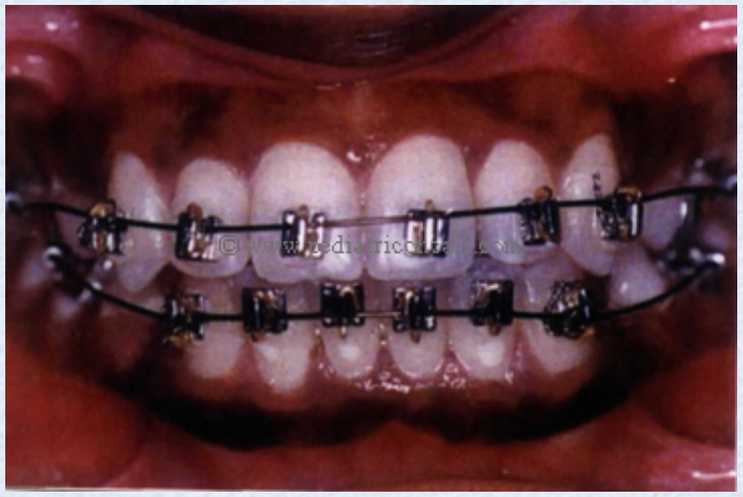


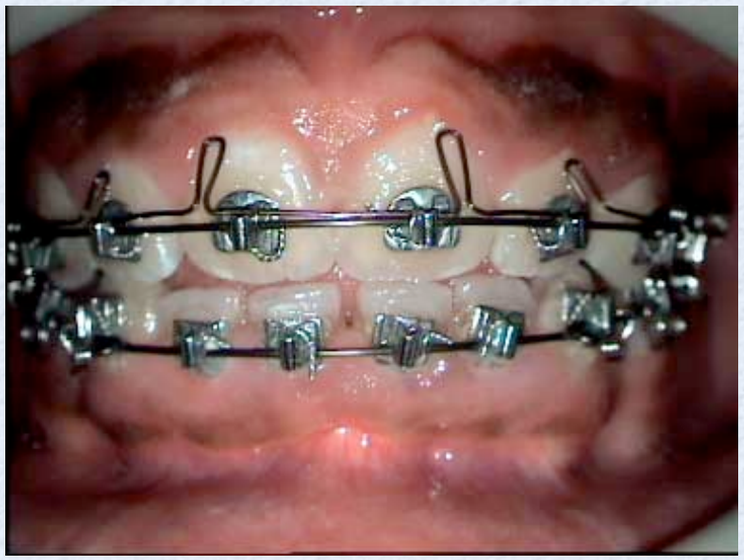


ANGLE'S RIBBON ARCH BRACKETS
WITH ROUND ARCH-WIRES.

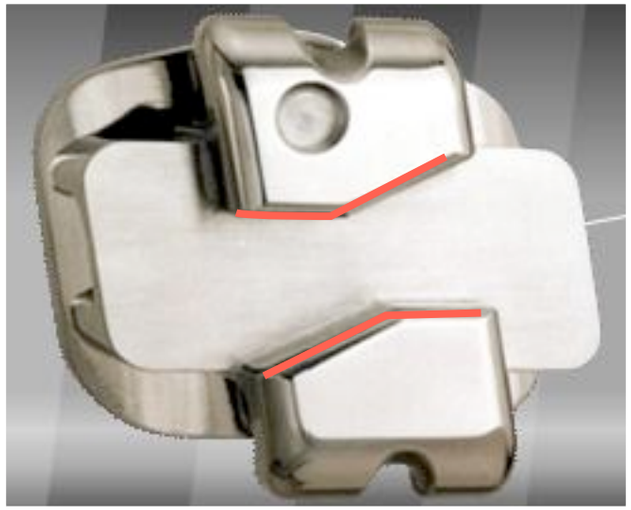
BRACKET DESIGN EVOLUTION

Begg's Technique





Tip edge Bracket



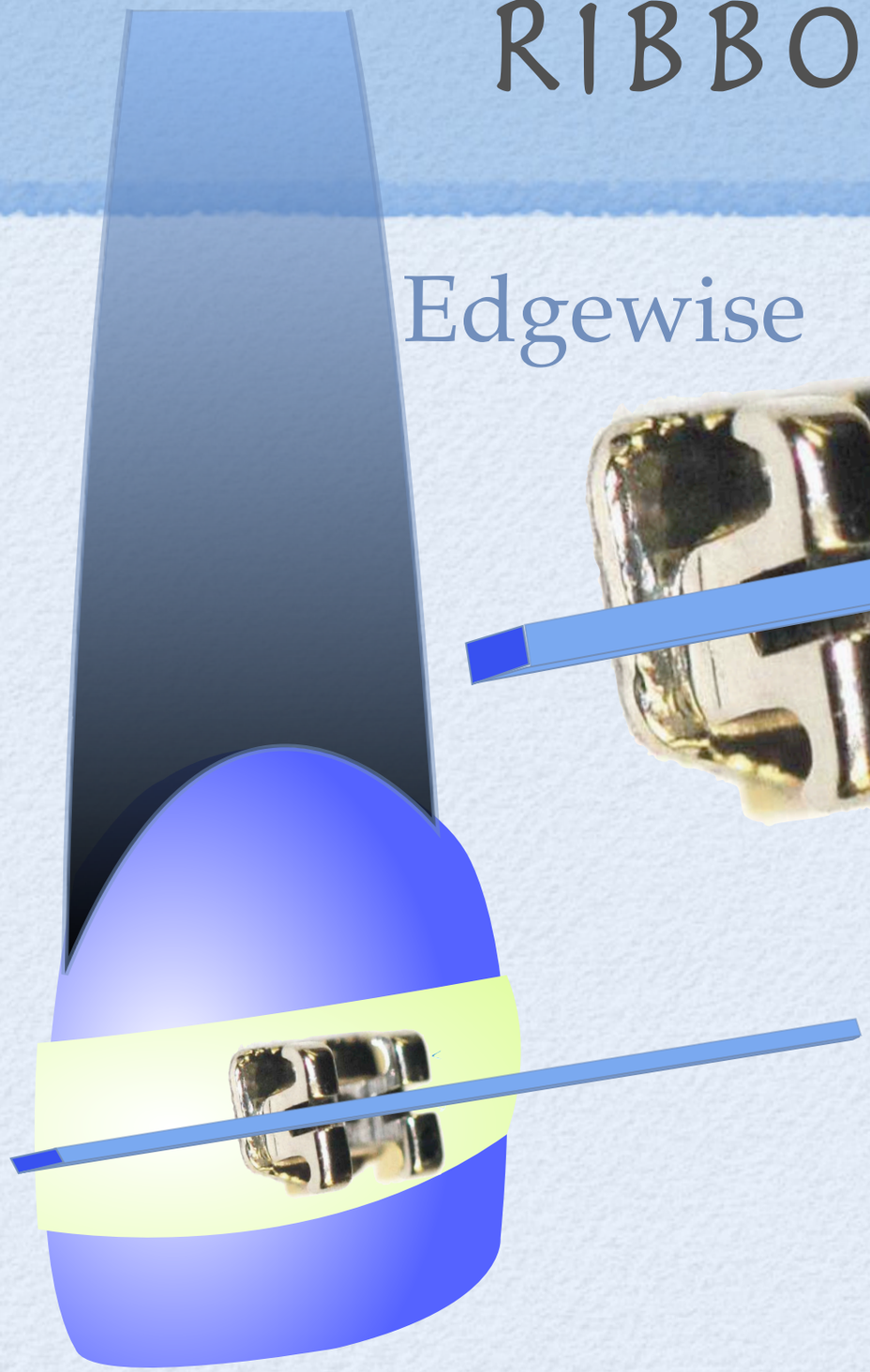
BRACKET DESIGN EVOLUTION

TWIN BRACKET
(OPEN SLOT BRACKET)

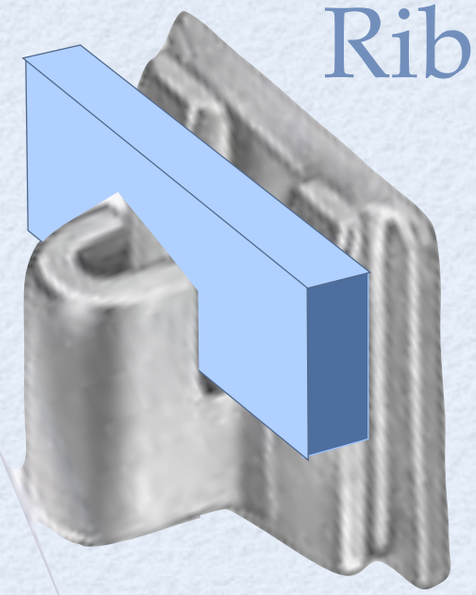
Variations of brackets have been modified such as rotating wings, twin brackets, different dimensions, pre-adjusted appliances, lingual applications, etc., but the essence has remained Edgewise.

RIBBON VS EDGEWISE

Edgewise



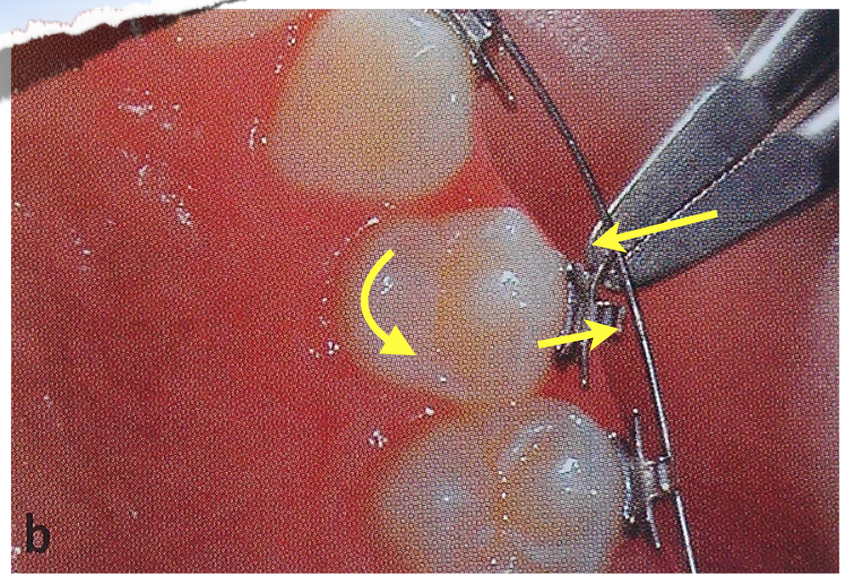
Ribon

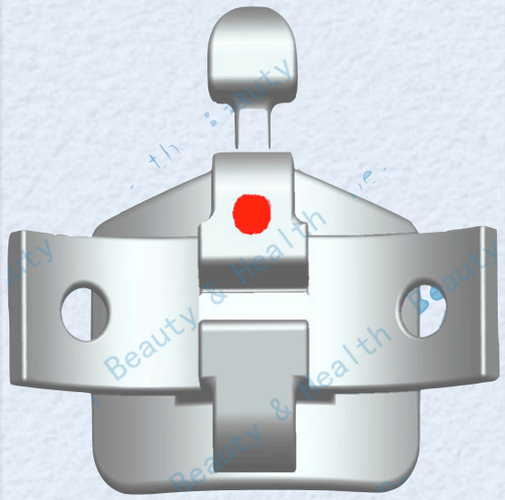


BRACKET VARIATION

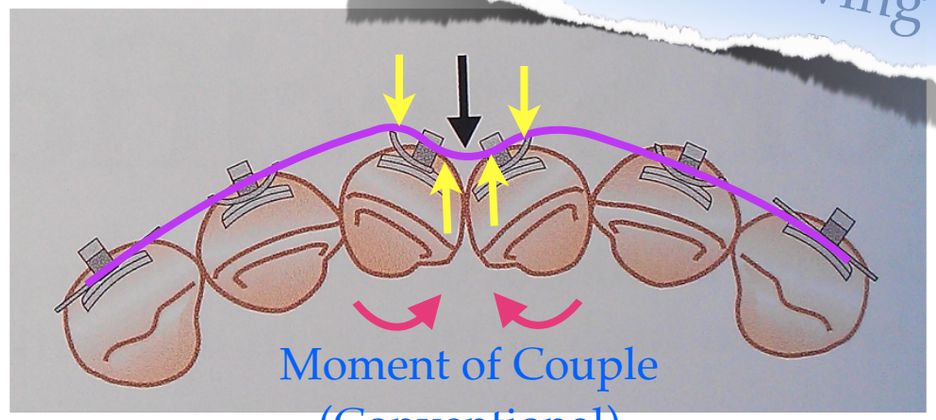
Alexander

De-rotation activation

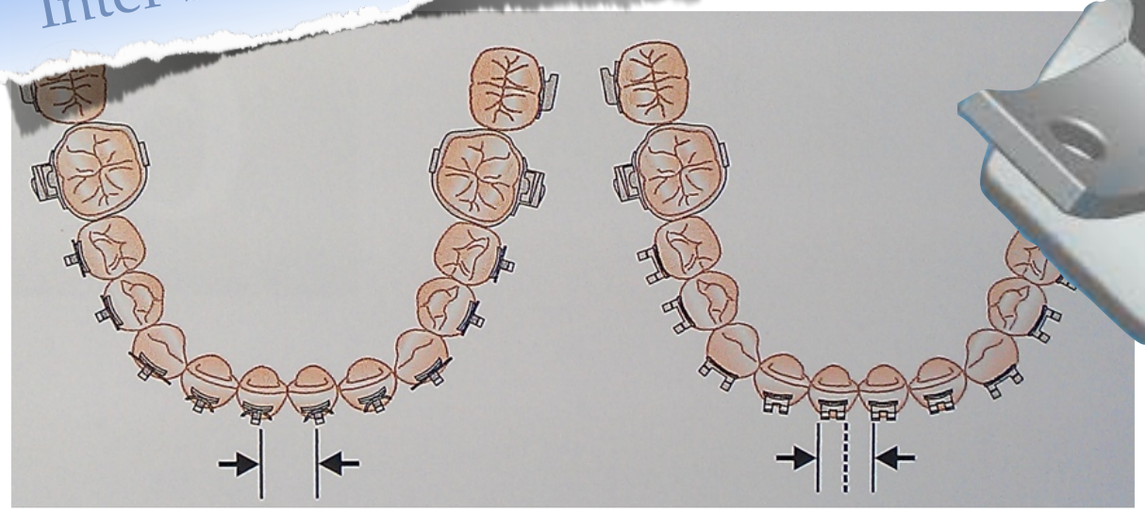


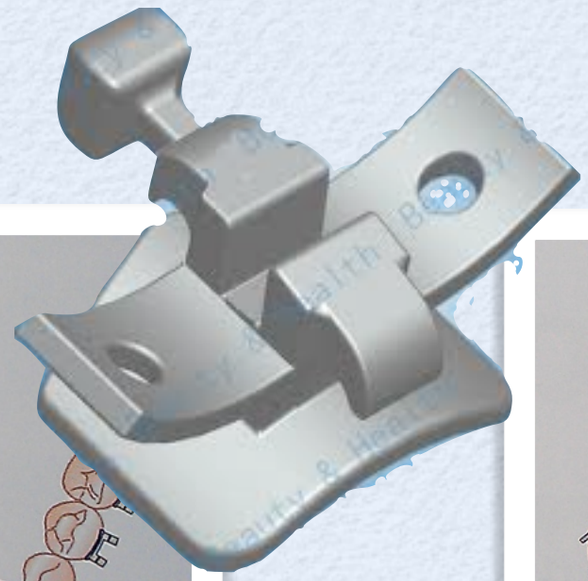


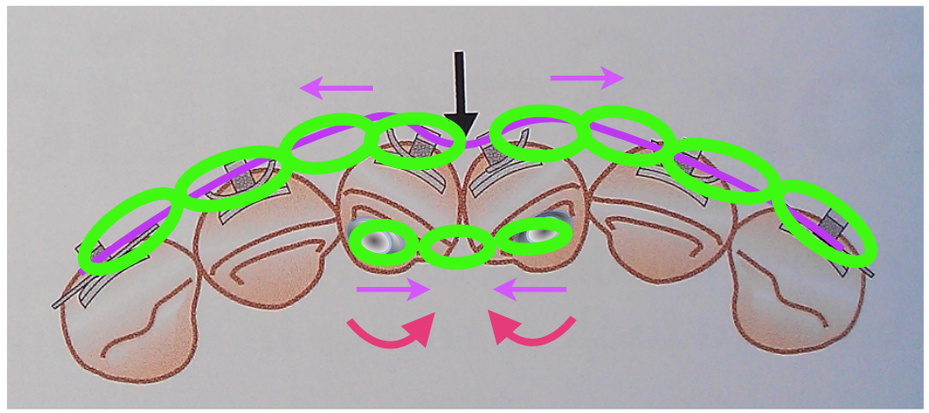
Cut off mesial wing



Inter bracket distance





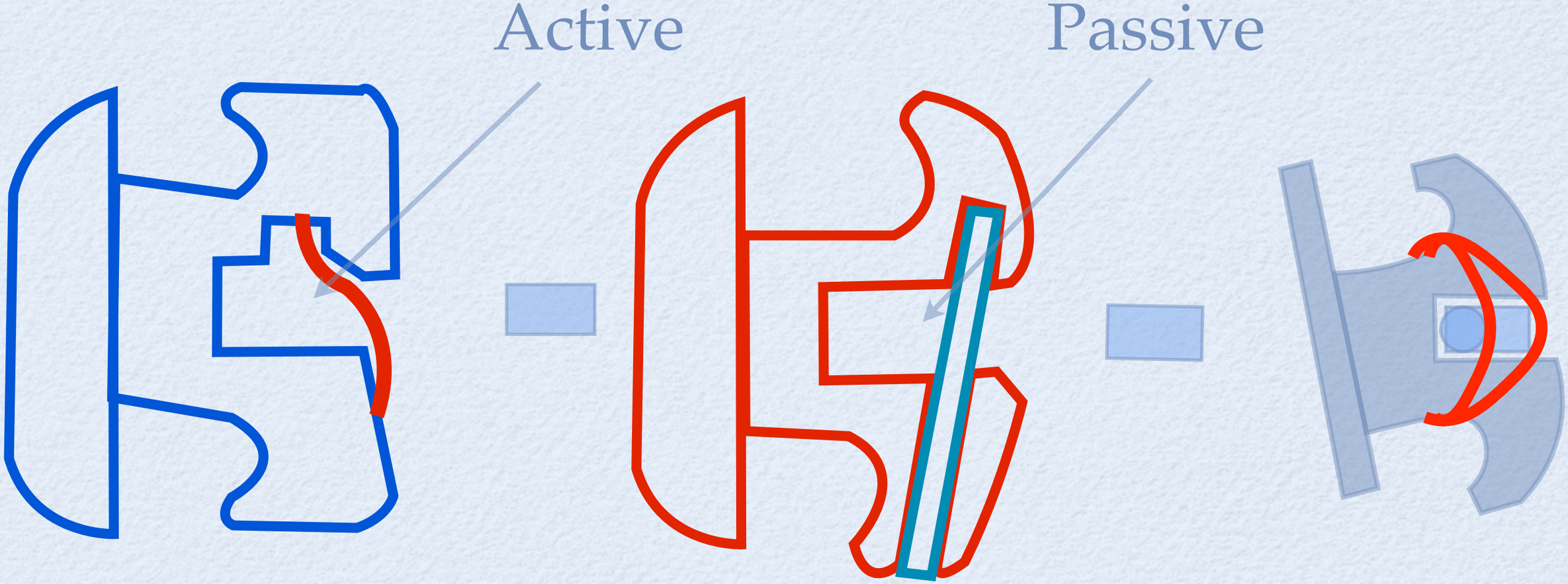


Moment of force

Alexander

SELF LIGATION BRACKET

A bracket, which utilizes a permanently installed, movable component to entrap the arch wire



LIGATION & FRICTION

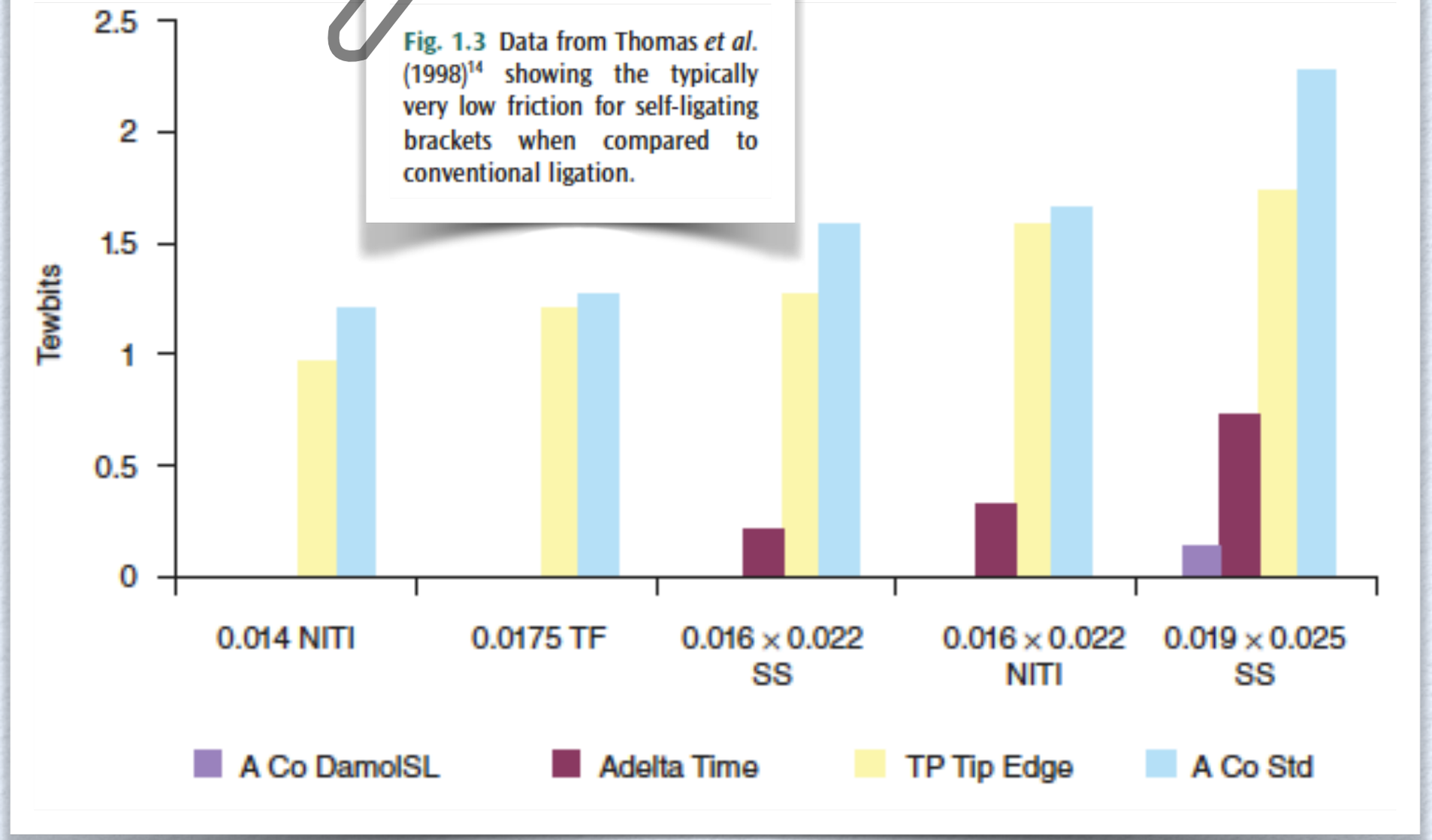


Fig. 1.3 Data from Thomas *et al.* (1998)[14] showing the typically very low friction for self-ligating brackets when compared to conventional ligation.

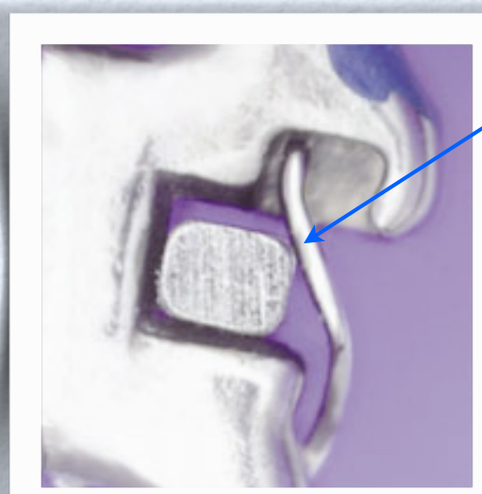
TYPE OF SELF-LIGATION

Active SL

in-ovation

Passive

Speed

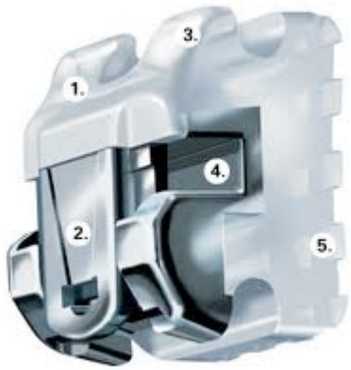


Active

SELF-LIGATION

Passive SL

Damon 2



Damon 3

Damon 3mx

Damon Q

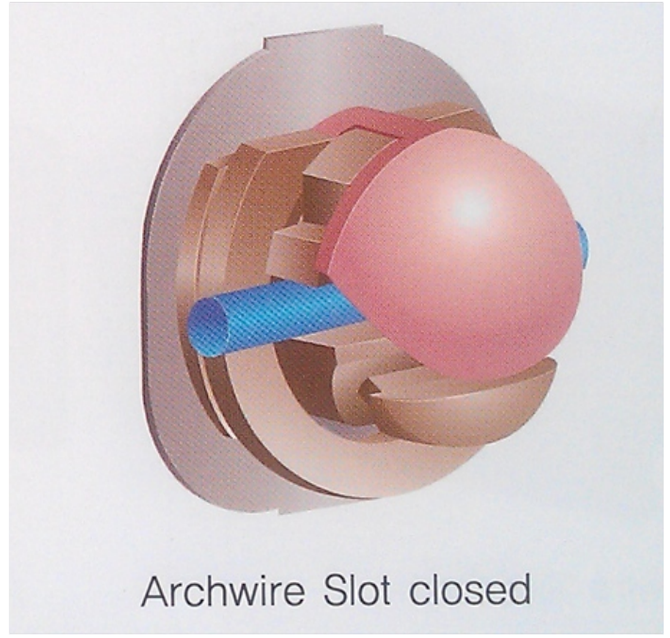
Smart clip

EVOLUTION OF SELF-LIGATION BRACKET

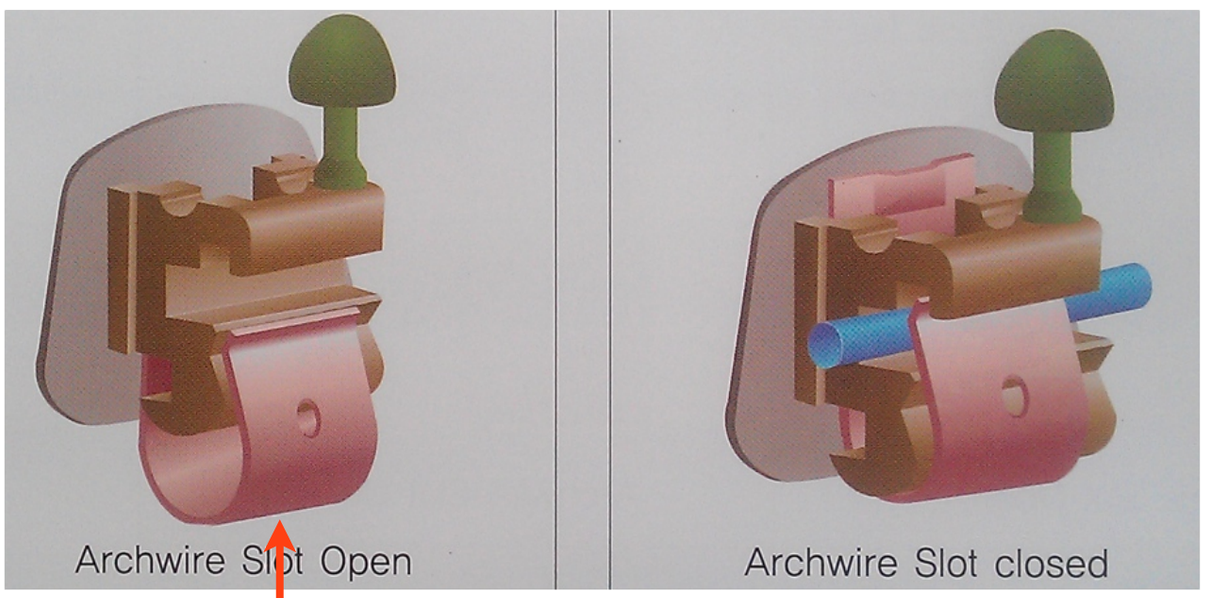
1972 Edgelok Bracket

Passive

Archwire Slot Open



Archwire Slot closed



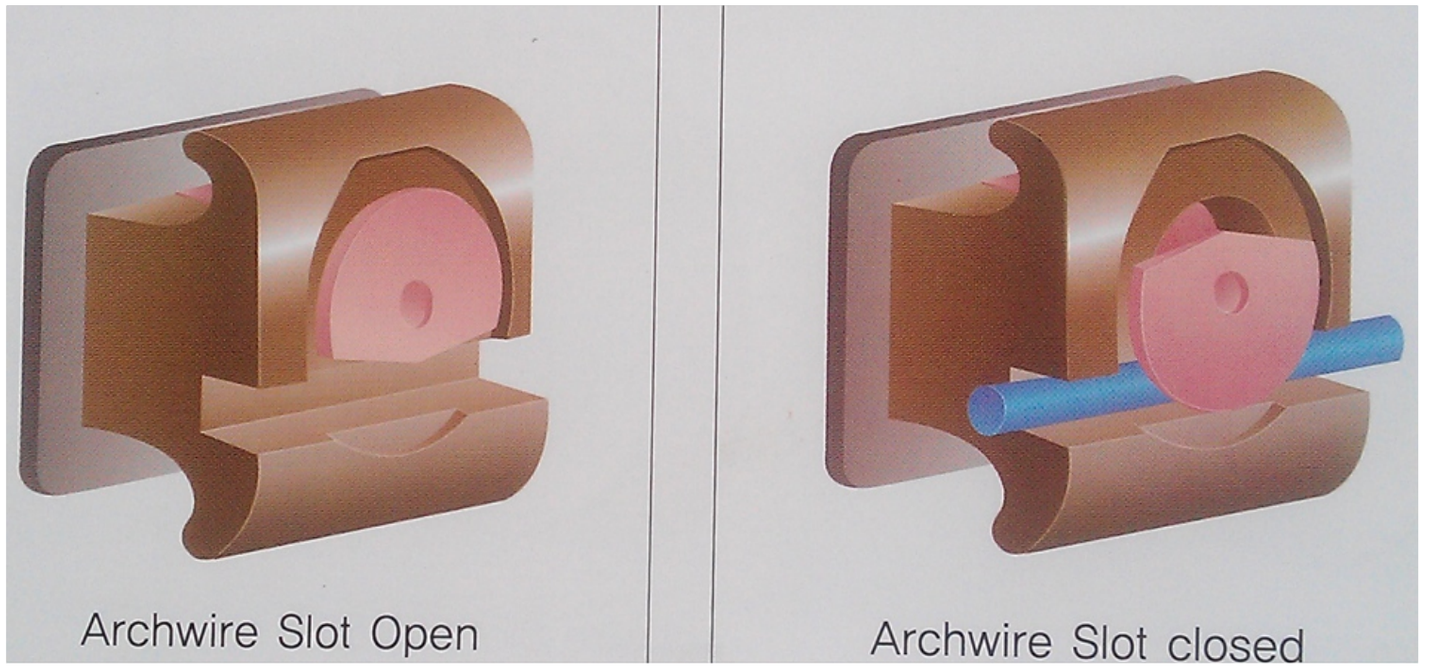
1980 SPEED Bracket

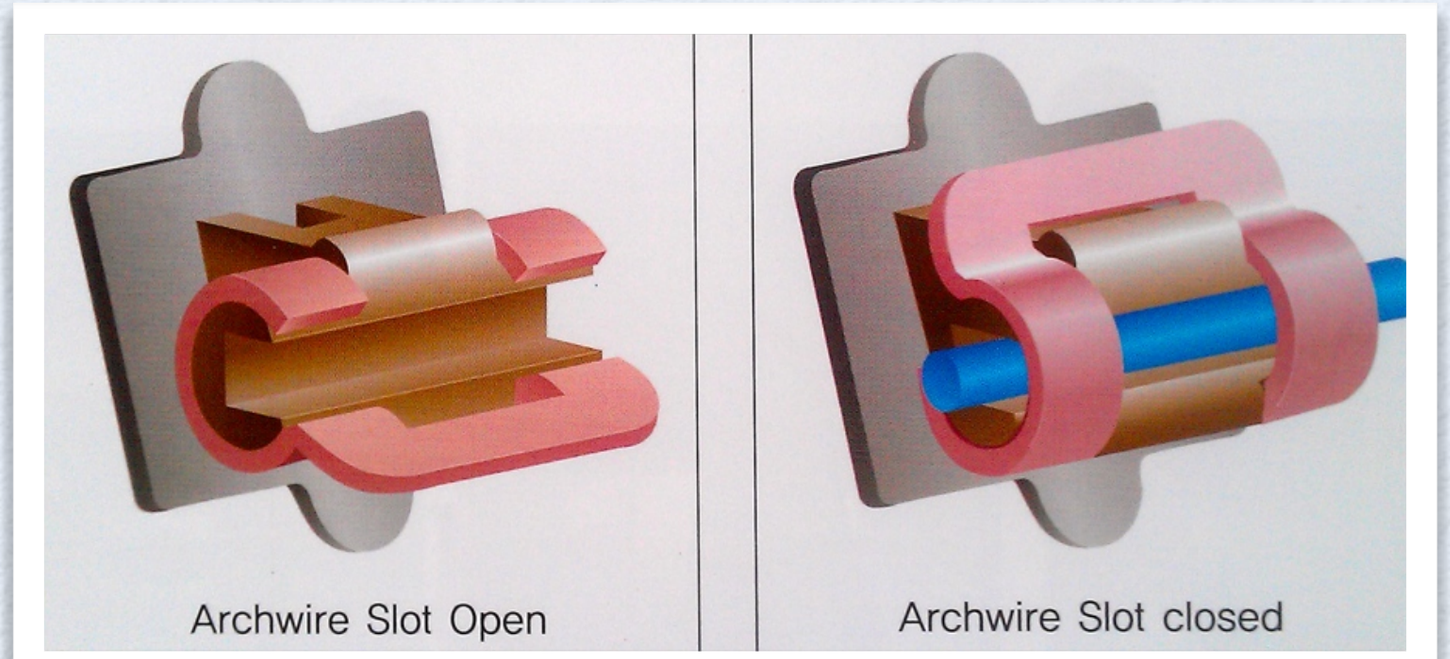
Active

1980

Mobil Lock bracket

Passive



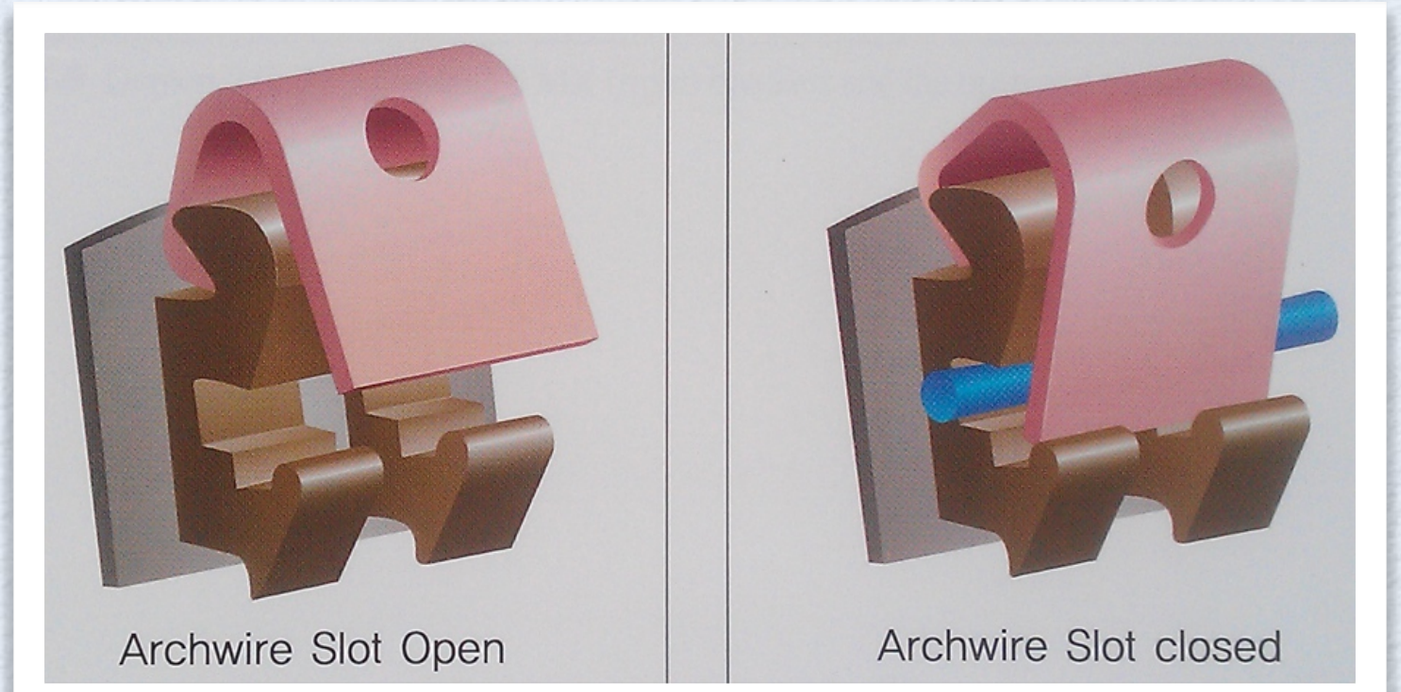


1986

Activa bracket

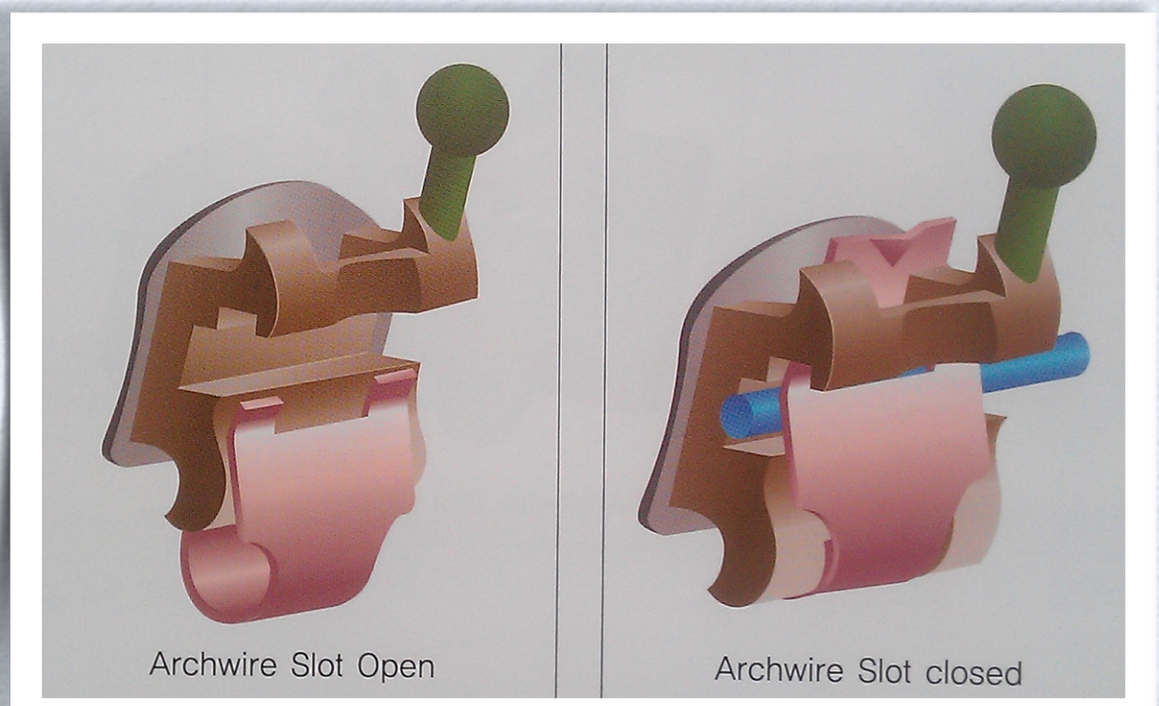
Active

1995
Time bracket



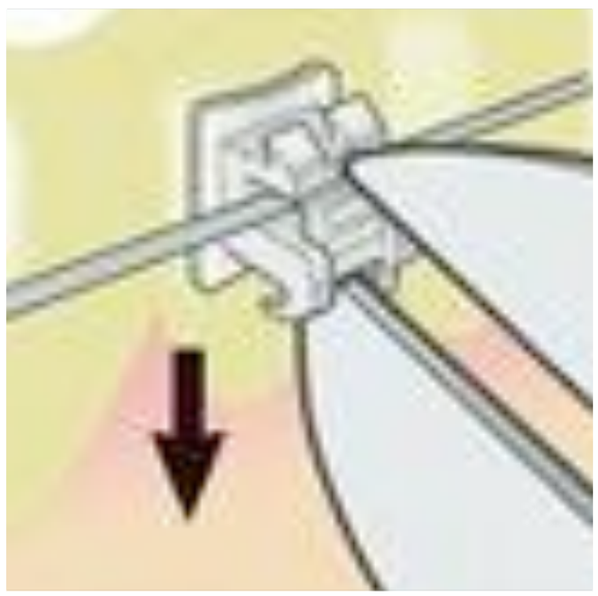
Active

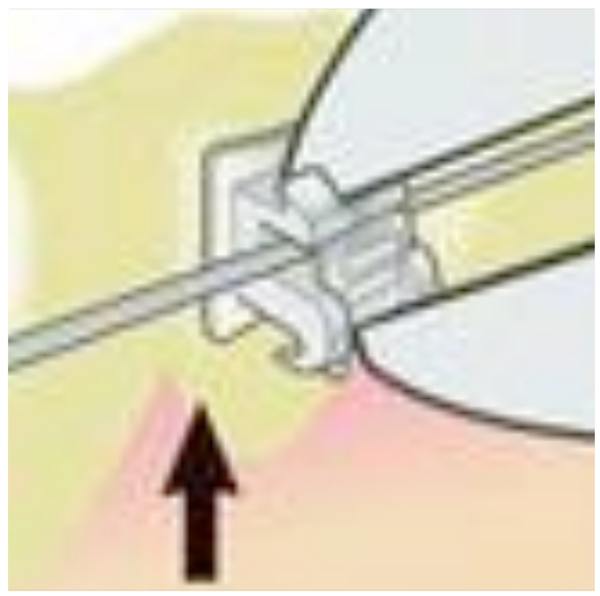
2000
In- Ovation



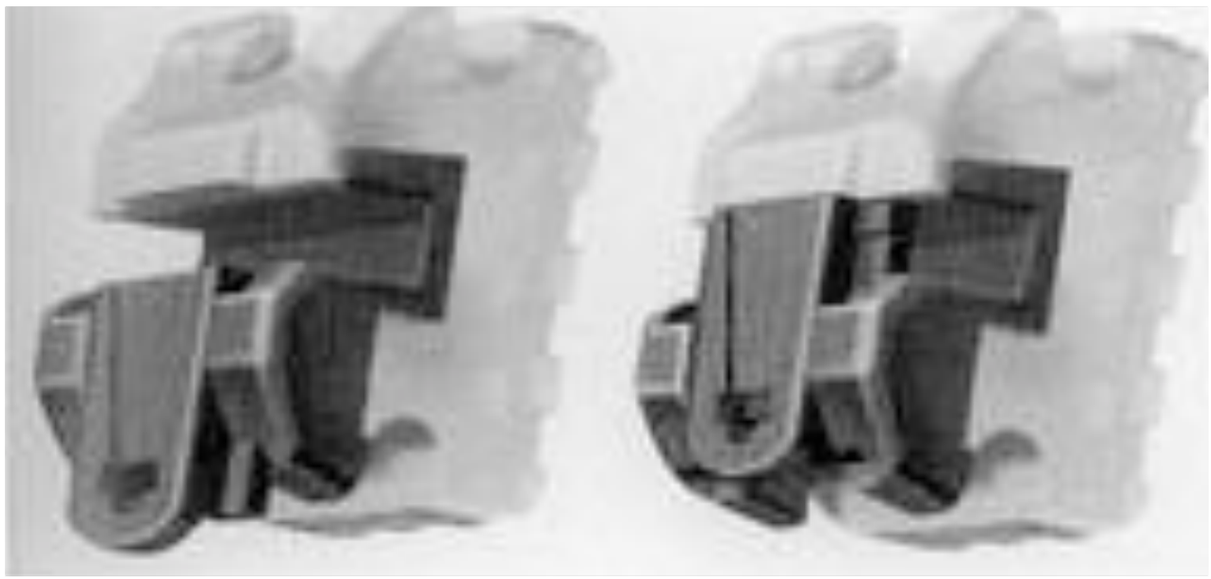
1996 Damon SL

2000 Damon 2





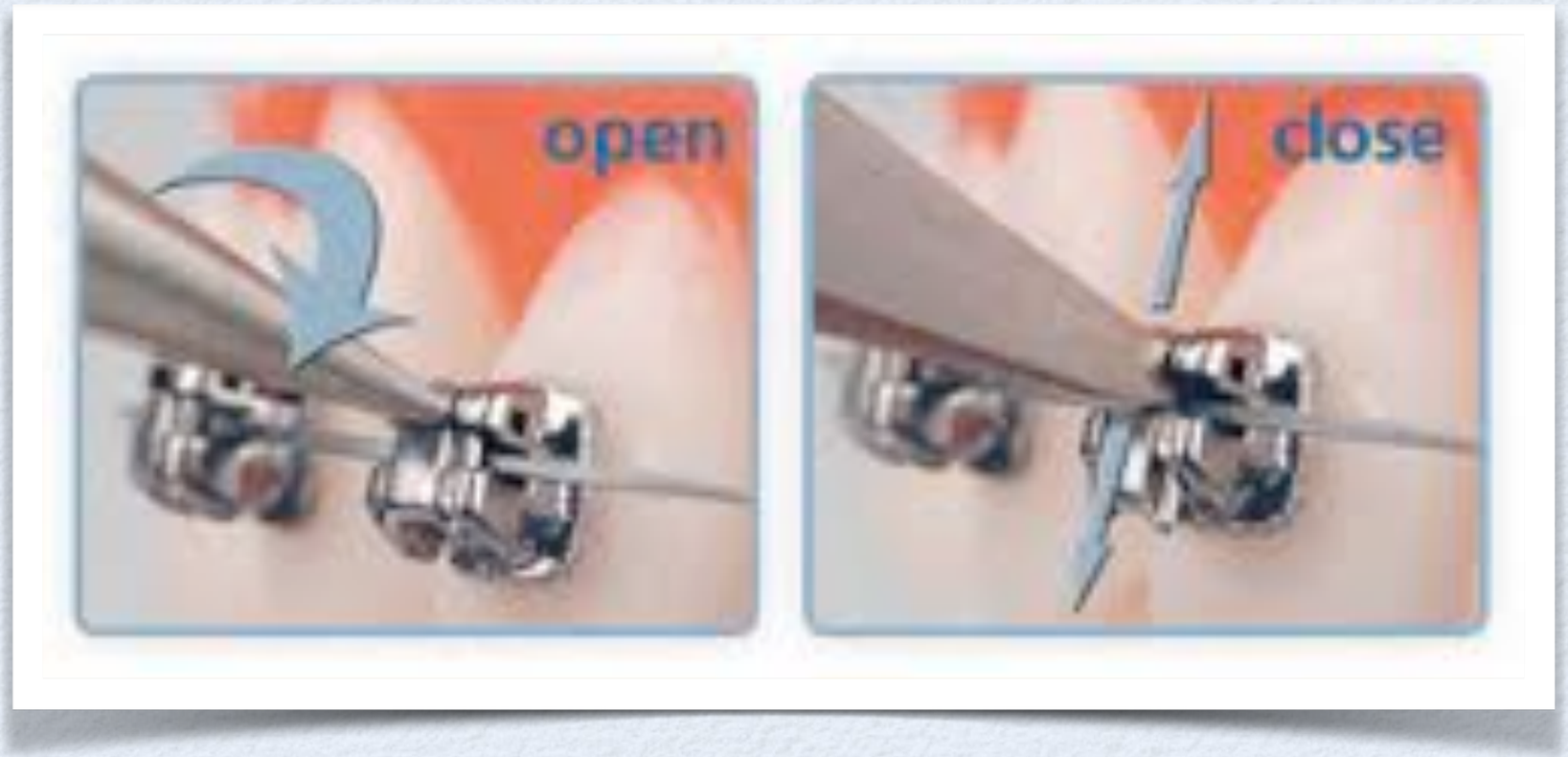
2004 Damon 3



2006 Damon 3MX

DAMON 3MX

2009 Damon Q



ADVANTAGES OF SL BRACKETS

According to the company

- Faster
- Decrease irritation
- Low friction
- Full engagement
- Reduced treatment time
- No chairside assistance

IDEAL SL BRACKET

- user friendly
- Open and close easily
- Never open inadvertently
- Never jams or breaks or distorts
- Have a positively held open clip/slide position

IDEAL SL BRACKET

Easy placement and removal of hooks/posts

Tolerant to obstructing the clip

No special auxiliaries tools

Play Controllable

Smoothness of contour

Hybrid System Available

High bond strength

TYPES OF SL BRACKETS

Passive Brackets

- Damon
- Smart clip
- Ten-brook

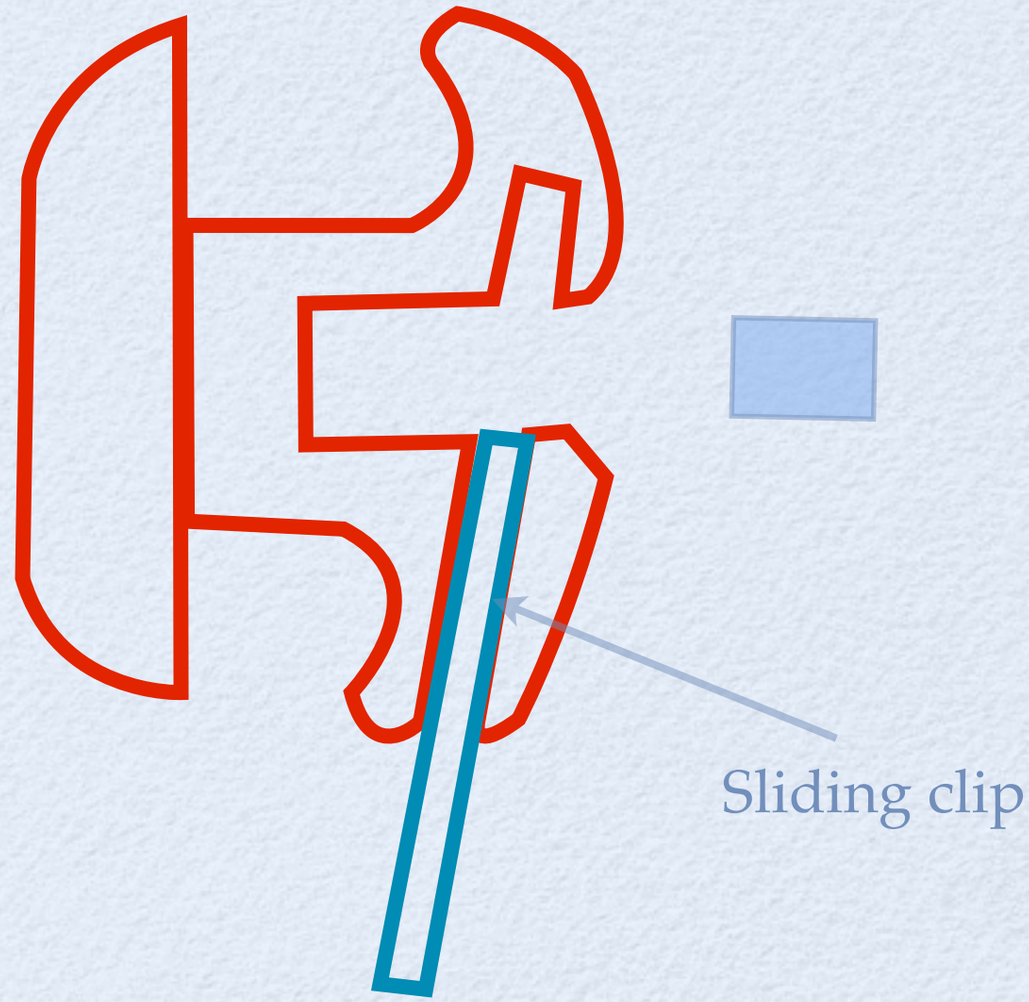
Active Brackets

-SPEED
-In-Ovation

ACTIVE VS PASSIVE SELF LIGATION BRACKETS

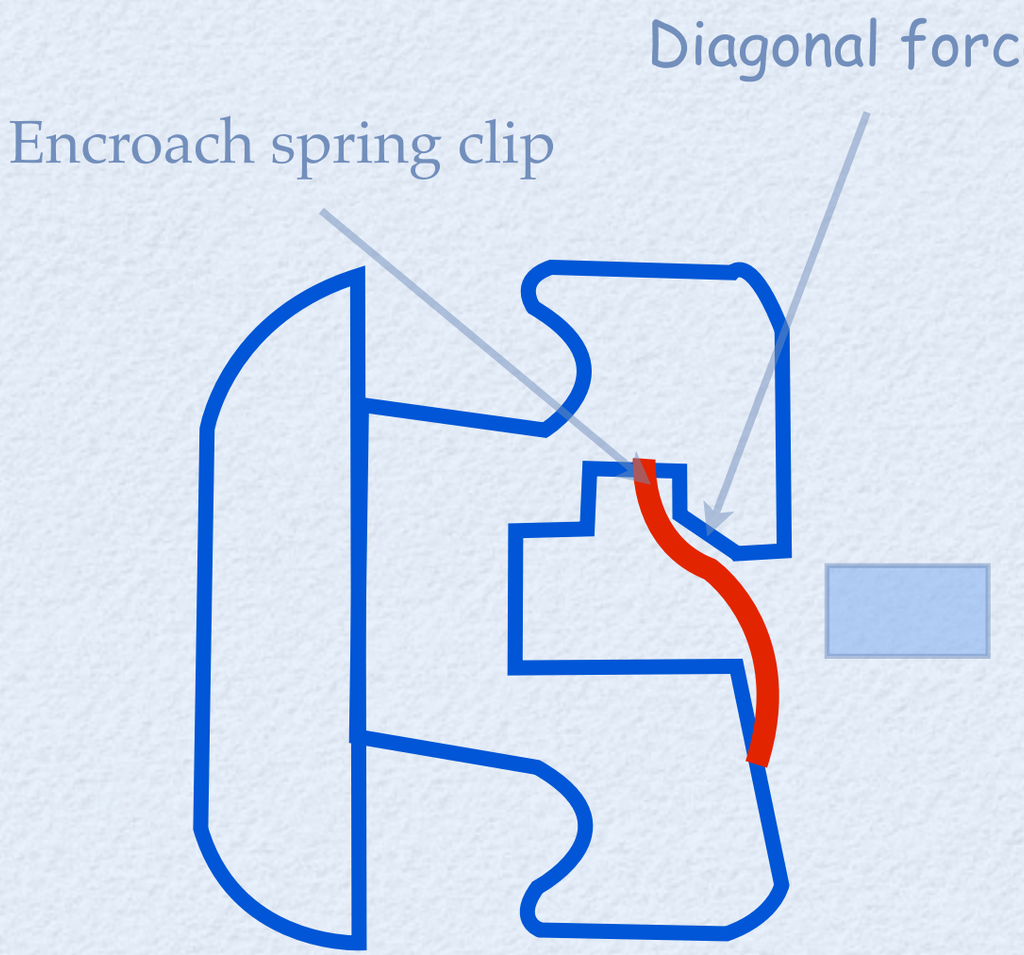
Passive brackets (Damon, Smart clip)

use a rigid, movable component to entrap the arch wire. Tooth control is determined by the fit between bracket slot and arch wire.



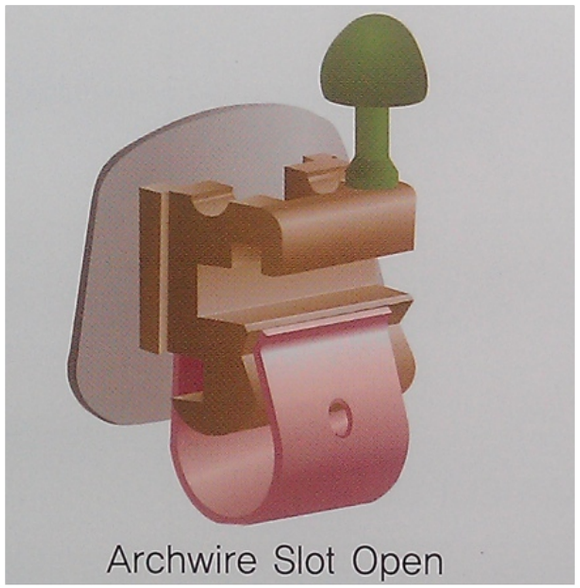
ACTIVE VS PASSIVE SELF LIGATION BRACKETS

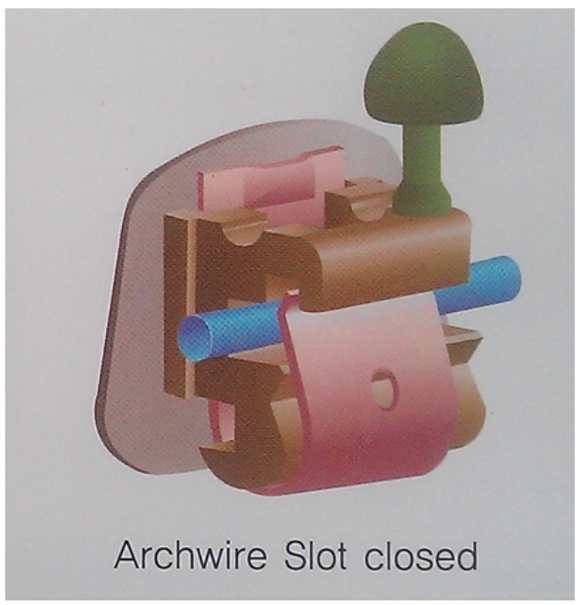
Active brackets (SPEED, In-Ovation)



use a flexible component to entrap the arch wire. This flexible component constrains the arch wire in the slot and has ability to store and release energy elastic deflection

ACTIVE CLIP(ACTIVE SELF LIGATION


Archwire Slot Open


Archwire Slot closed

SPEED Bracket

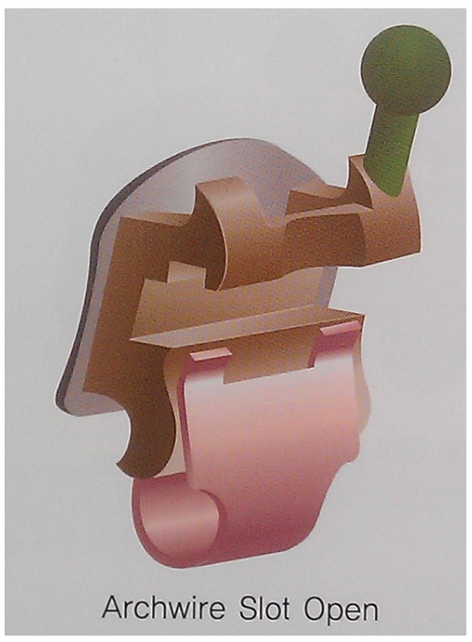
have a sliding spring clip, which encroaches on the slot from the labial aspect, potentially placing an active force on the arch wire

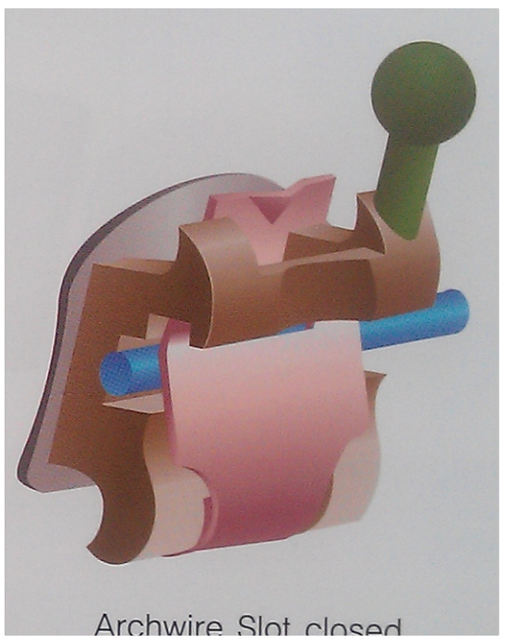
SPEED BRACKET

ACTIVE CLIP(ACTIVE SELF LIGATION

In-Ovation Bracket (GAC)

In-Ovation R





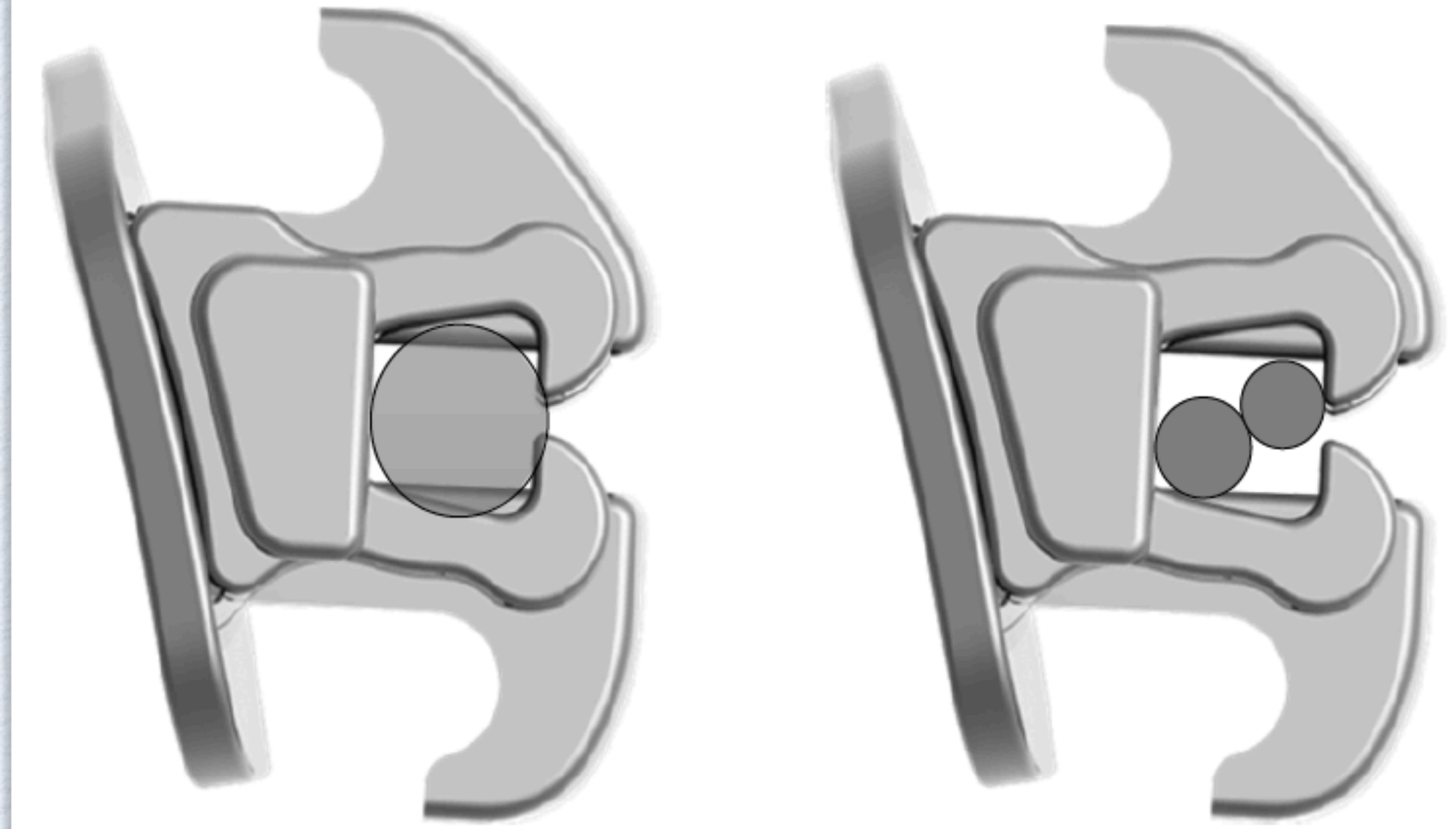
IN-OVATION R

PASSIVE CLIP(PASSIVE SELF LIGATION)

Smart Clip

Vision LP

Smart Clip



SMARTCLIP

Archwire Insertion

Using the SmartClip™ Appliance Wire Insertion Instrument

- **Double or Torquing key end:**

Single-handed technique

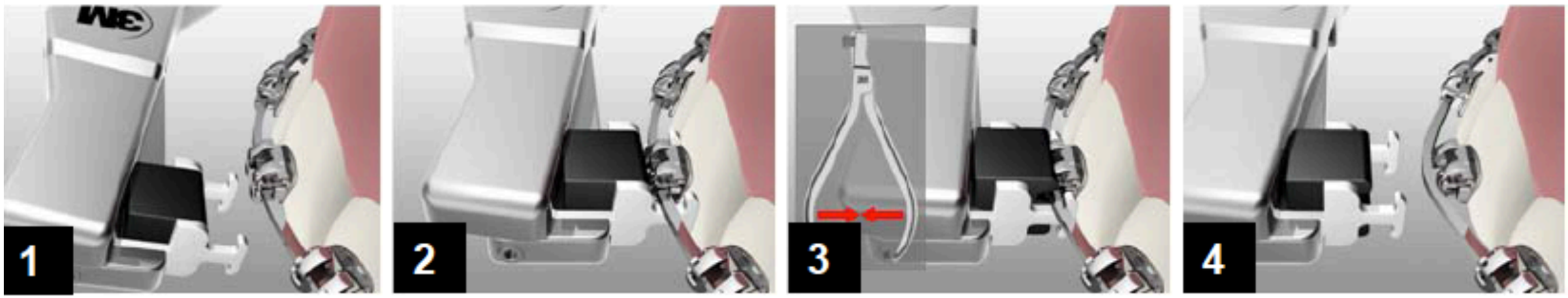
Dual-handed technique

1. **Align** archwire over clip opening and bracket slot.
2. **Position** instrument on archwire so the torquing key straddles the bracket.
3. **Torque** rectangular wires by rolling the instrument until the wire torque matches the slot torque, which will allow the wire will naturally fall into place with little effort.
4. **Push** instrument gently while providing lingual support to the teeth.

Consider using fingers instead of instruments on round and smaller rectangular wires. It may be easier to feel the force levels and the proper seating of the wire.

Archwire Disengagement

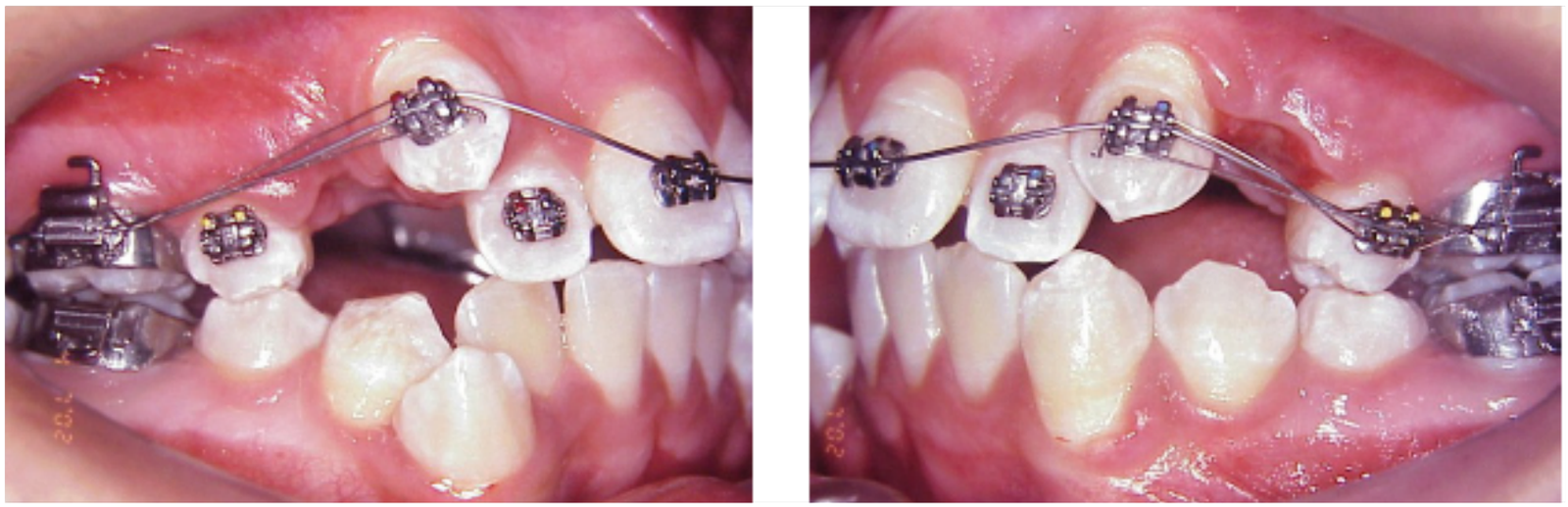
Using the SmartClip™ Appliance Wire Disengagement Instrument

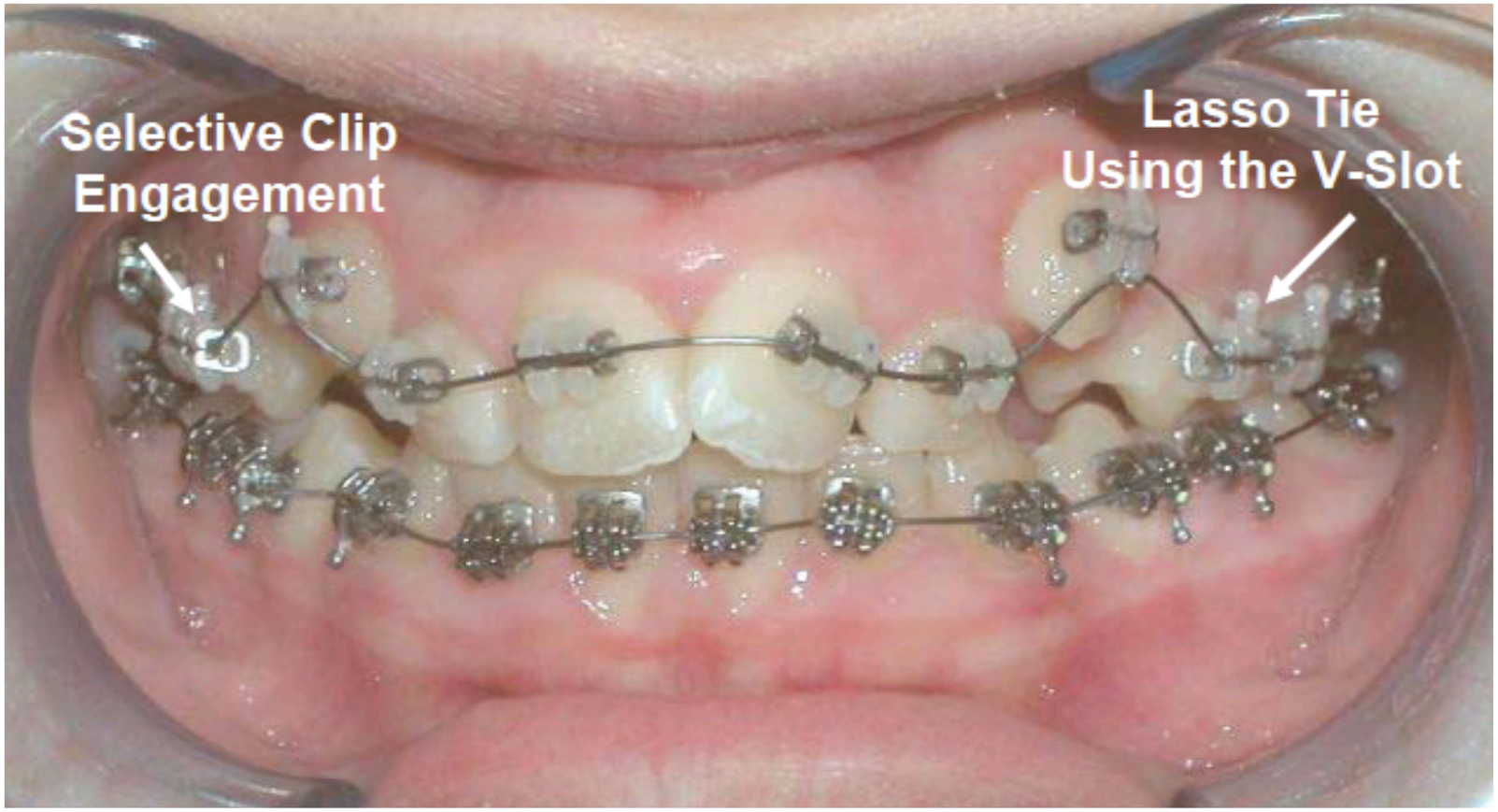


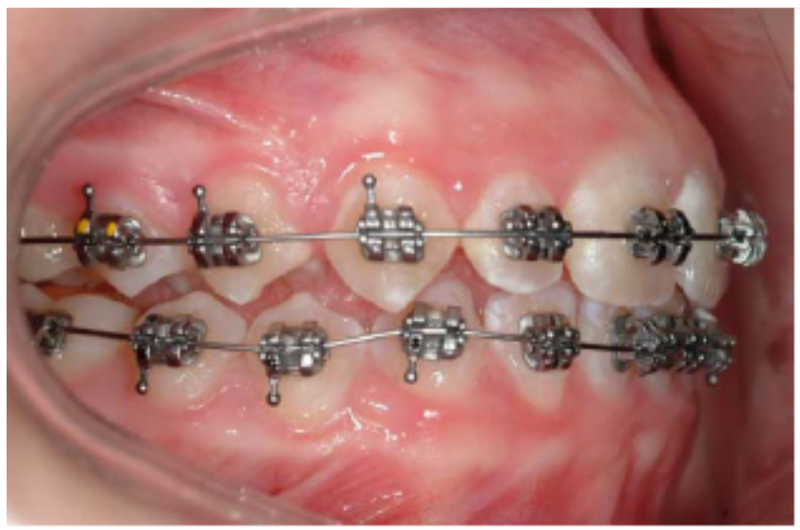
1. Approach archwire with disengagement instrument from occlusal or gingival side.

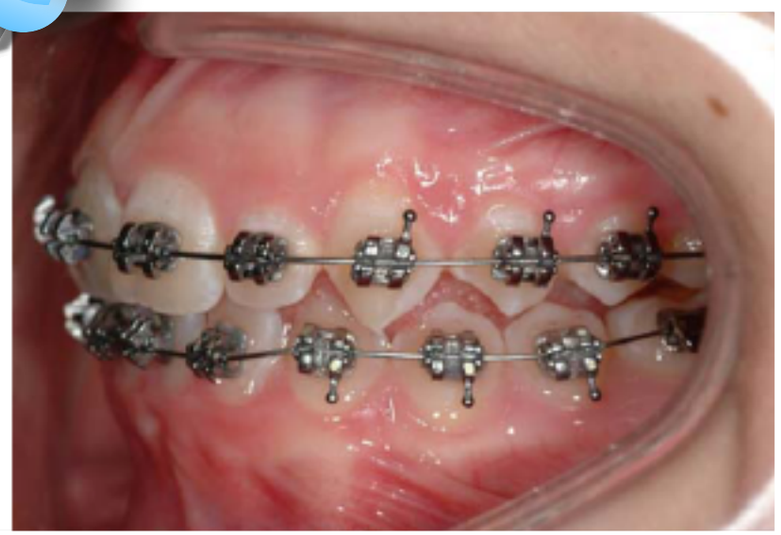
2. Place instrument hooks under archwire keeping the bracket between the instrument hooks, avoiding the mesial and distal protrusions and tie-wings.

3. Squeeze handles (Note: It is not necessary to fully squeeze the instrument. Only squeeze until the wire releases from the clips.)




Selective Clip
Engagement
Lasso Tie
Using the V-Slot



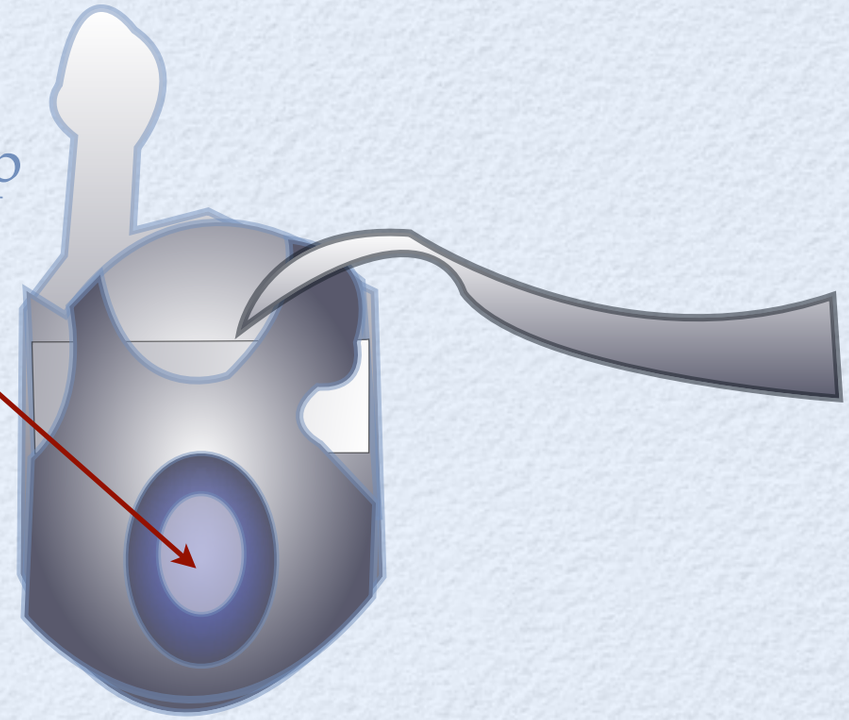


PASSIVE CLIP(PASSIVE SELF LIGATION)

Ten Brook

Edgelok style clip lock

Rotating cap



Tip Edge slot

Rotating cap allows
arch wire engagements

PASSIVE CLIP(PASSIVE SELF LIGATION)

Damon Bracket

brackets have a slide which opens and closes vertically and creates a passive labial surface to the slot

DAMON Q

PASSIVE CLIP(PASSIVE SELF LIGATION)

Introducing Agility®

In creating our latest innovation, the Agility® bracket system, ODP's engineers thought outside the box to produce a truly unique, passive, self-ligating bracket system that performs as smoothly as it looks.

ODP's Agility® brackets are based on our popular Comfort Zone bracket system, which is already revered by orthodontists around the world.

With a sleek, ultra low profile design for ultimate patient comfort, the Agility® bracket system is perhaps the easiest self-ligating system available on the market, requiring no special instruments or training of any kind. Simply bond it, clip it, and watch it work.

The Agility® system is an effective self-ligating bracket system that allows you to focus on treatment, and not the appliances.

The name says it all… Agility®.

The Agility® bracket system is Patent Pending.

Agility®

SELF-LIGATING
PASSIVE SYSTEM

by Orthodontic Design and Production, Inc.

Classic Twin Design

ODP's Agility® bracket system allows for fast and accurate bracket placement due to its familiar twin design. Even though Agility® is a self-ligating bracket system, it was engineered with a generous under tie wing area for the option of engaging elastomeric ligatures or a power chain, making it a truly versatile and powerful treatment appliance.

SL SERIES

The SL SERIES is a premium line of self-ligating products designed and manufactured by Orthodontic Design and Production, Inc.

A Revolutionary Clip Design

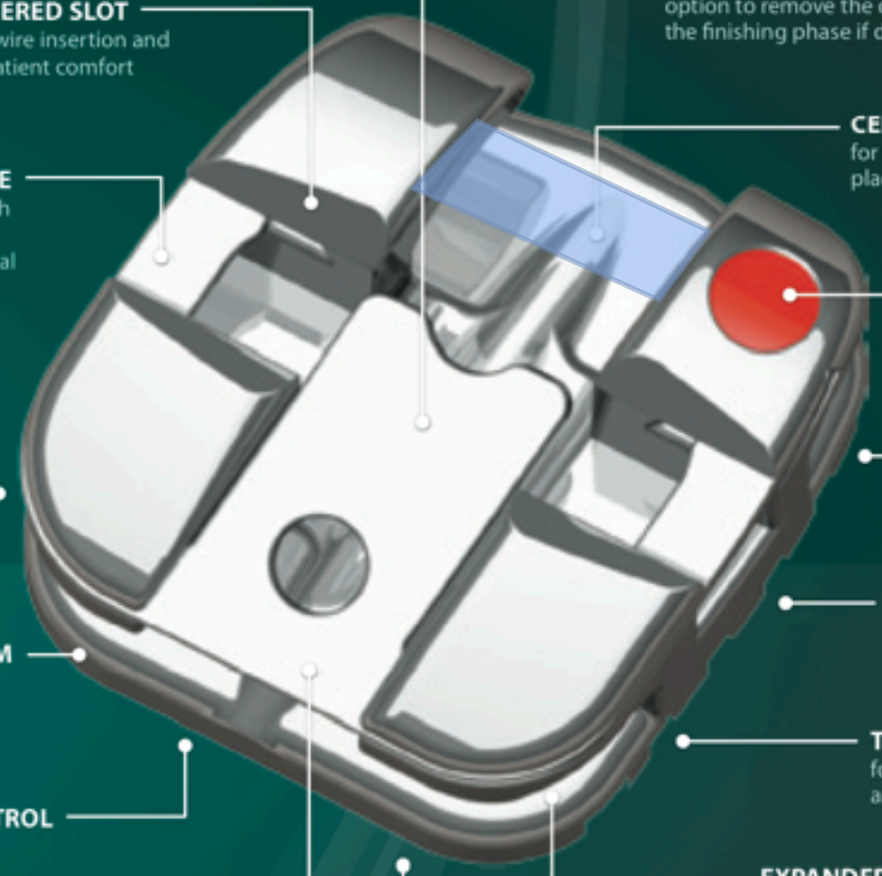
Engineered for maximum patient comfort and hygiene, Agility® brackets feature a convenient, versatile, easy-to-use self-ligating "confidence" clip that is constructed of high quality nickel titanium. The durable, easy sliding clips of the Agility® bracket system provide optimum flexibility, and will endure the lifetime of the treatment.

The passive design of the "confidence" clip provides excellent sliding mechanics, virtually eliminating friction, which allows for fast and accurate tooth movement.

A Better Hygienic Clip

The clips are designed with a powerful dual-locking mechanism that eliminates unwanted openings. In fact, the tolerances of the sliding mechanism are so precisely engineered that it is virtually impossible for food debris to enter, leading to less chance of plaque and tartar buildup. This not only promotes good oral hygiene, but also allows the bracket to function as intended over the lifetime of the treatment.

In addition, the "confidence" clip spans the entire mesial/distal width of every bracket, without deflection, for superior rotational control. This allows the wire to utilize the full width of the true twin design without the need for auxiliaries.



CHAMFERED SLOT
for easy wire insertion and added patient comfort

HIGH QUALITY CONVERTIBLE NICKEL TITANIUM CLIP
offers superior flexibility with the option to remove the clip during the finishing phase if desired

CENTER SCRIBE LINE
for more accurate bracket placement

FULL SLOT CLIP COVERAGE
for the entire mesial/distal width of every bracket, without deflection, for superior rotational control; allowing the wire to utilize the full width of the true twin design without the need for auxiliaries

PERMANENT COLOR-ENHANCED I.D. MARKS
for easy identification

STATE-OF-THE-ART BASE DESIGN
for enhanced bond strength

LOW PROFILE DESIGN
for added patient comfort

COMPOUND CONTOUR
for increased bond strength and precise bracket placement

DUAL LOCKING MECHANISM
ensures the clip remains securely engaged for the lifetime of the treatment

TORQUE IN BASE
for level slot lineup and improved finishing

FULL ROTATIONAL CONTROL
due to the true twin design

EXPANDED TIE WING UNDERCUTS
for easy ligation

EASY OPENING CLIP
allows for quick, easy, and economical wire changes when compared to conventional brackets – simply open the clip with an explorer, engage the wire, and then slide the clip closed with either an explorer or your fingertip – it's that simple!

SINGLE PIECE MIM CONSTRUCTION
combines strength and precision into a single piece construction that allows full advantage to be taken of all aspects of the built in prescription for easy achievement of desired torques and angulations

Opening Technique

Opening the clips of the Agility® bracket is a snap! The first "click" you hear will be the clip disengaging from the top lock, and the second "click," assures you the clip is fully open.

Simply insert the tip of an explorer into the clip's easily accessible circular opening.

Pull the explorer towards the incisal to open the clip.

Alternate Opening Technique

Simply place the tip of an explorer at the end of the alignment guide.

Pull the explorer towards the incisal to open the clip.

Closing Technique

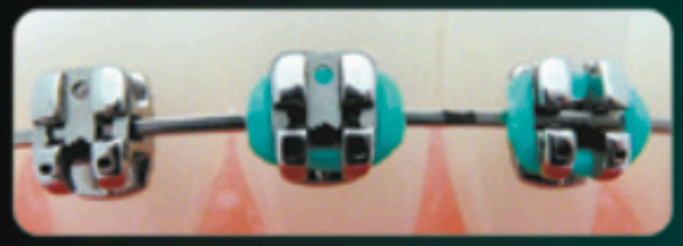
As if opening the Agility clips isn't easy enough, closing them is even easier.

Using a utility plier, a tweezer, or even your own fingertip, gently apply pressure to the occlusal side of the bracket and the clip simultaneously.

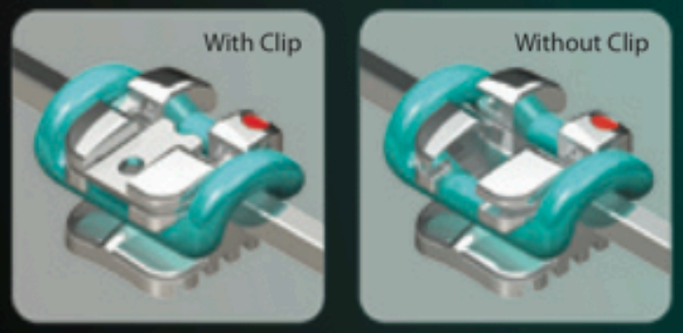
When the clip begins to close, it will "click" once as it disengages from the bottom lock, and will then "click" a second time to indicate it is fully closed.

Finish With Ultimate Control

The Agility® self-ligating bracket system gives you the complete control you need to finish each treatment quickly, efficiently, and hassle-free. Agility® brackets deliver powerful functionality during those times in treatment when a tooth or a group of teeth need to be tied or anchored to prevent unwanted movement along the archwire.



Agility® allows for easy ligation of archwires with metal or elastomeric ligatures, during the finishing and detailing phases of treatment. With the power and responsiveness to move teeth quickly and easily, ODP's Agility® bracket system gives you the freedom to finish each case with ultimate control.



Every bracket was designed to accommodate an elastomeric ring or chain, to work in conjunction with the clip, for ultimate control.

Optional Convertible Clip

The clips can be easily removed during the finishing phase allowing the use of ligatures to secure the archwire into the slot.

To convert, simply insert the ends of a tweezer between the mesial/distal grooves.

Rotate the tweezer towards the incisal in a 45° motion, gently easing the clip open.

Agility® Redefines Low Profile

UP TO **20%** LOWER

In-Ovation R is a trademark of Dentsply GAC International. Lotus is a trademark of OrthoTechnology, Inc.
Damon Q is a trademark of Ormco/Sybron Dental Specialties, Inc.
Carriere LX is a trademark of Ortho Organizers, Inc. Agility is a trademark of ODP, Inc.

ROTH† PRESCRIPTION

Full Sets	Anchor-Lock Pad .018	Anchor-Lock Pad .022	Accu-Lock Mesh .018	Accu-Lock Mesh .022
Upper/Lower 5x5 No Hooks	15K-NHK-18	15K-NHK-22	12K-NHK-18	12K-NHK-22
Upper/Lower 5x5 Hook on 3	15K-3-18	15K-3-22	12K-3-18	12K-3-22
Upper/Lower 5x5 Hooks on 4 & 5	15K-45-18	15K-45-22	12K-45-18	12K-45-22
Upper/Lower 5x5 Hooks on 3, 4, & 5	15K-345-18	15K-345-22	12K-345-18	12K-345-22

MBT† PRESCRIPTION

Full Sets	Anchor-Lock Pad .018	Anchor-Lock Pad .022	Accu-Lock Mesh .018	Accu-Lock Mesh .022
Upper/Lower 5x5 No Hooks	14K-NHK-18	14K-NHK-22	13K-NHK-18	13K-NHK-22
Upper/Lower 5x5 Hook on 3	14K-3-18	14K-3-22	13K-3-18	13K-3-22
Upper/Lower 5x5 Hooks on 4 & 5	14K-45-18	14K-45-22	13K-45-18	13K-45-22
Upper/Lower 5x5 Hooks on 3, 4, & 5	14K-345-18	14K-345-22	13K-345-18	13K-345-22

† *ODP prescriptions are not implied to be an exact version of any other system, nor do we claim any endorsement by the doctor*

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AGILITY


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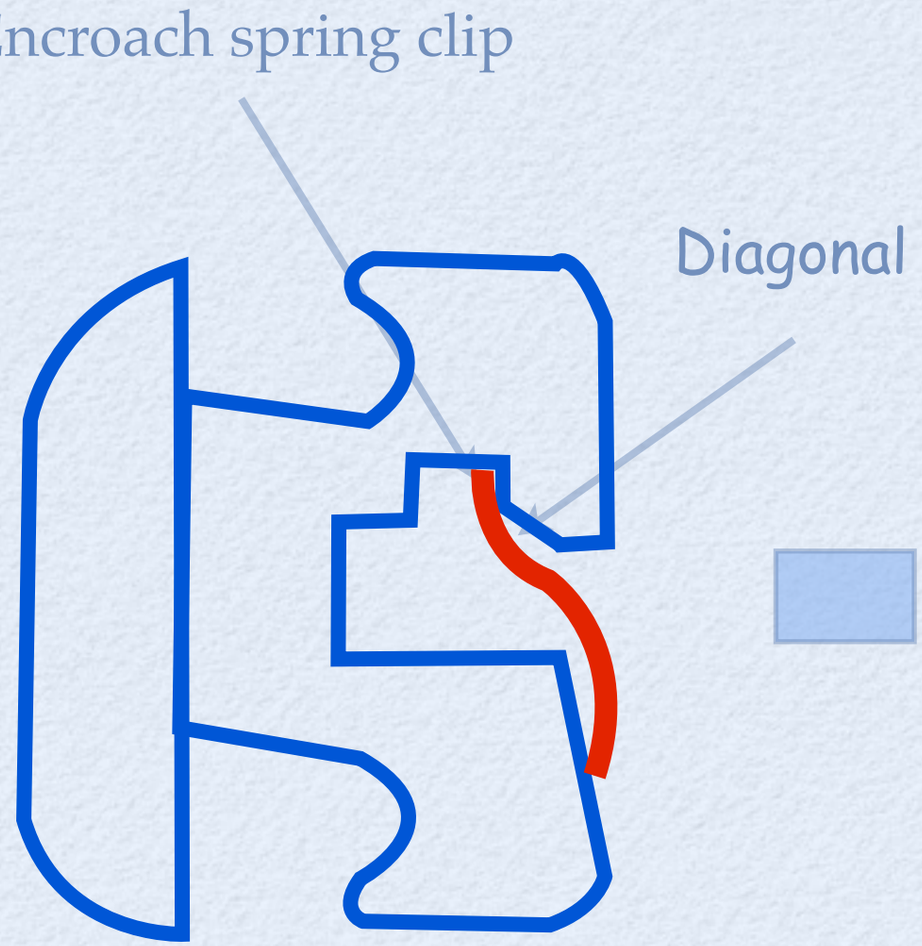
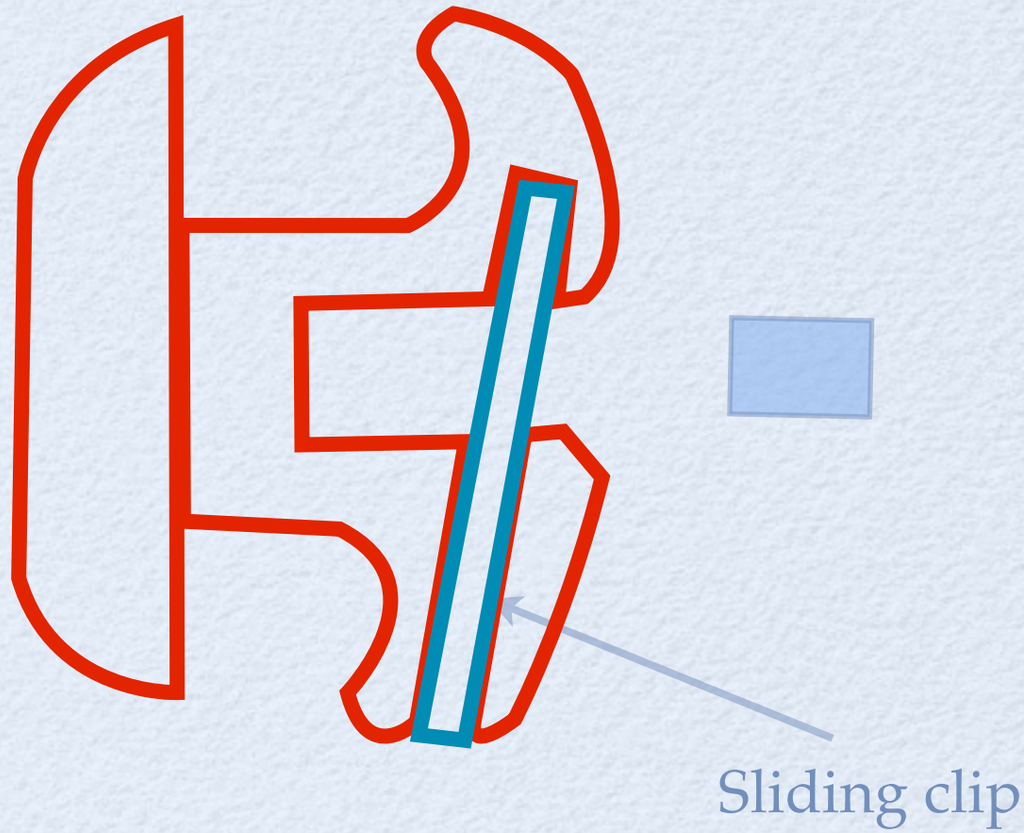
AGILITY

ACTIVE VS PASSIVE
SELF LIGATION BRACKET



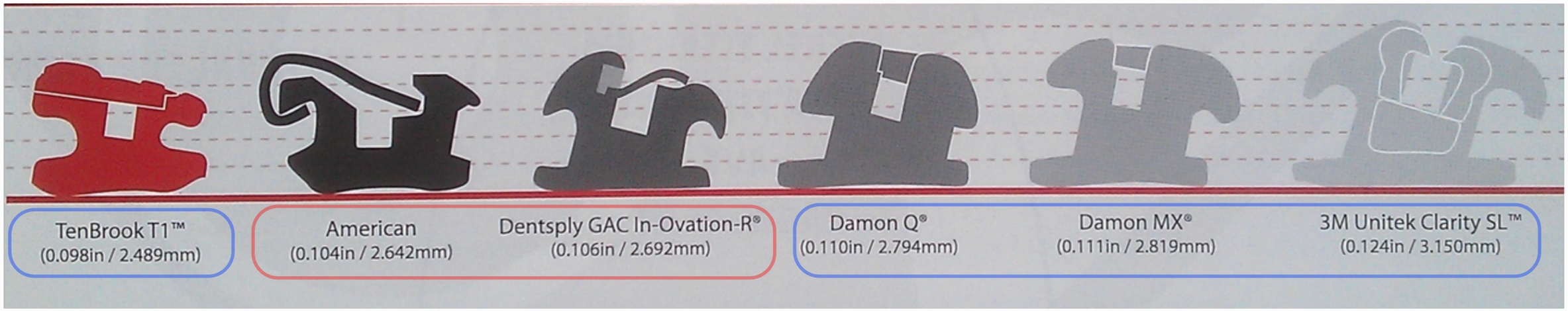
Active brackets



Passive brackets

ACTIVE VS PASSIVE SELF LIGATION BRACKET

BRACKET PROFILE



: Passive SL

: Active SL

ACTIVE VS PASSIVE SELF LIGATION BRACKET

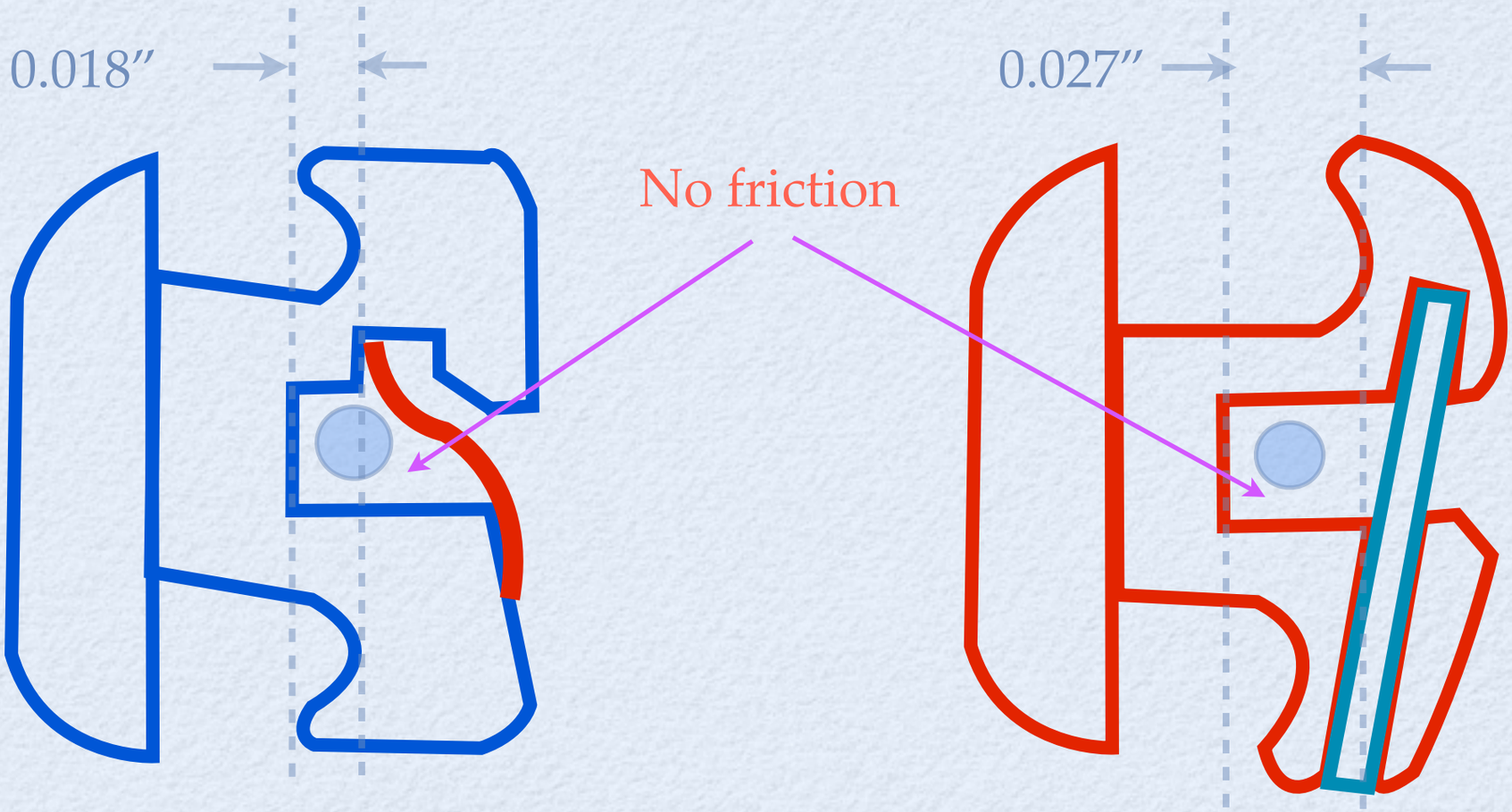
WIRE DIMENSION

Round wires 0.018"-- diameter

-Bucco-lingual leveling is more effective in active SL.

-The active clip can bring the tooth more labially with a given wire.
(maximum Bucco-lingual play is of 0.027 - 0.018 = 0.009 inches)

-Friction free on both



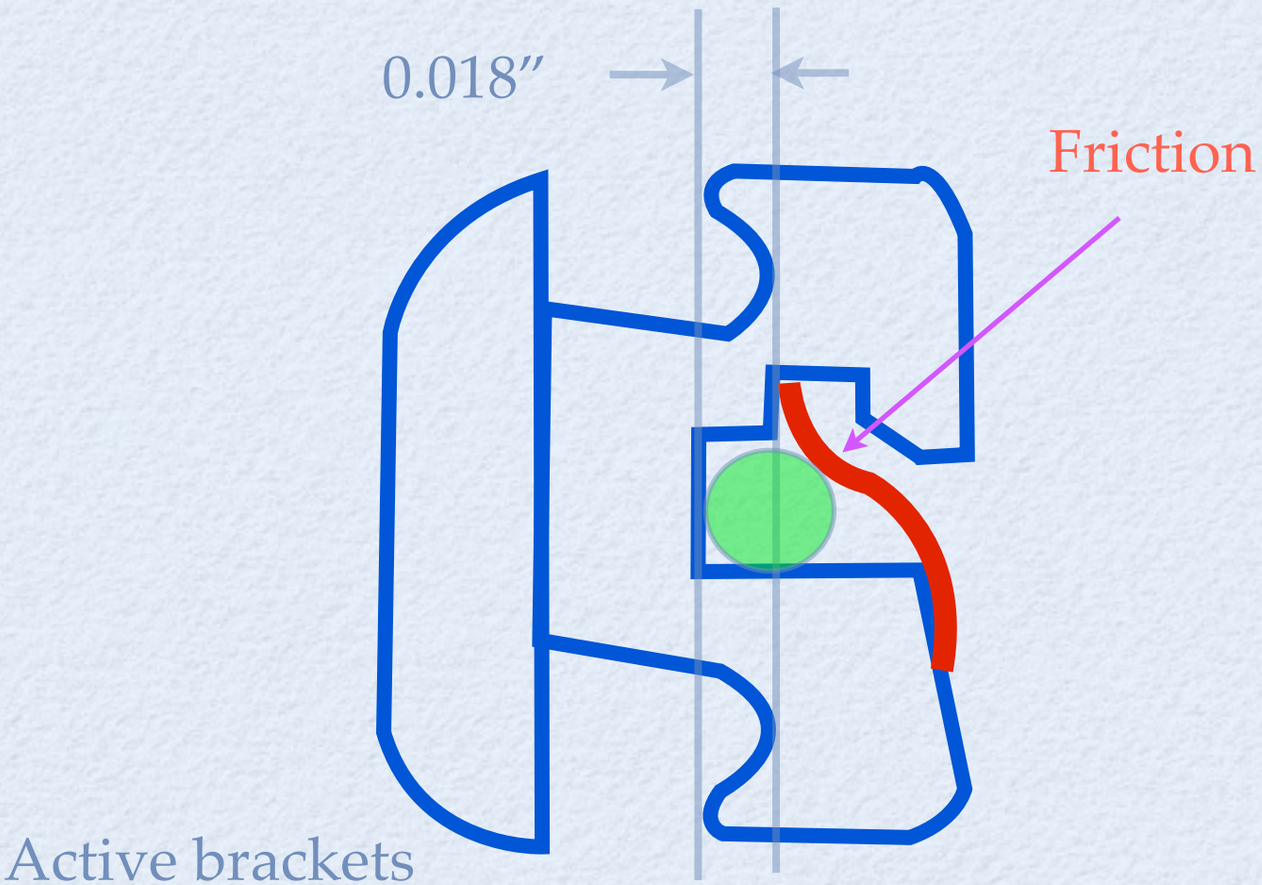
ACTIVE VS PASSIVE SELF LIGATION BRACKET

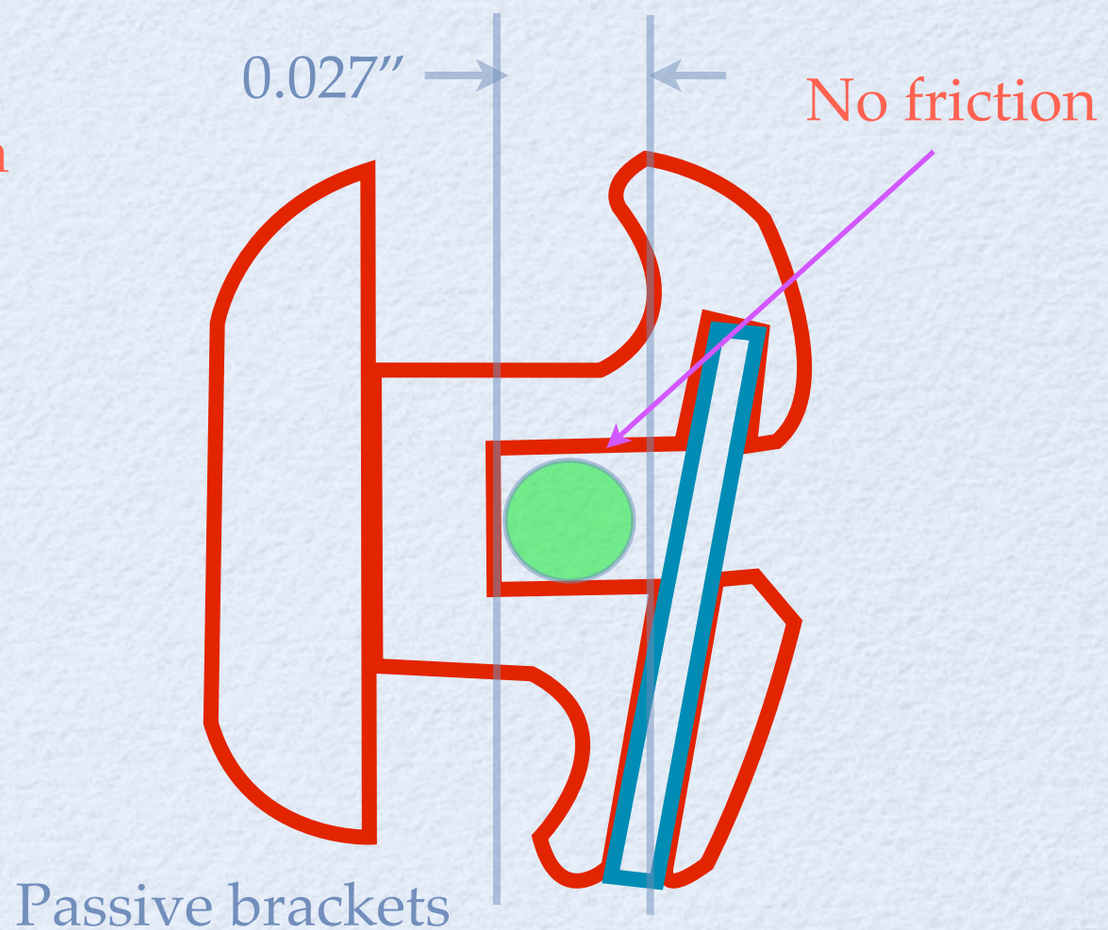
WIRE DIMENSION

Round wires 0.018"++ diameter

-Bucco-lingual leveling is more effective in active SL.

-Friction present on Active SL (Diagonal lingual force)





ACTIVE VS PASSIVE SELF LIGATION BRACKET

Rectangular wires

short gingival wall slot

0.018″

Diagonal lingual force

Active brackets

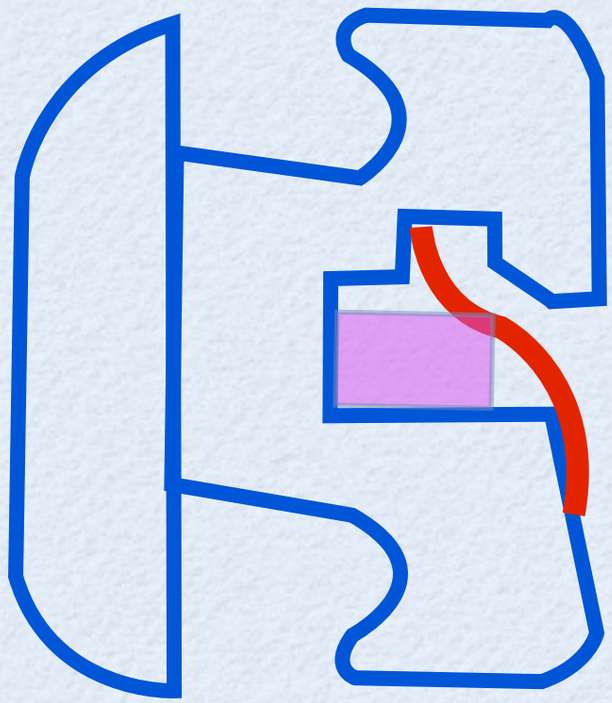
Real Couple force

0.027″

Passive brackets

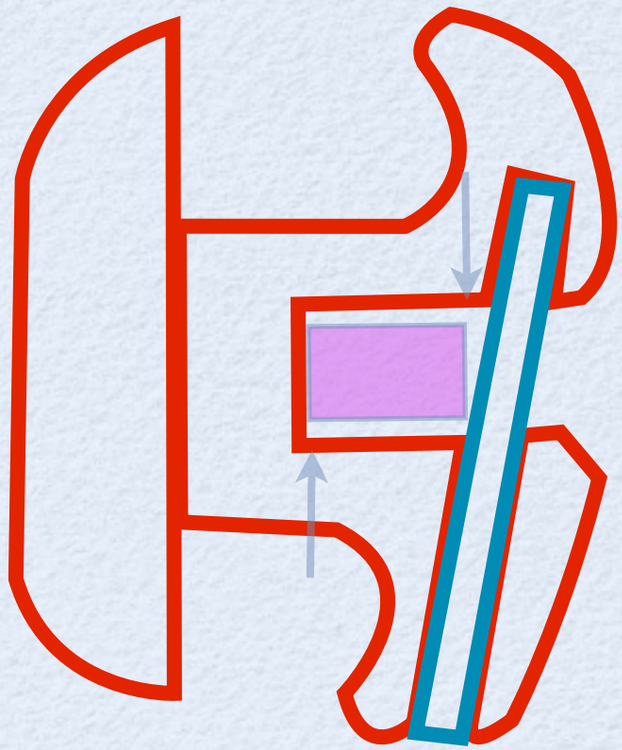
TORQUING FORCE & SL

Active brackets



No third-order effect
(No couple force)

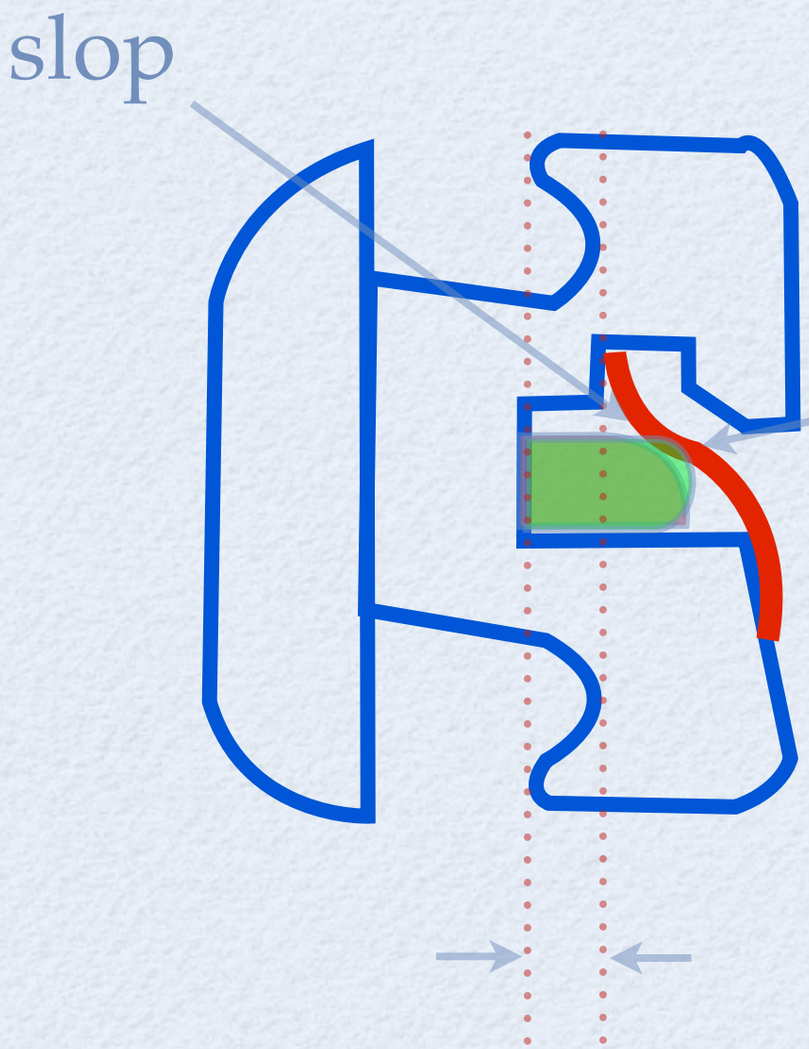
Passive brackets



Real Couple force
produced

THE ‘SLOP’ BETWEEN THE RECTANGULAR WIRE AND THE SLOT AND ALSO REDUCES THE MOMENT ARM OF THE TORQUING MECHANISM AND EVEN MORE, THE FRICTION INCREASE DUE TO A CONTINUAL LINGUALLY DIRECTED FORCE

Several solution to compensate the torque control

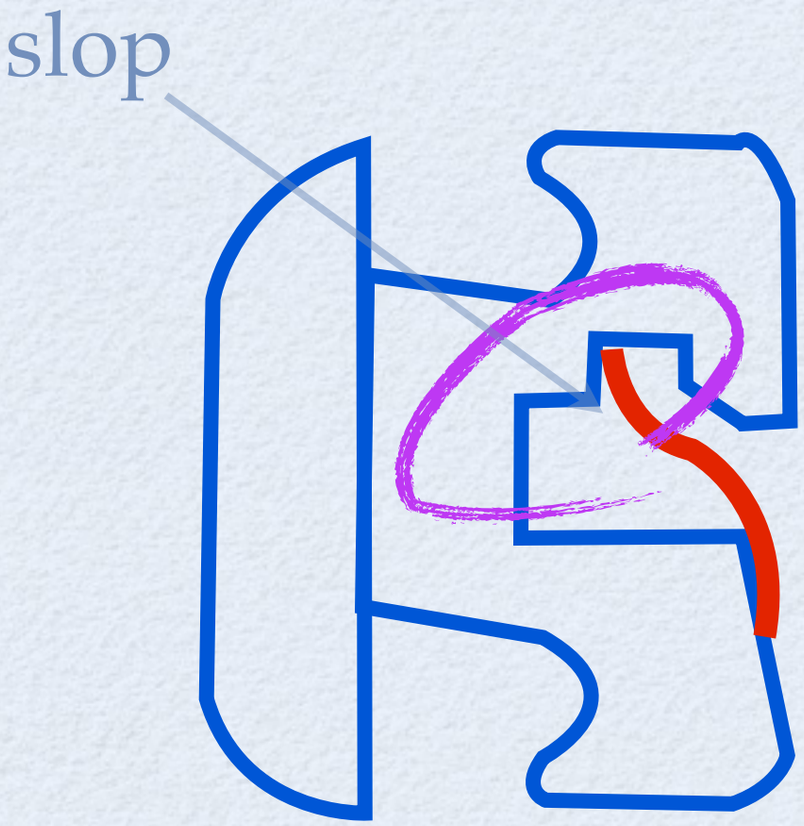


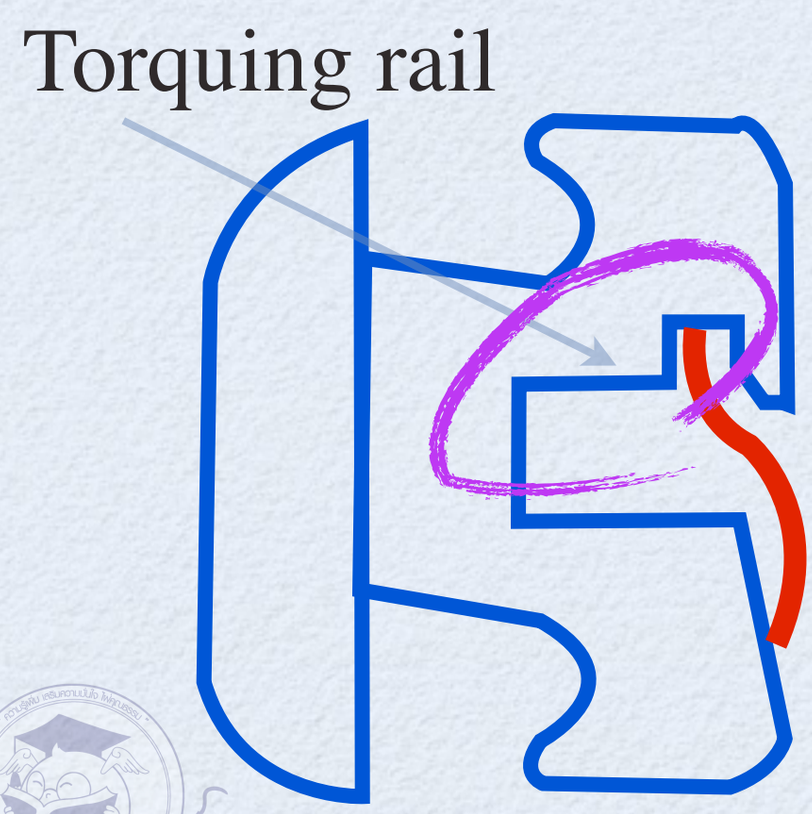
Arch wire shape

- High precision and control with reduce friction during sliding mechanics

- Highly effective in torque control during finishing

No third order interaction between the wire corners and the walls of the bracket slot



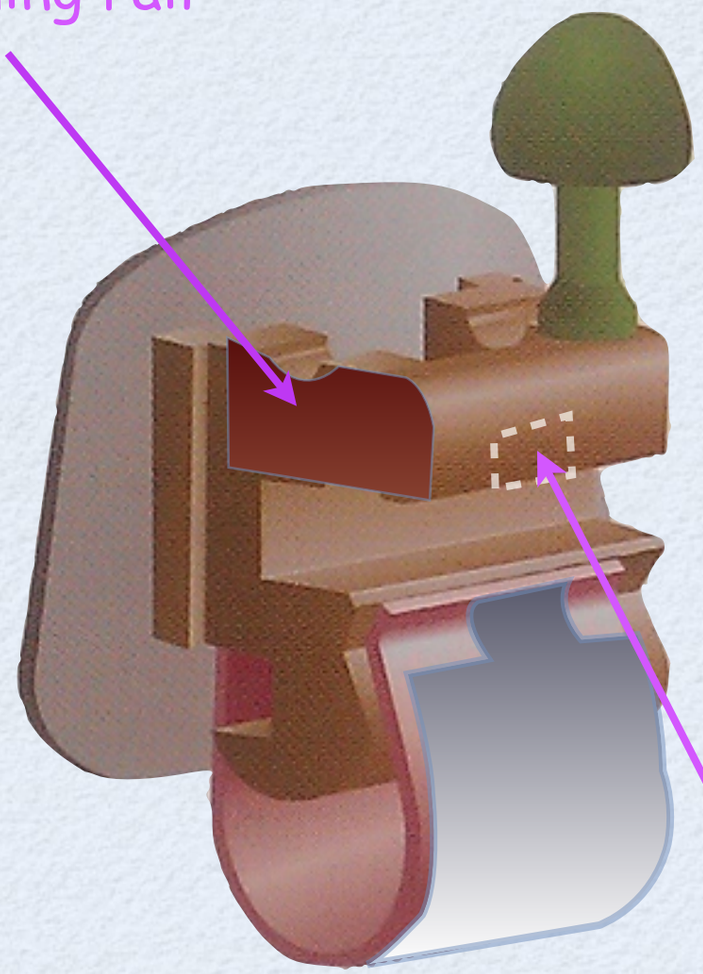


Several solution to compensate the torque control

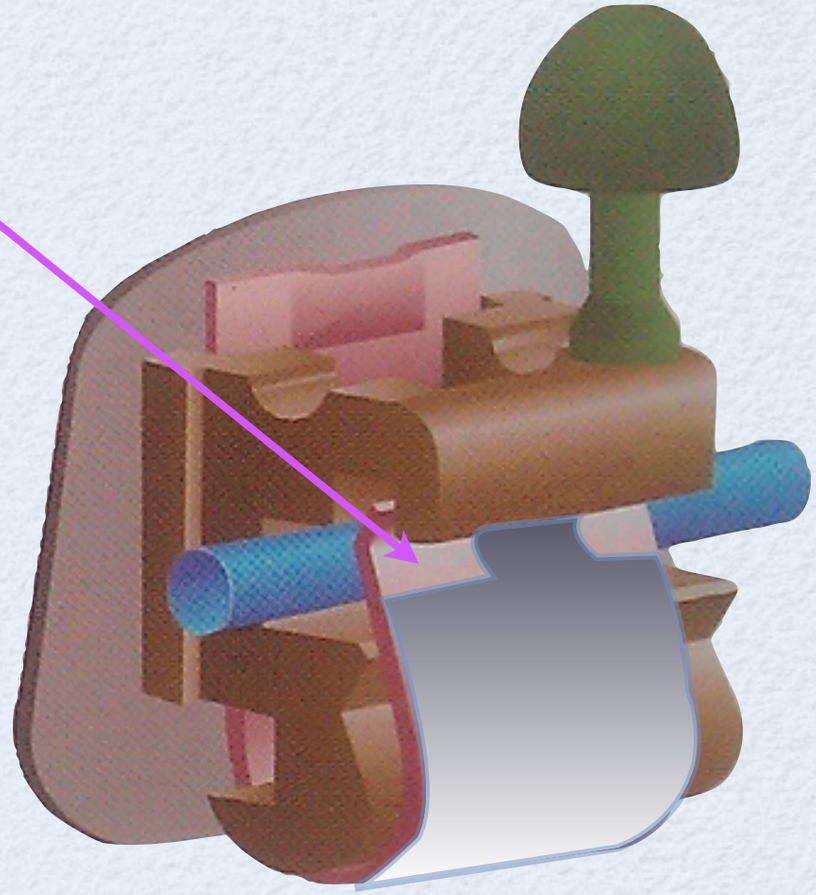
Torquing rails
at upper anterior teeth

extending the gingival walls of the slot either side of the clip restore the torquing effectiveness, but at the cost of a reduced mesio-distal width of the clip and therefore reduced rotational control.

Torquing rail



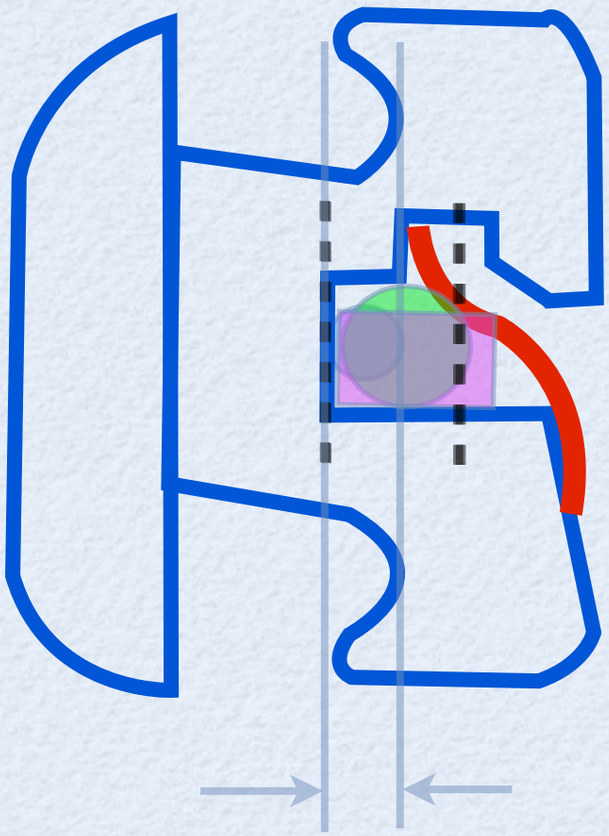
Rotational control



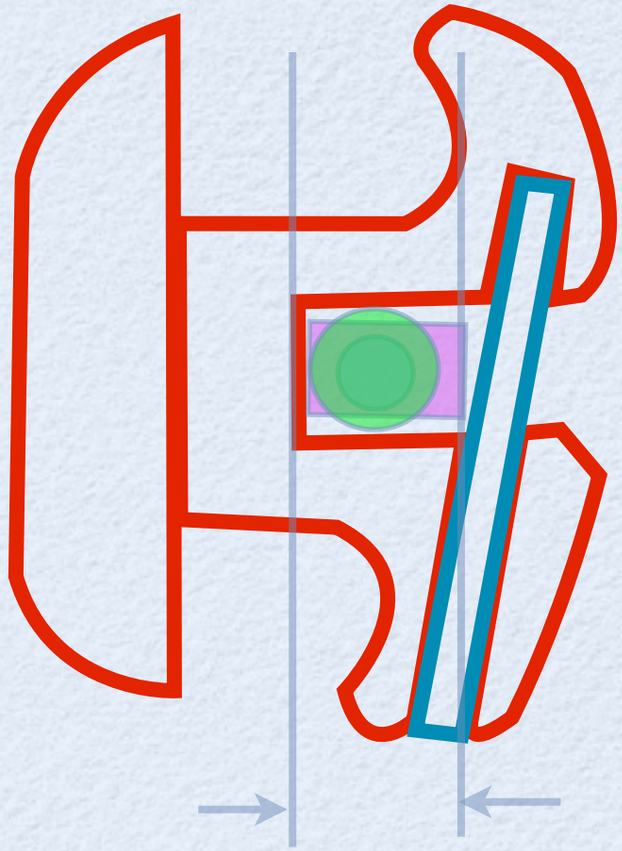
Shorten encroach spring clip

ACTIVE VS PASSIVE BRACKETS

Slot Depth



Active brackets



Passive brackets

Sliding Mechanic & Friction

in self ligation bracket

The orthodontic procedure involving sliding and friction

Levelling (2º) the arch

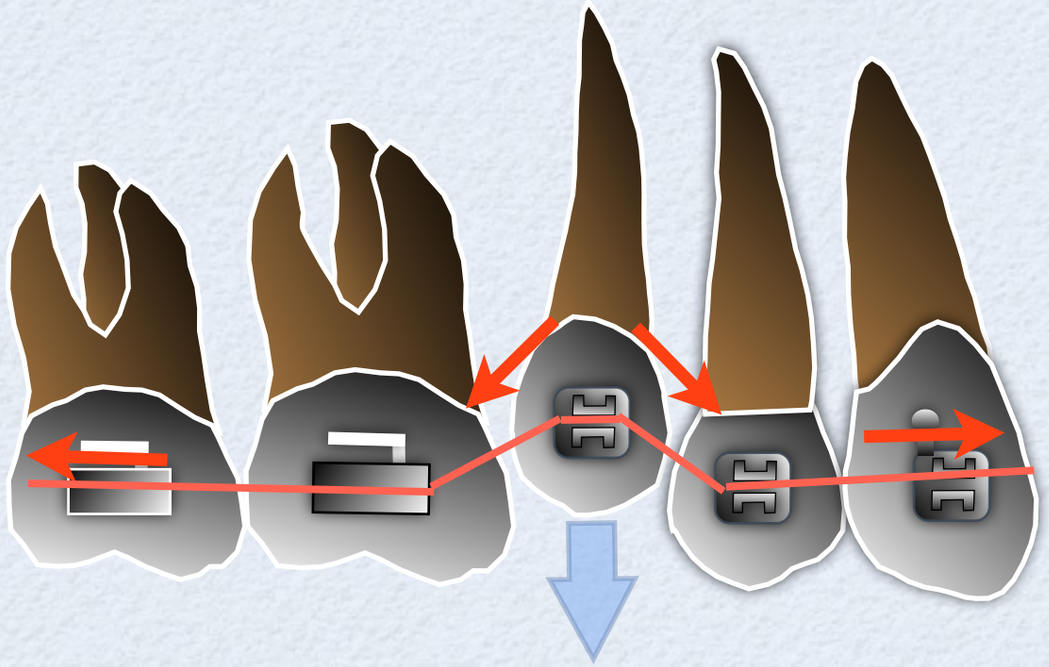
In-out (1º) discrepancies

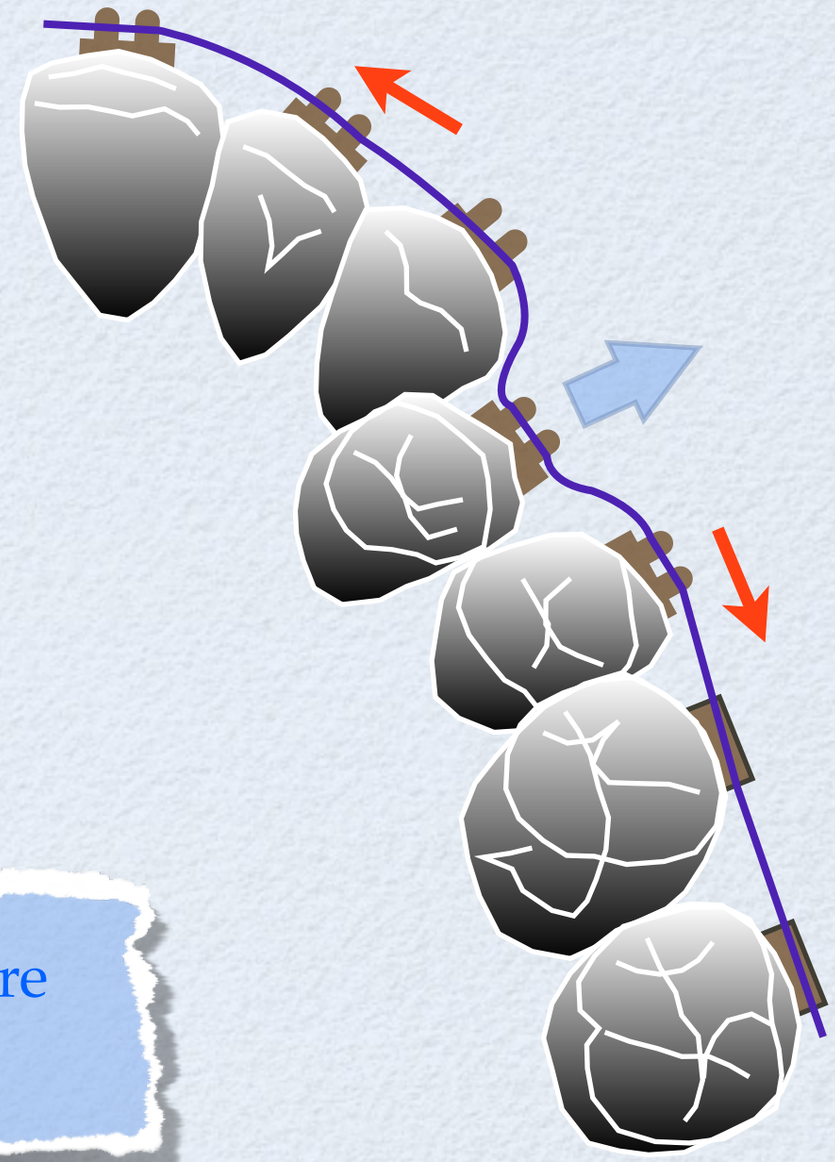
Aligning high canine (2º)

Rotational tooth correction (1º)

Changing the arch form (expansion (1º))

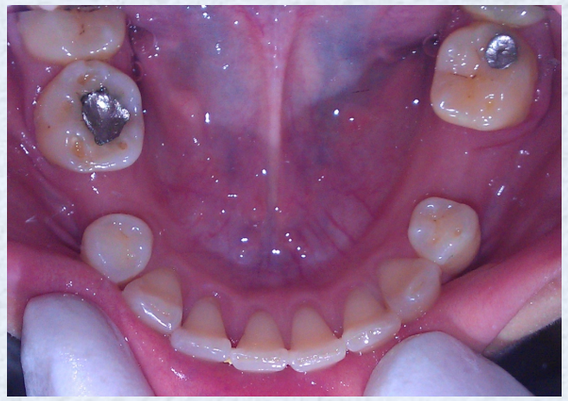
Sliding Mechanic & friction

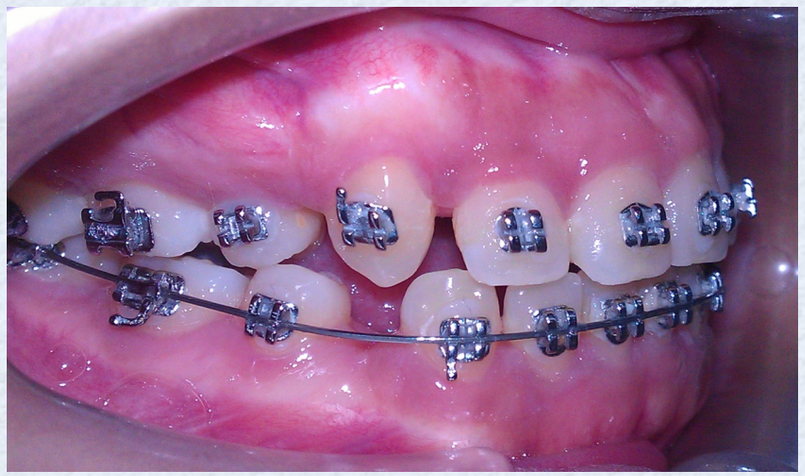


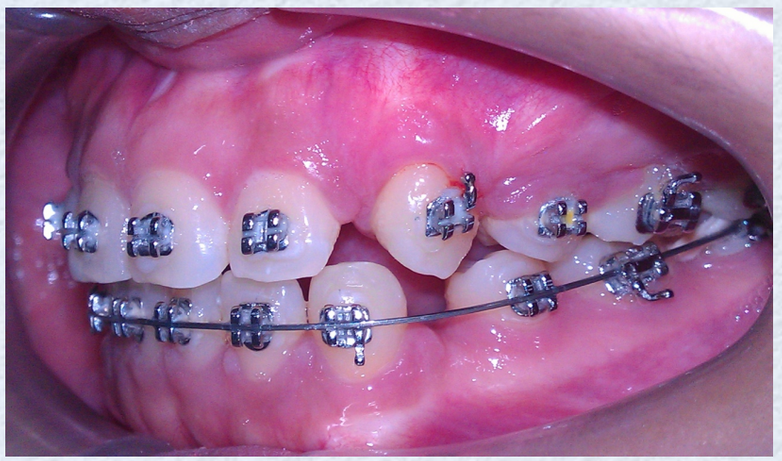


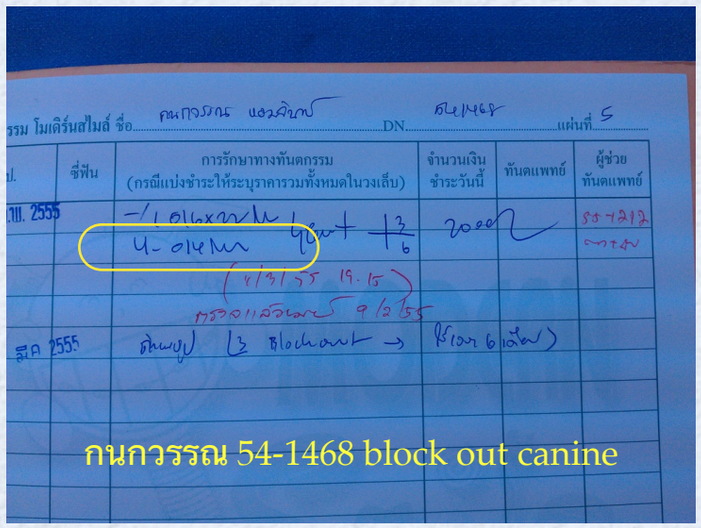
In the levelling and aligning stage, the wire must slide along the slot of the bracket


เดือนเพ็ญ 53-0306



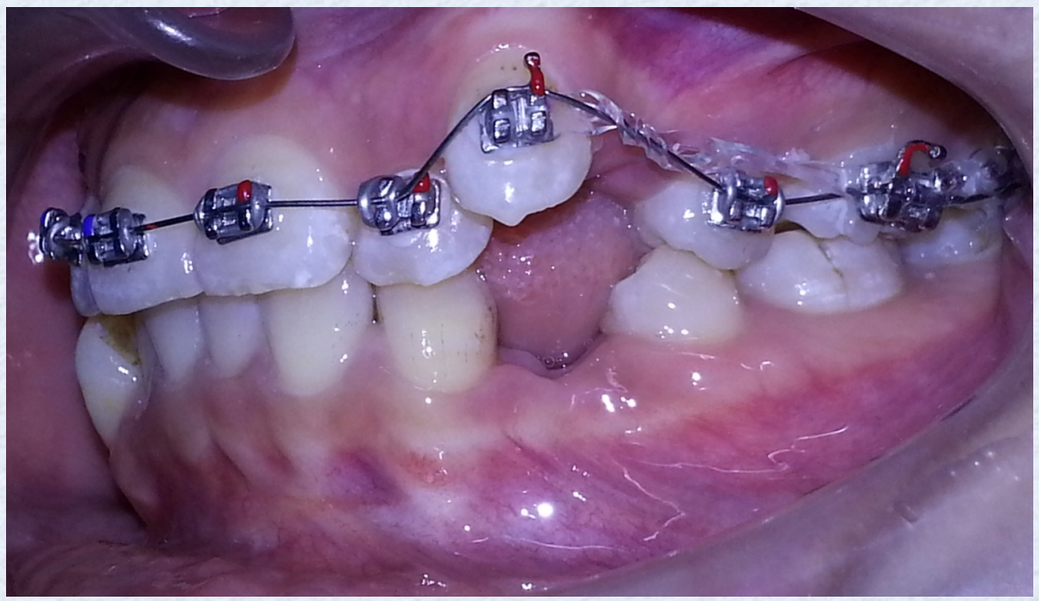


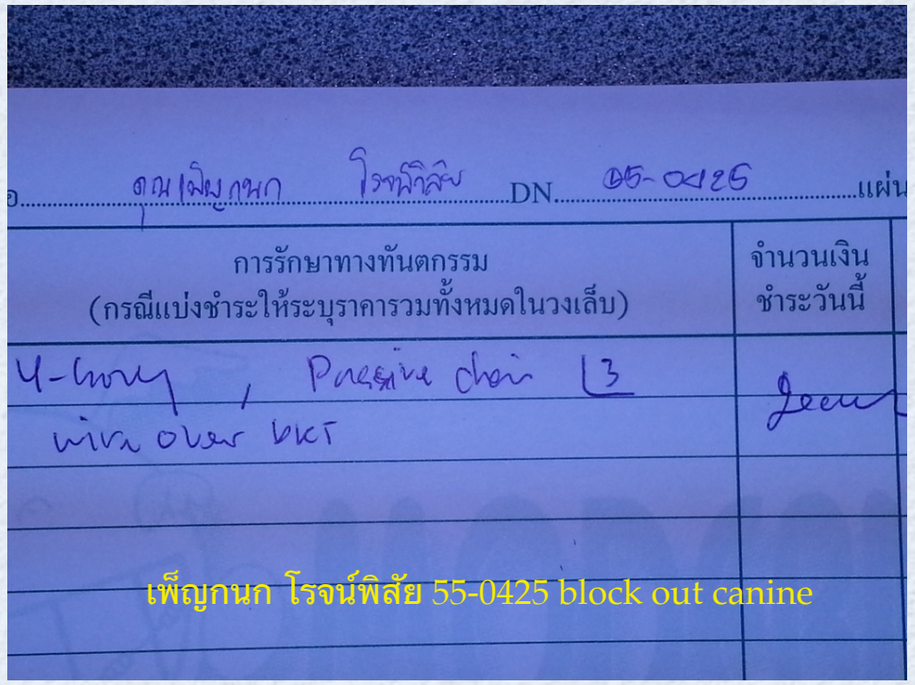


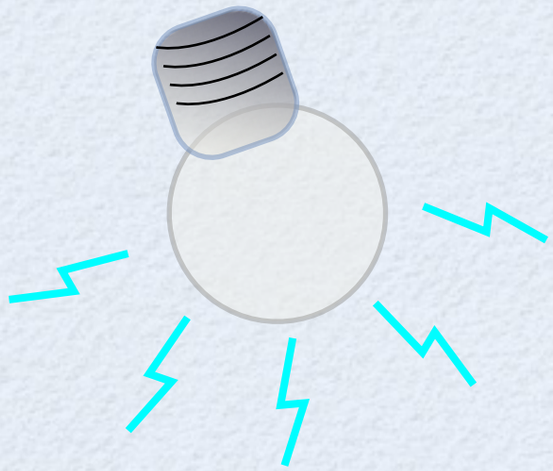


กนกวรรณ 54-1468 block out canine

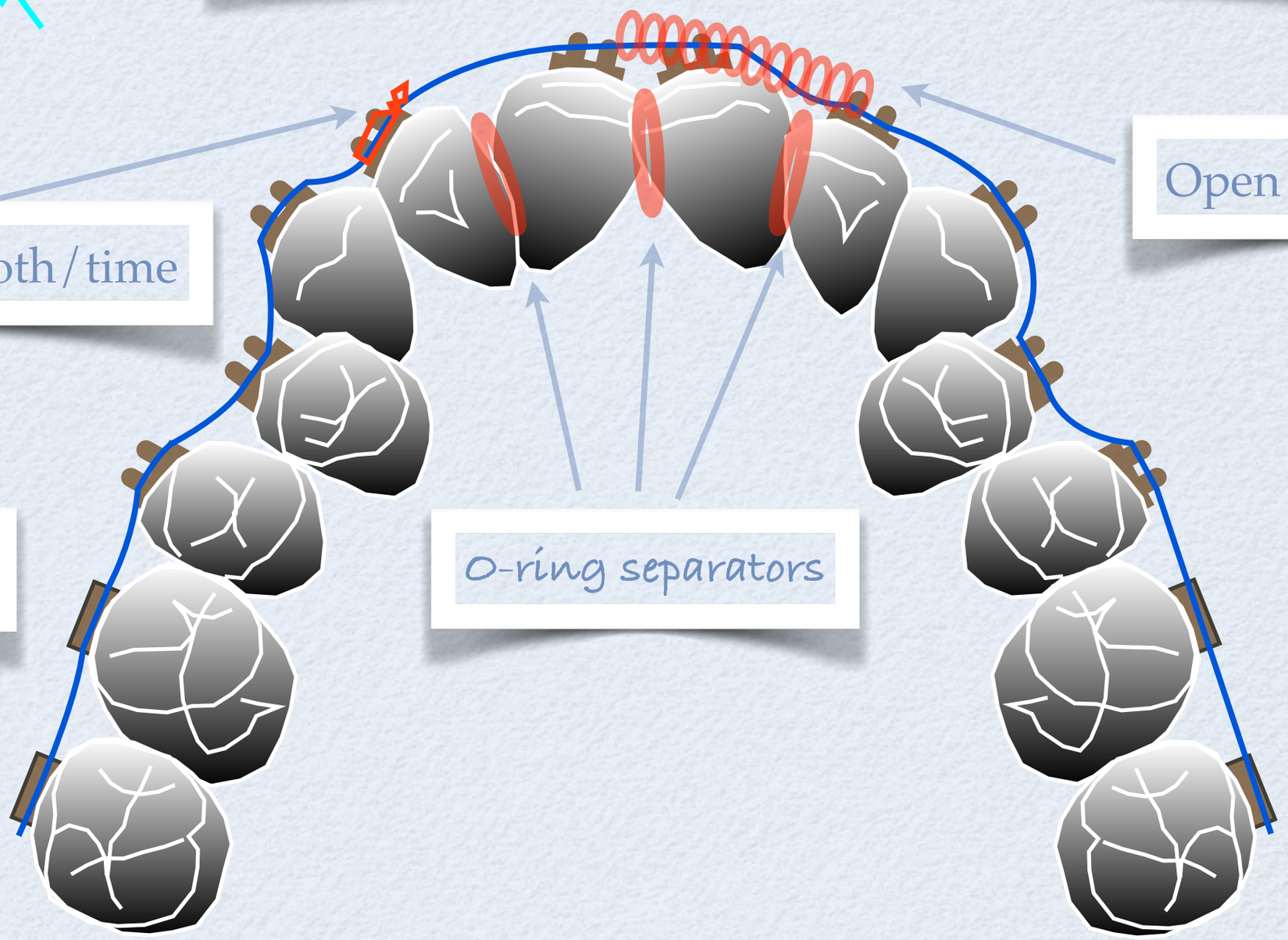
กนกพร พูนศาสตร์ 52-1731 block out canine




DN 55-0425
การรักษาทางทันตกรรม
(กรณีแบ่งชำระให้ระบุราคารวมทั้งหมดในวงเล็บ)
จำนวนเงิน
ชำระวันนี้
Passive chain L3
เพ็ญกนก โรจน์พิสัย 55-0425 block out canine



Clinical Tip for un-crowding teeth in conventional bracket



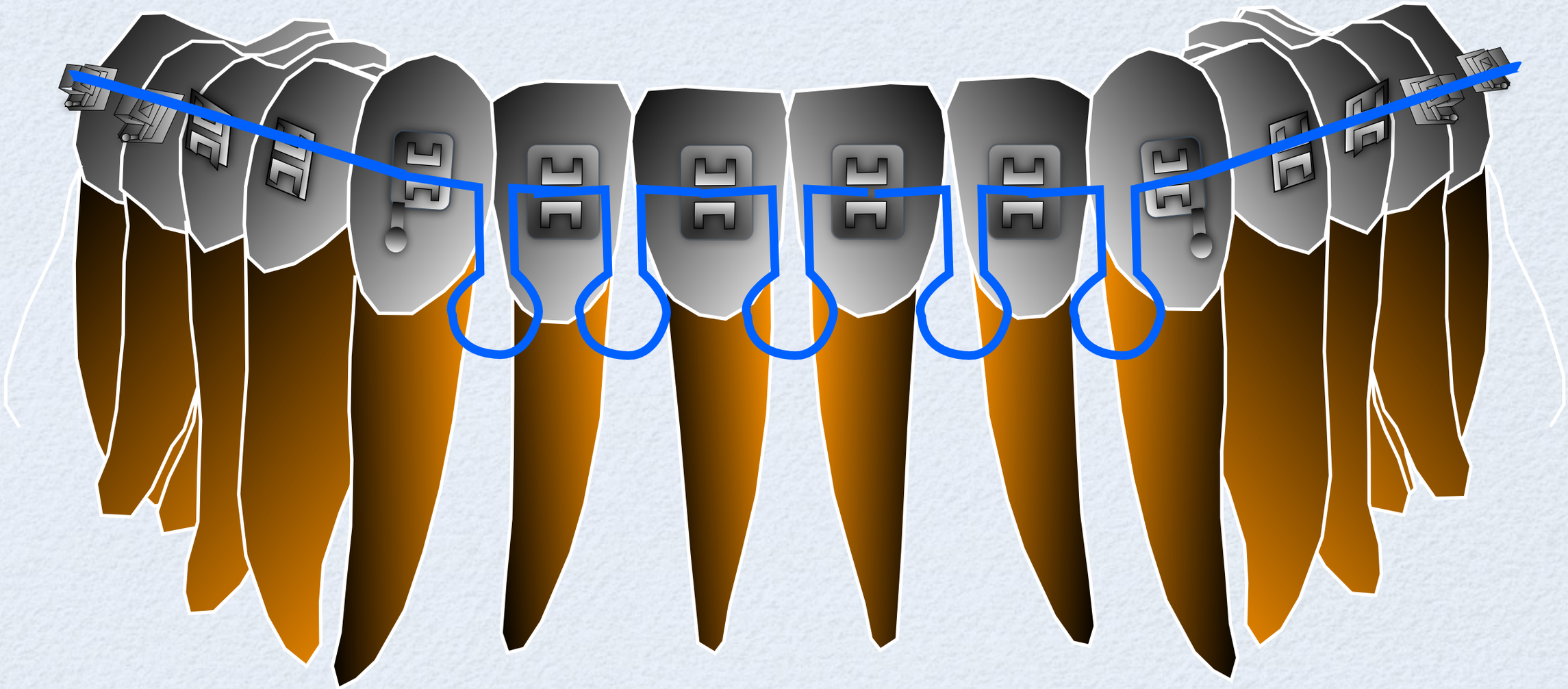
Tightening one tooth / time

Open coil spring

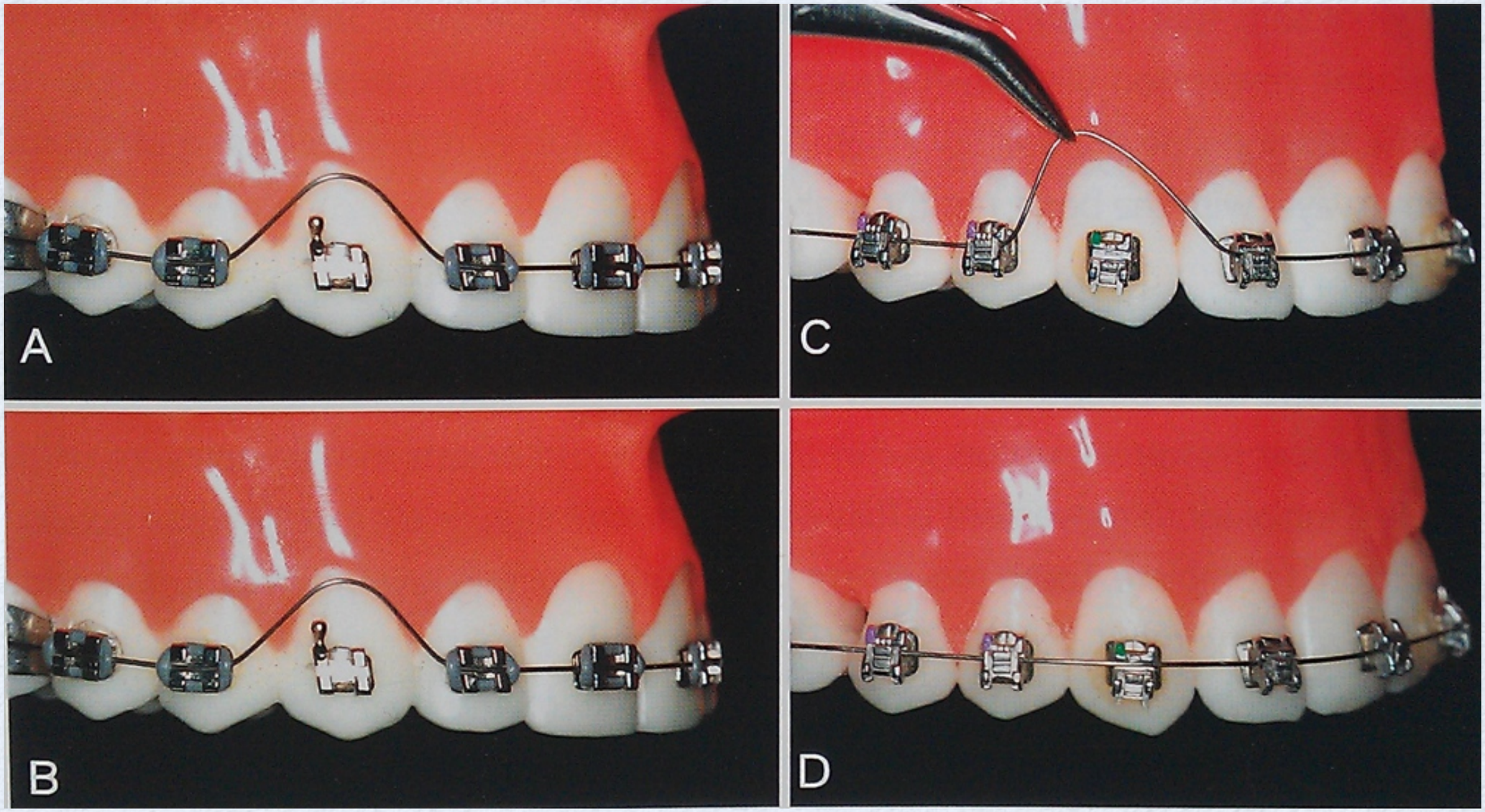
Scaling calculus

O-ring separators

Multiple loop



FRICTION



FRICTION

The friction factors are as follows

- BKT material: Metal, Porcelain,Polymer, Plastic
- Wire material: SS, NiTi, TMA
- Contact angle: Friction, Binding, Notching
- Ligation Method: Elastomeric figure-8 O-ring, Elastomeric O-ring, SS, Active SL, Passive SL
- Lubrication: Saliva
- Accumulation of plaque or calculus

Classical friction

FRICTION

Binding

Notching

Resistance to sliding
(Frictional Resistance)

Classical friction

: The wire does not contact the bracket slot wall
(Contact Angle < Critical Contact Angle)

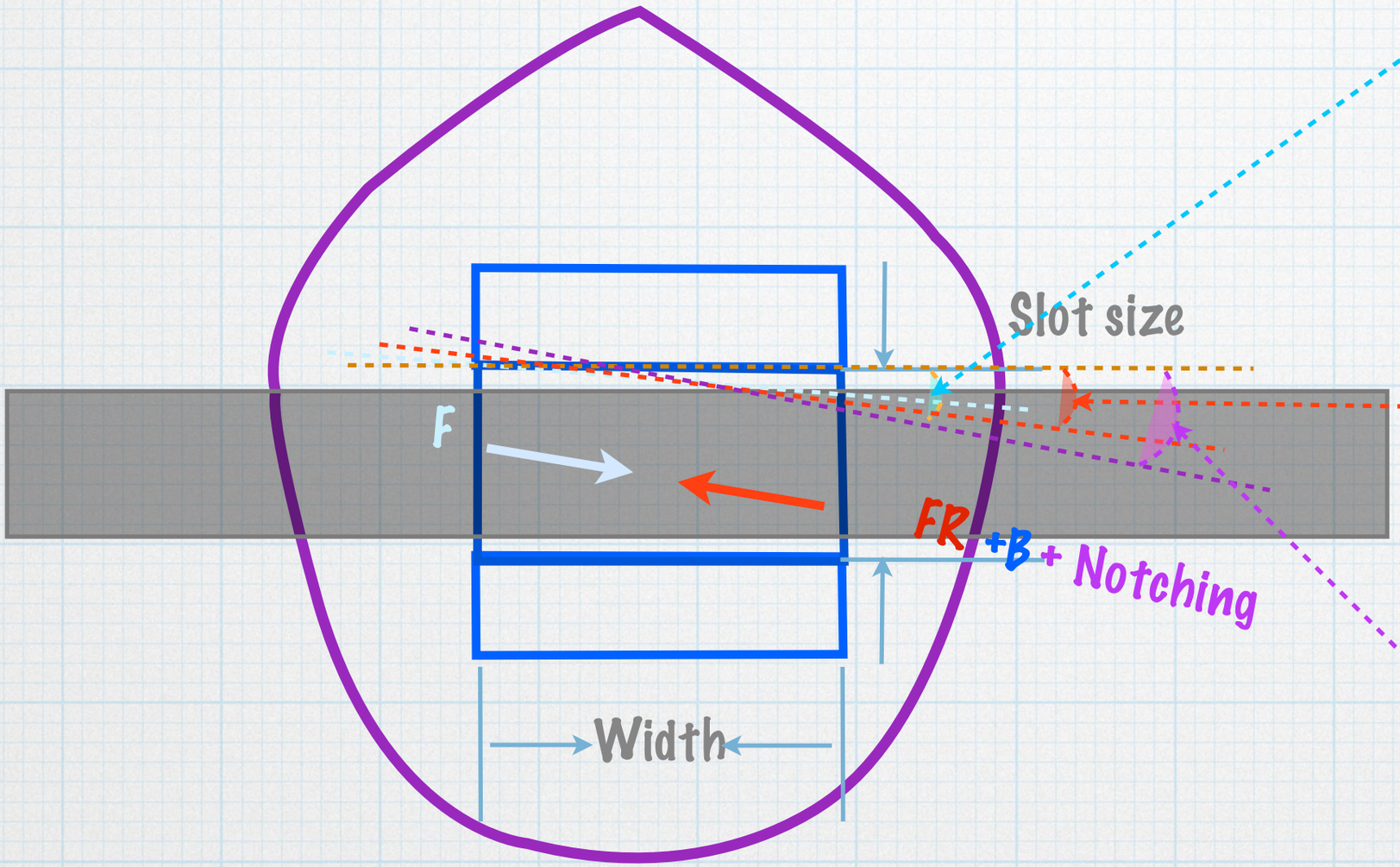
Binding friction

: The wire does contact the bracket slot wall and the wire is forced to bend (elastically deformed) contributing binding effect.
(Contact Angle > Critical Contact Angle)

Notching friction

: At the greater angle and the wire is forced to bend further beyond the elastic ability of the wire (wire deformed) contributing notching effect.
(Contact Angle >>> Critical Contact Angle)

Critical Contact Angle



θ < θc

= Classical friction

θ => θc

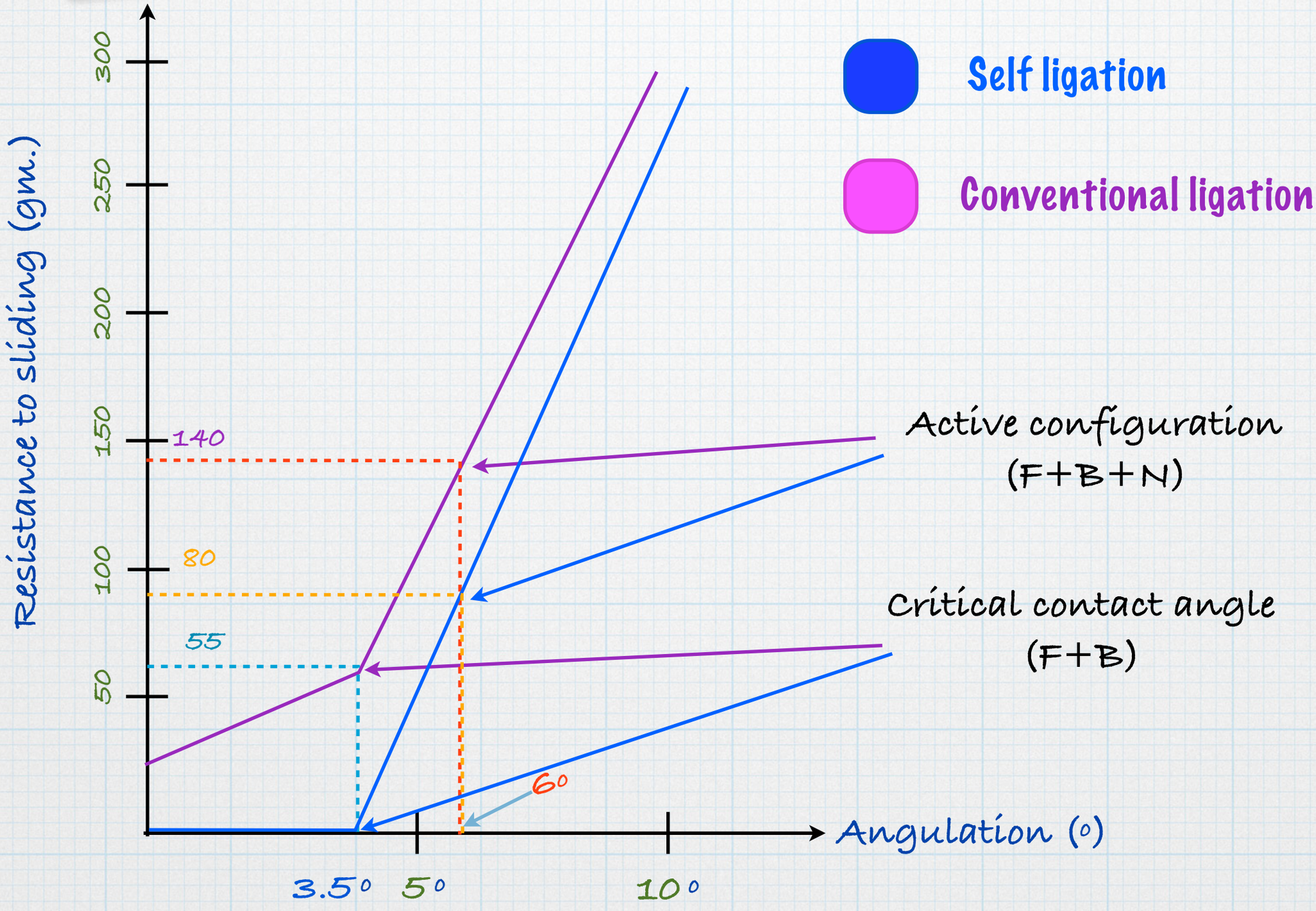
= Classical friction + Binding

θ =>> θc

= Classical friction + Binding + Notching

Kang BS, et all. AJODO 2003: 123(1) 64-73)

Comparison of RS of 0.018x 0.025 SS between 0.022 slot and Damon2



Thorstenson GA, Et al. AJODO 2005: 120(4): 361-70

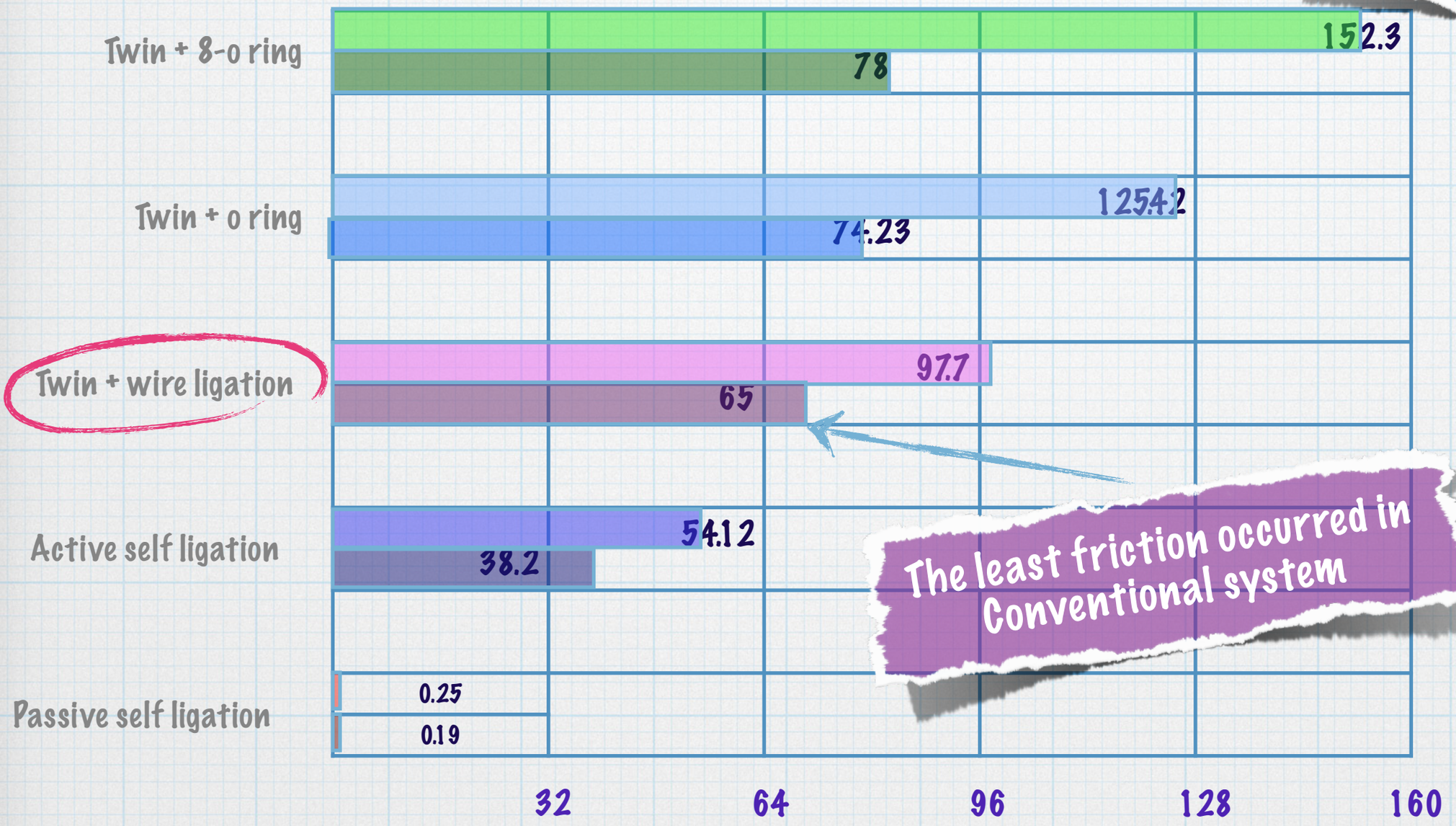
Result

Angulation (°)	Resistance to Sliding (gm)(1 8x25 ss in 22 slot)	
	Conventional ligation (gm.)	Self ligation (gm.)
0	34	0
3.5	55	0
6	140	80

Critical angle

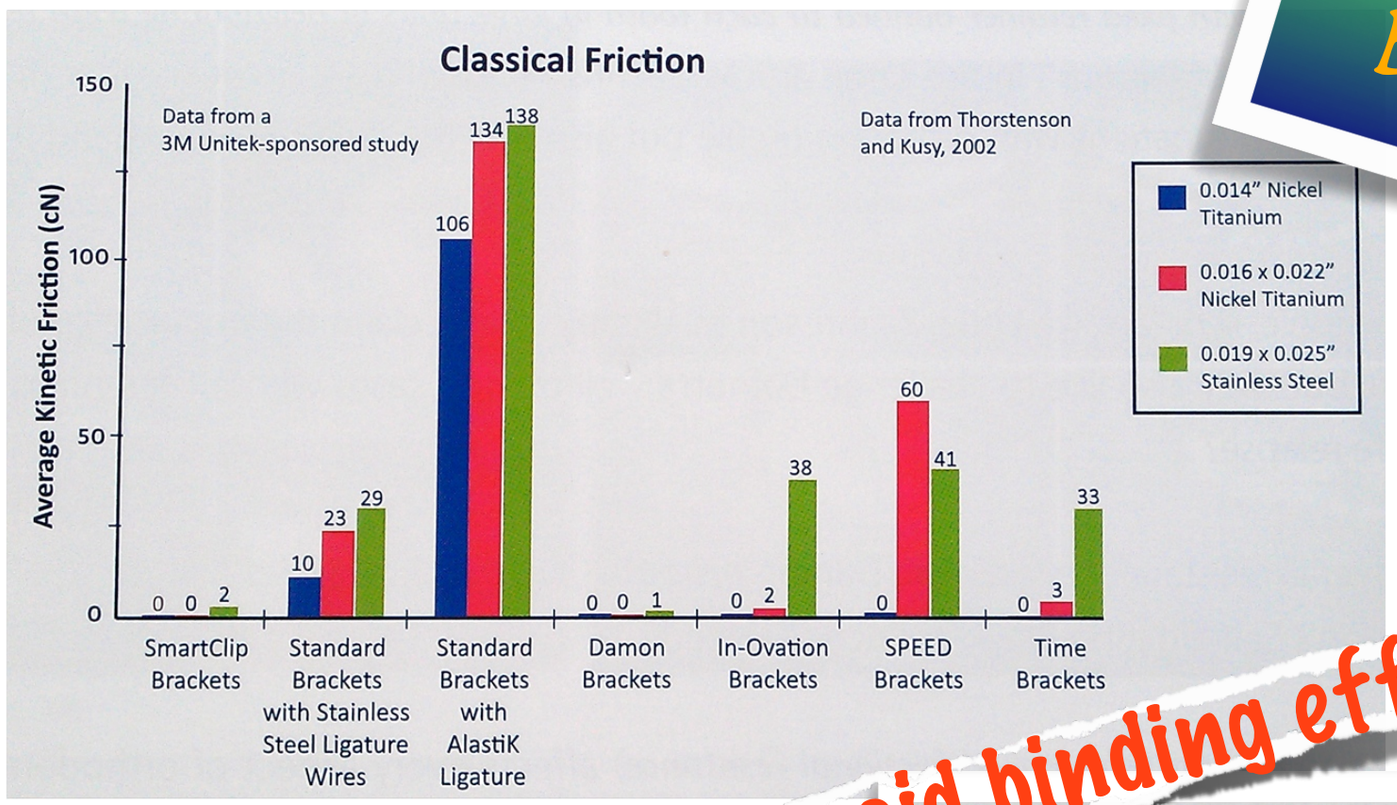
Friction: Comparison between several BKT

Classic Friction

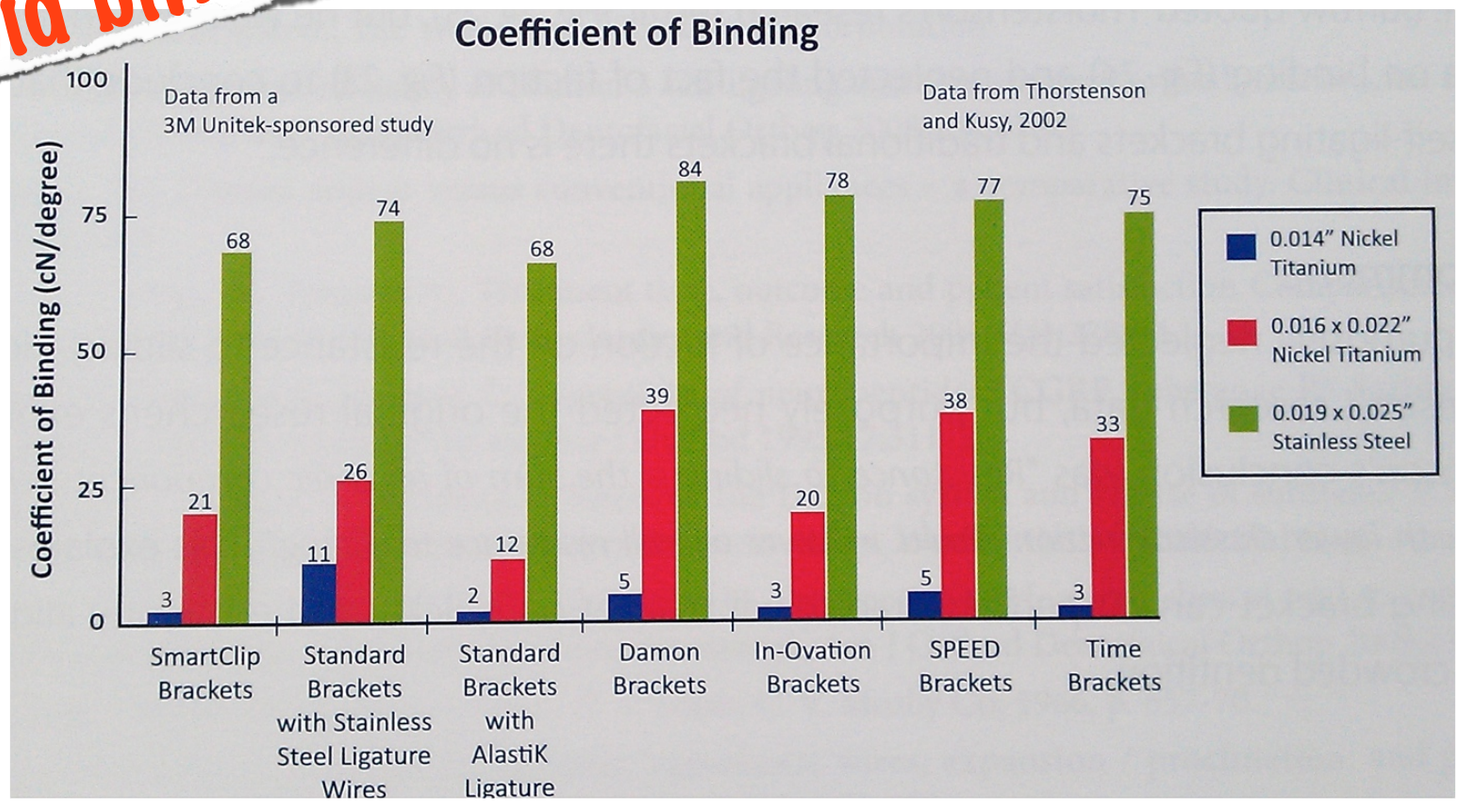


Frictional Resistance (gms) on 019x025 SS & .020

FRICTION & BINDING FRICTION



Try to avoid binding effect



How to avoid binding effect ??

In crowded teeth:

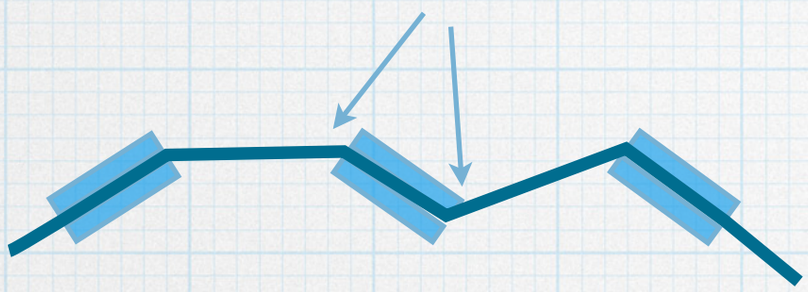
Use small wire to lumen ratio

In working wire (1 9x25):

Be sure that binding effect will not occur
(Complete levelling must be achieved)

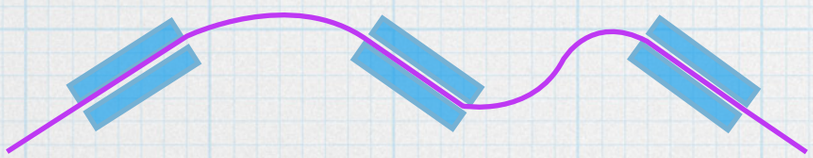
wire - to - lumen ratio

Binding friction



Large wire - to - lumen ratio

No binding friction



Small wire - to - lumen ratio

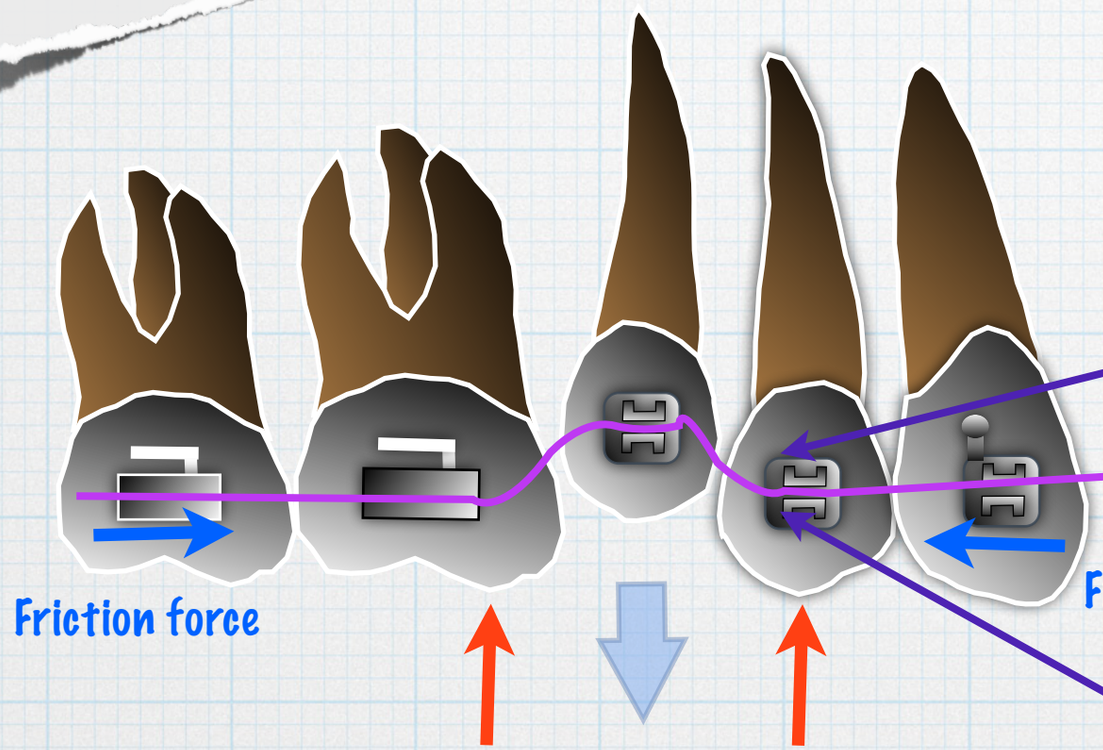
The lower the applied force,
the less the binding friction

FRICTION IN LEVELING AND ALIGNMENT

Clinical situation

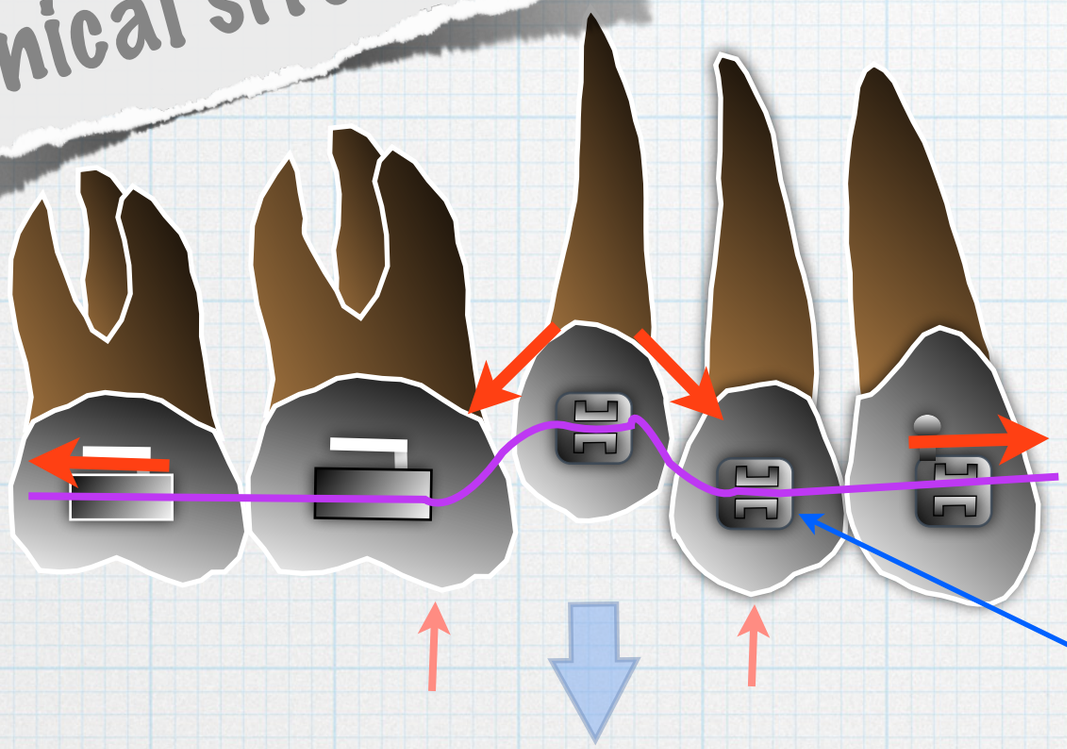
Conventional bracket

14 Niti in 22 slot



FRICTION IN LEVELING AND ALIGNMENT

Clinical situation



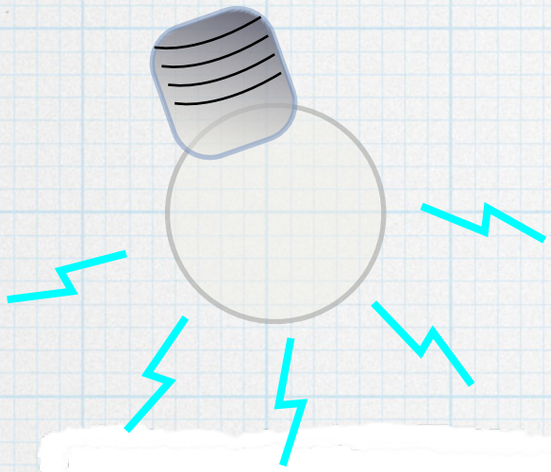
Damon bracket

14 Niti in 22 slot

No Flaring of anterior teeth due to **lip bumper** effect

No-binding effect
(Small wire to lumen)

Less or no Intrusion force of the adjacent teeth



Clinical tip

-Use Small wire - to - lumen ratio in levelling stage.

-Avoid binding effect by not to let the critical contact angle occurred.

-Un-engaged in the bracket slot in case of severe crowding such as high canine.

Classical friction

The arch wire does not contact the edges of bracket slot walls, contributing the resistance to sliding

Binding

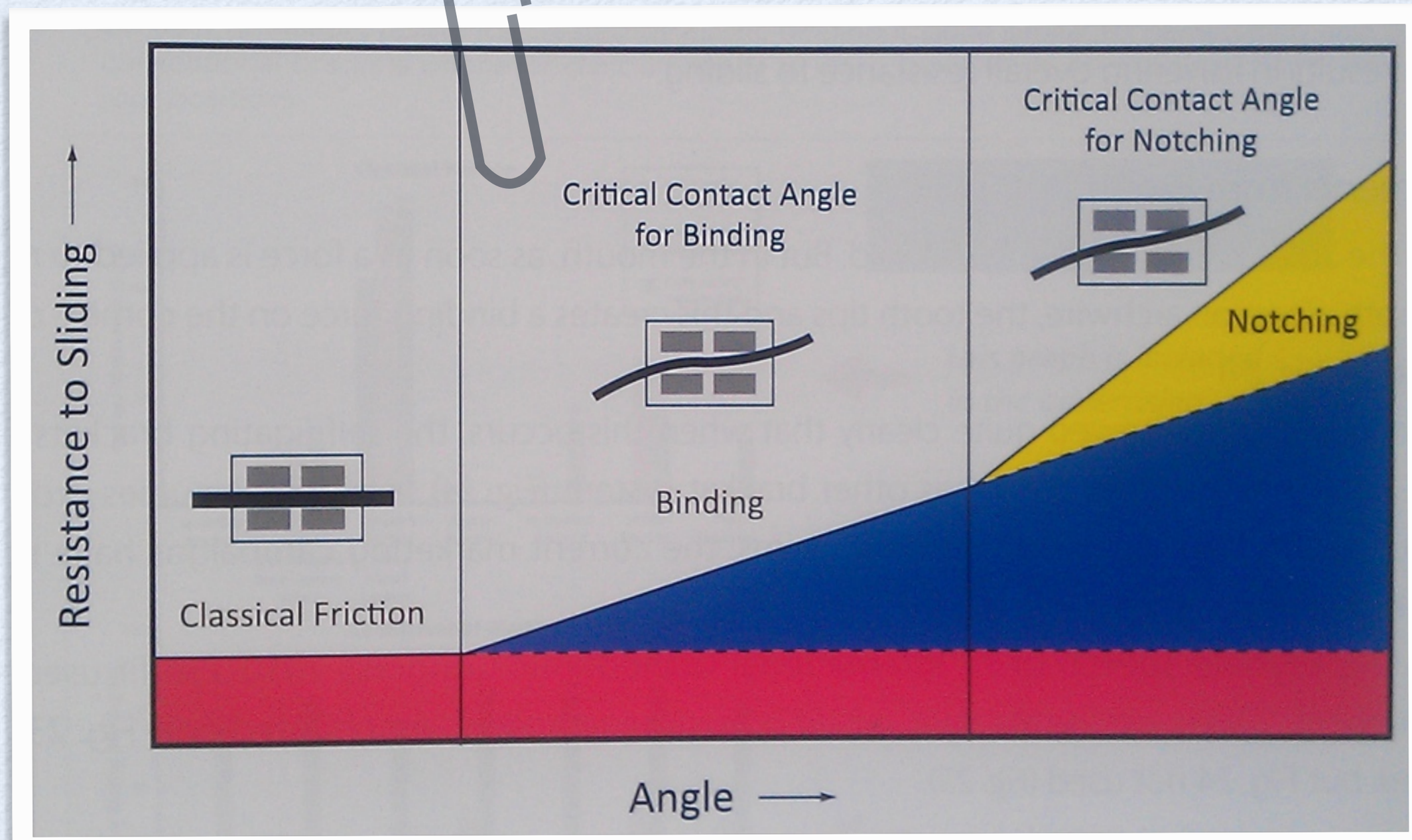
The arch wire does contact both opposing slot walls and is force to bend creating binding, contributing to the sliding resistance

Notching

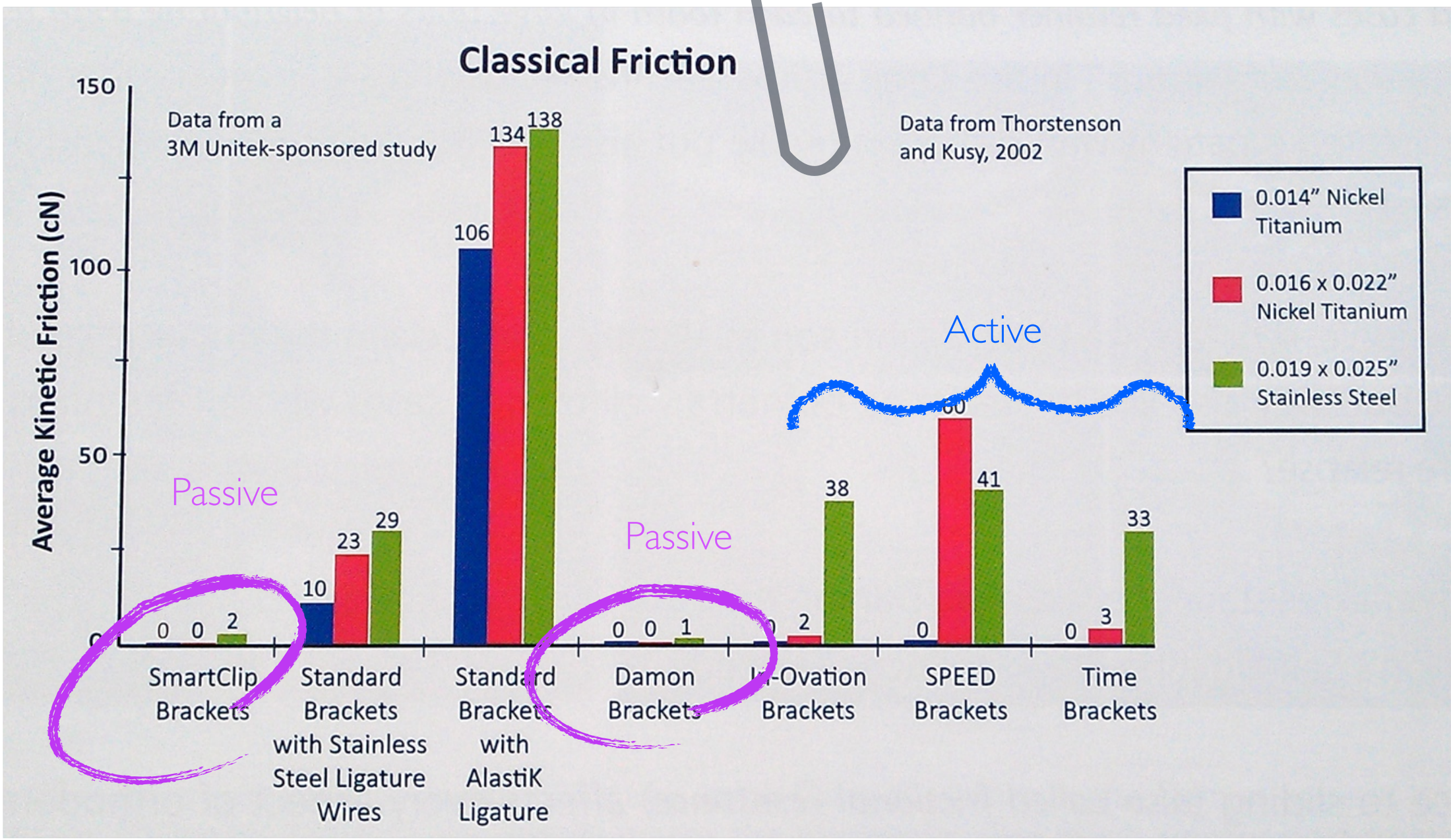
At some angle greater than the critical contact angle for binding, the arch wire can no longer withstand the forces at the edges of the slot walls and begins to permanently deform

MODERN SMILE INSTITUTE

FRICTION & SLOT-WIRE ANGLE



CLASSIC FRICTION



EXPERIMENT ON CLASSIC FRICTION

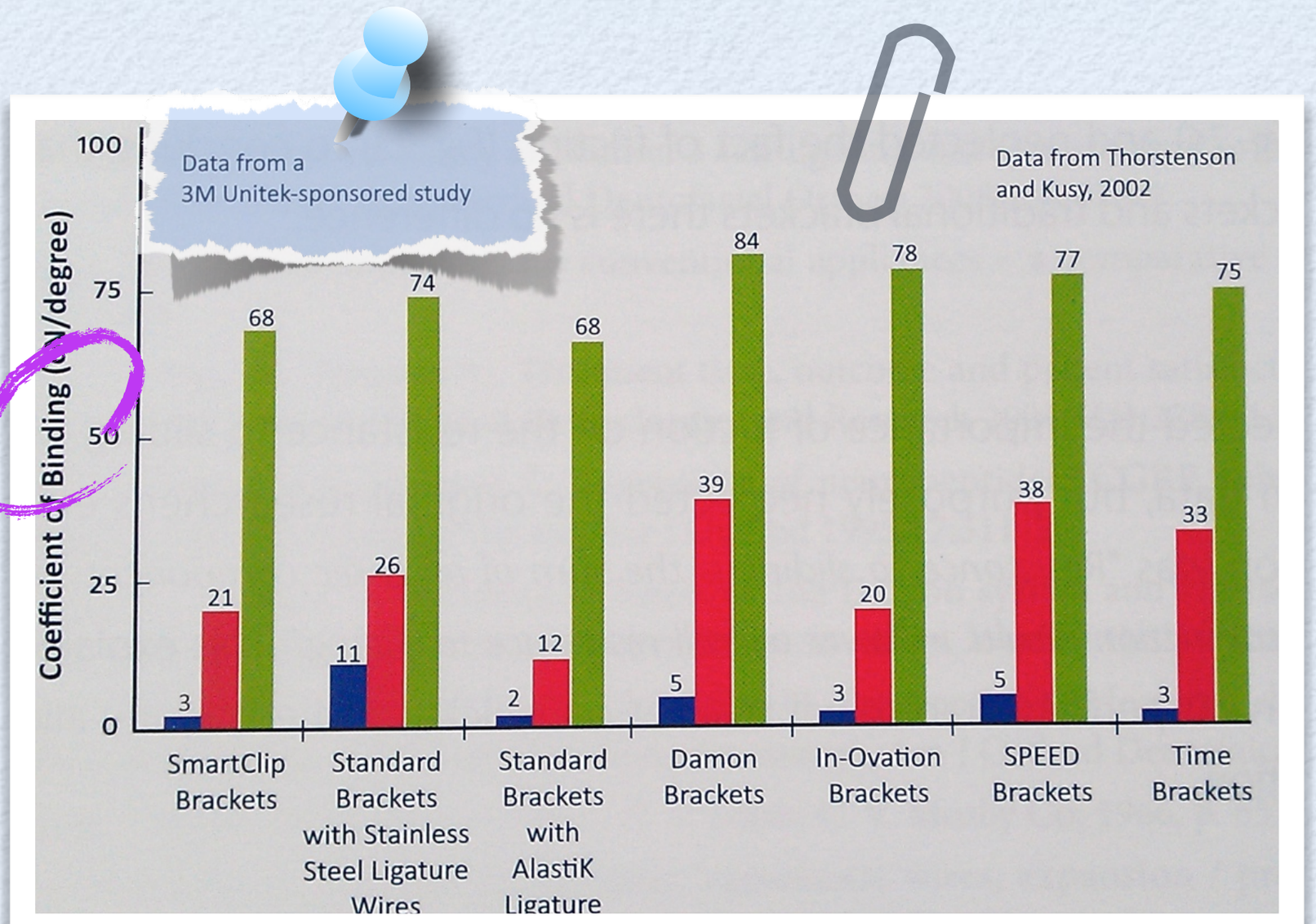
Table 1.2 Resistance to sliding (RS) for different bracket angulations with a 0.018/0.025 archwire. Forces in cN. Data from Thorstenson and Kusy (2001)[16].

Angulation (degrees)	Damon SL	Conventional bracket
0	0	34
3.5	0	55
6.0	80	140

Table 1.3 Mean dynamic friction for different brackets with an applied tipping moment on a 0.019/0.025 stainless steel archwire. Forces in cN. Data from Mah *et al.* (2003)[19].

Bracket	Minitwin	Transcend 600	In-Ovation	Damon2
RS in cN	379	455	238	99

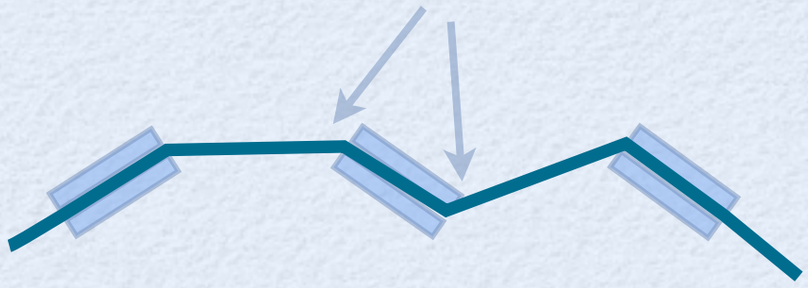
BINDING EFFECT



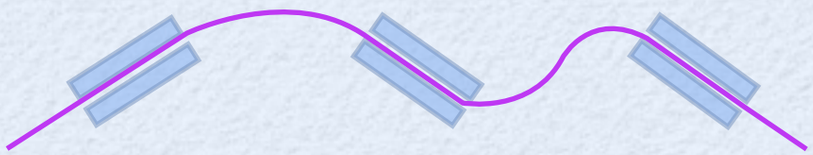
No differences between SL (Neither active nor passive) and Conventional bracket in view of binding effect

FRICTION & BINDING FRICTION

Binding friction



No binding friction



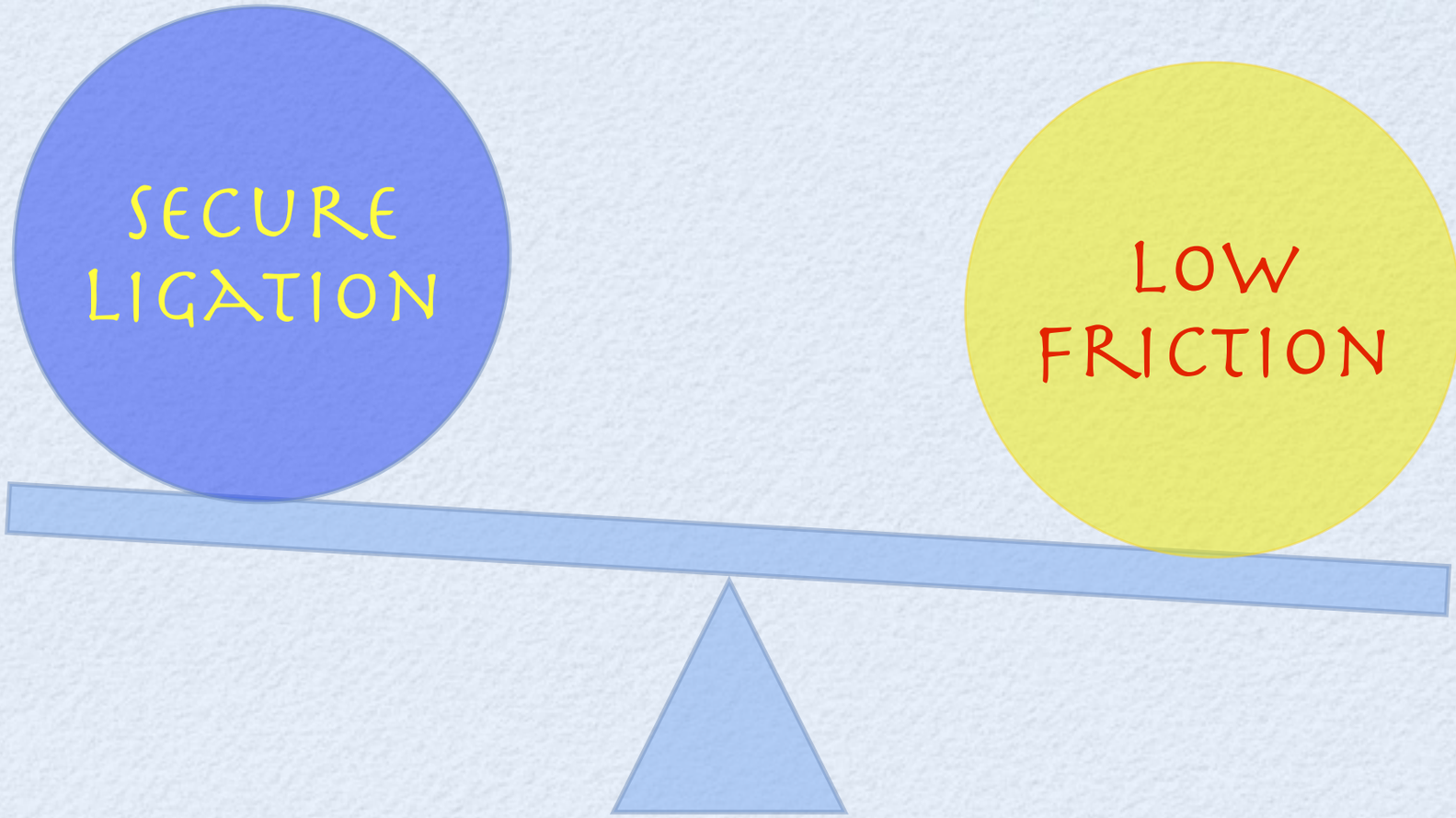
wire - to - lumen ratio

Large wire - to - lumen ratio

Small wire - to - lumen ratio

The lower the applied force (small wire-lumen ratio), the less the binding friction

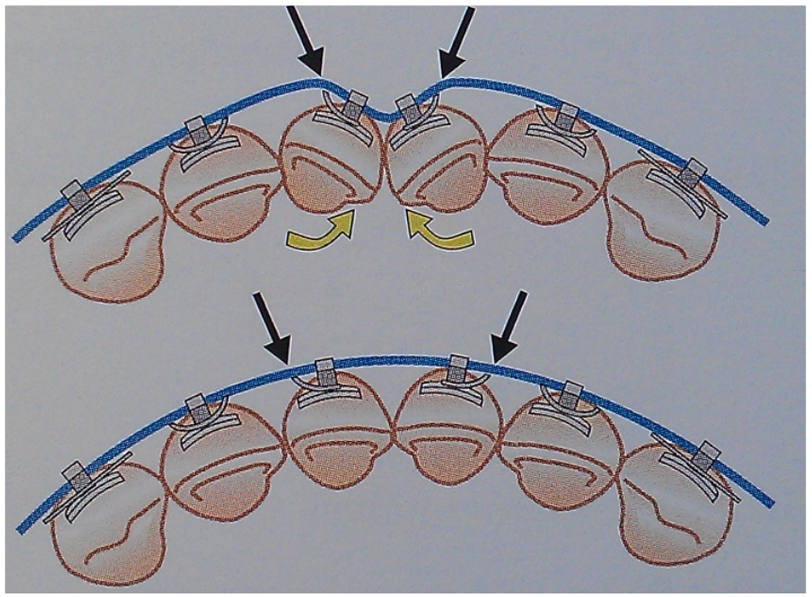
SECURE LIGATION AND LOW FRICTION AS A COMBINATION



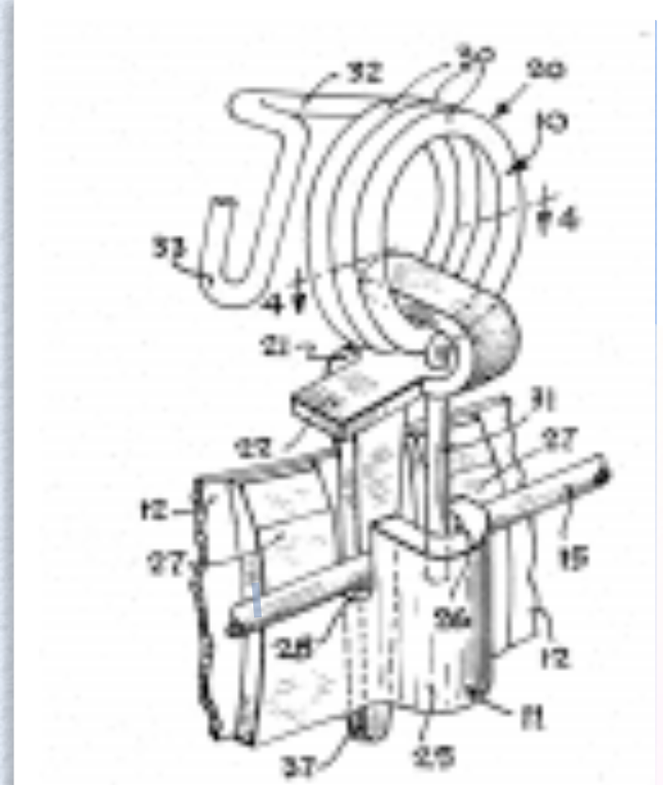
PASSIVE LIGATION CAN OVER COME BOTH SECURE LIGATION & LOW FRICTION

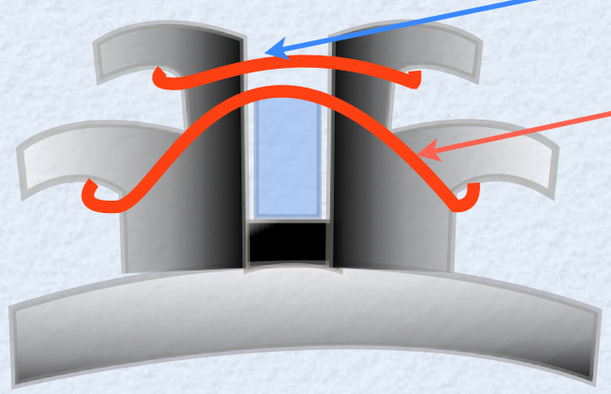
SECURE LIGATION AND LOW FRICTION AS A COMBINATION

Alexander Brackets



Begg brackets





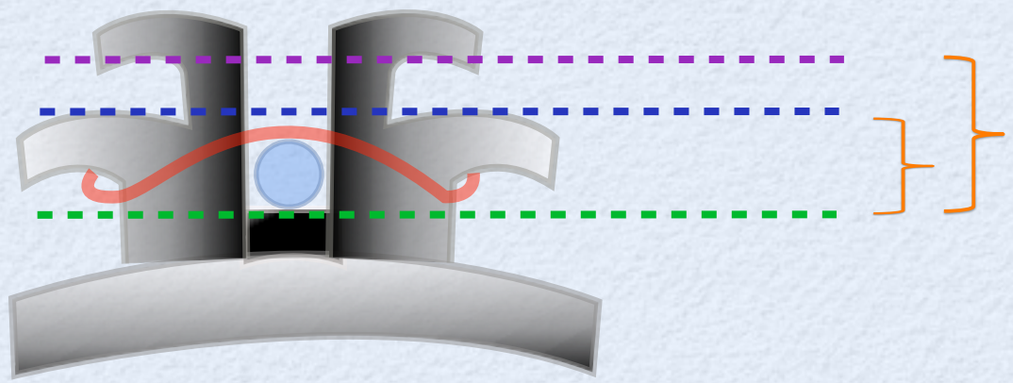
Low Friction Bracket

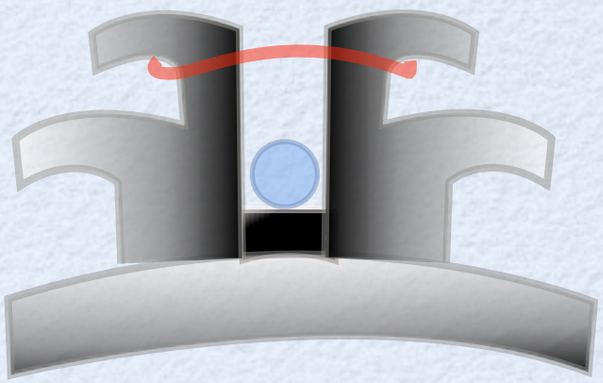
Double slot depth

SECURE LIGATION AND LOW FRICTION AS A COMBINATION

Low Friction Bracket

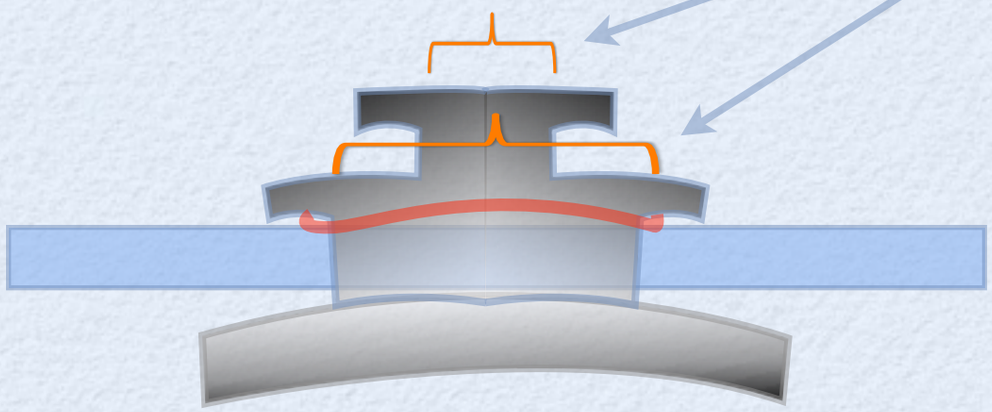
Double slot depth



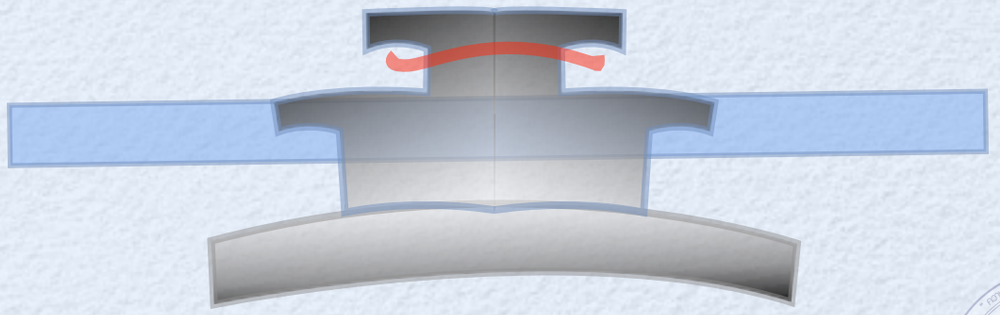


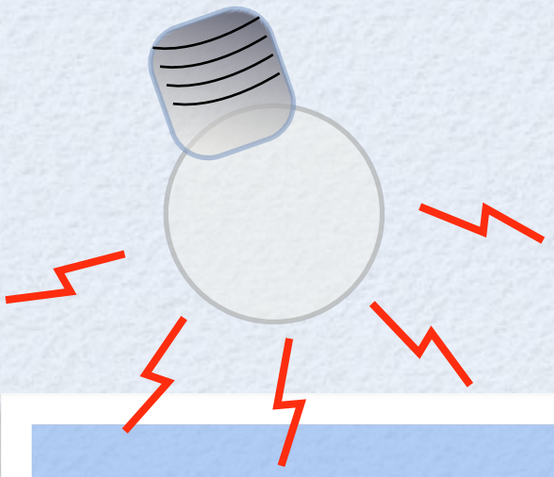
Double slot width

Small bucco-lingual play



Large bucco-lingual play





- Use Passive ligation bracket (less classical friction)

- Use high tech small wire during levelling to avoid binding effect

- Use light force during sliding mechanic being exercised.

- Self ligation bracket does not help in binding friction, does in classical friction

LABIO-LINGUAL EFFECT (PLAY)
(ROTATION CORRECTION)

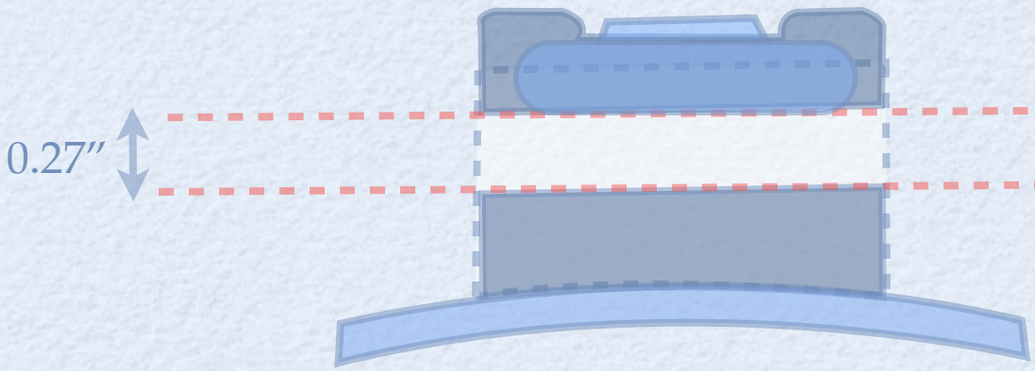
Wire dimension
(Edgewise)

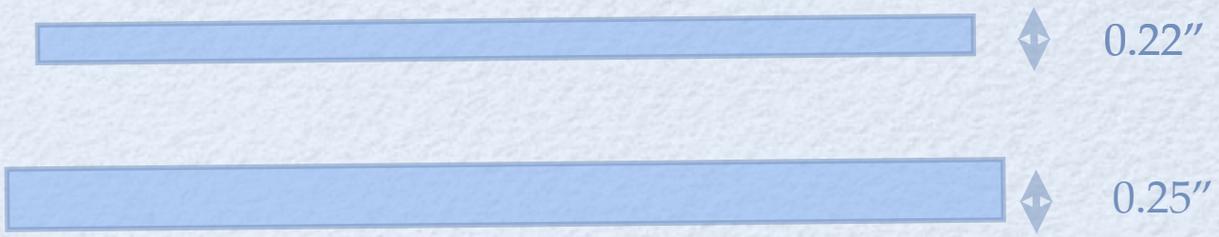
LABIO-
LINGUAL
EFFECT

Slot depth

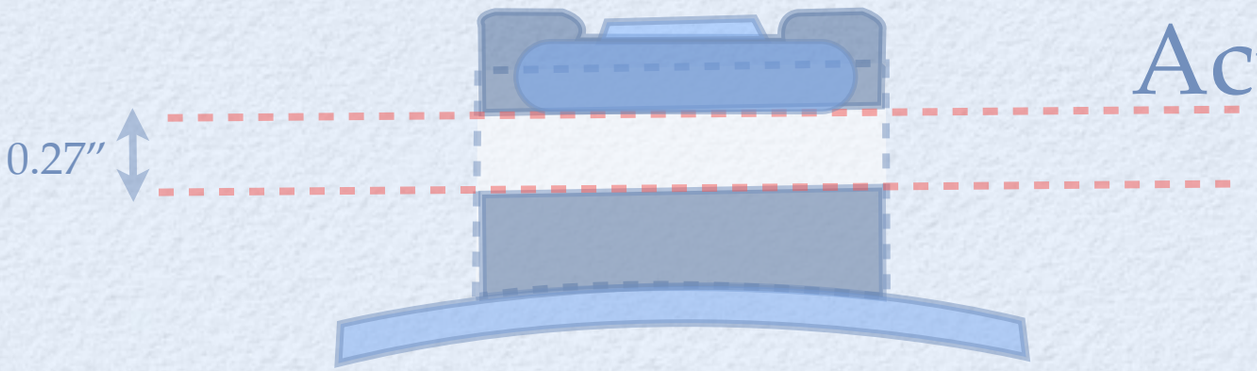
Slot width

SLOT DEPTH & WIRE DIMENSION



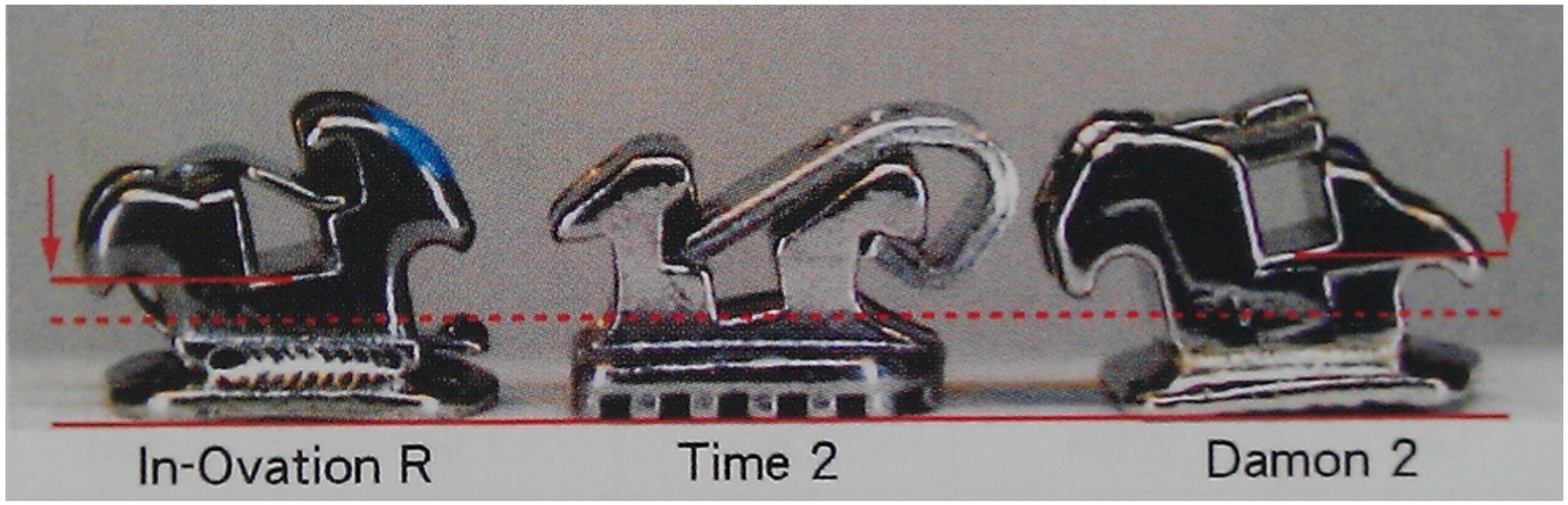


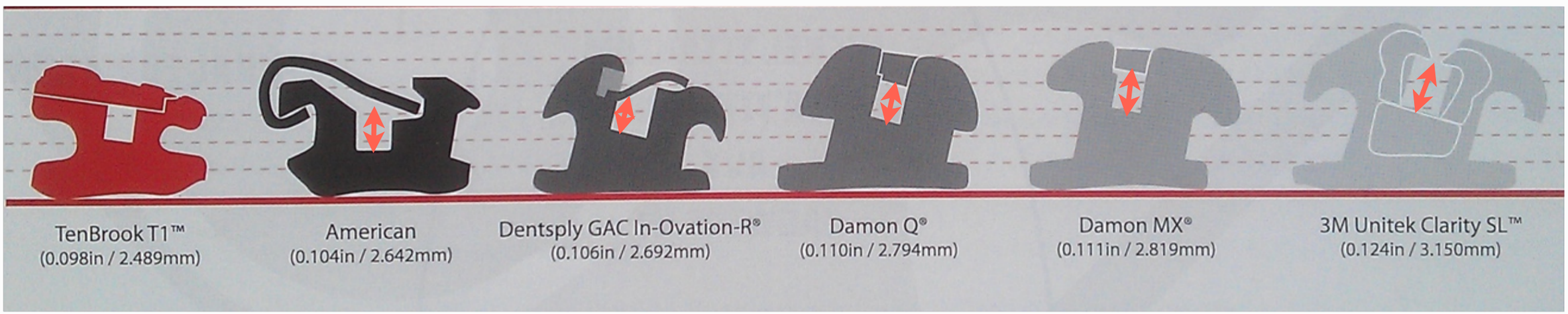
Passive brackets



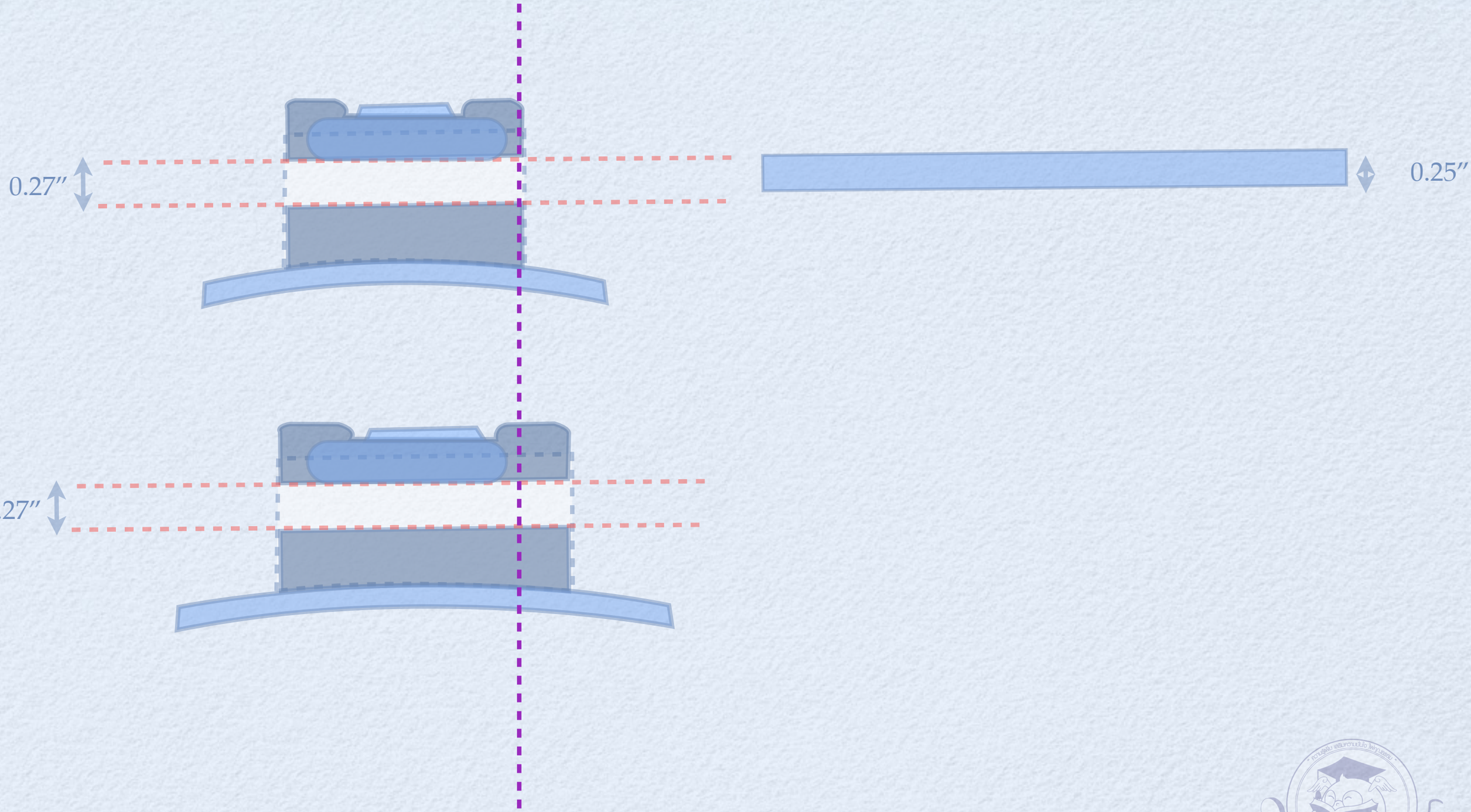
Active brackets

LABIO-LINGUAL EFFECT (SLOT DEPTH)





SLOT WIDTH



LABIO-LINGUAL EFFECT (ROTATION CORRECTION)

Summary

Active clip, The shallower slot will potentially place more force for a given arch wire, initial alignment is more complete for a wire of given size to an extent compared to passive clip

The larger diameter wires, an active clip will place a continuous lingually directed force on the wire even when the wire has gone passive.

LABIO-LINGUAL EFFECT (SLOT DEPTH)

Summary

-The active clip will have its range of labio-lingual action extended and produce more alignment than would a passive slide with the same dimension wire.

- 0.016" x 0.025" or 0.014" x 0.025" nickel titanium wires are recommended as the intermediate aligning wire for the passive Damon system to correct rotation

ADVANTAGES - DISADVANTAGES

ACTIVE CLIP	PASSIVE CLIP
Initial alignment is more complete for a wire of given size to an extent	Small wire-to-lumen ratio will generate lower forces and may facilitate dissipation of binding forces.
Store all the force in the dividing between wire and clip.	store all the force in the wire
The relative stiffness of archwires and the spring clip is not well documented.	Passive tube
In the thick working archwire, an active clip are increased friction (still less than conventional ligation)	Play in tube in 3 plane of space
Potentially reduced torquing capacity in one direction.	Real couple force
The active clips self-ligating appliances aging thus reducing the pressure applied to the archwire by time.	passive sliding door can be obstructed by food or calculus

Any Question ?