The Roth Prescription

Over correction bracket
"End of Appliance Therapy Goal"

Roth's Prescription Development

TMD Problems

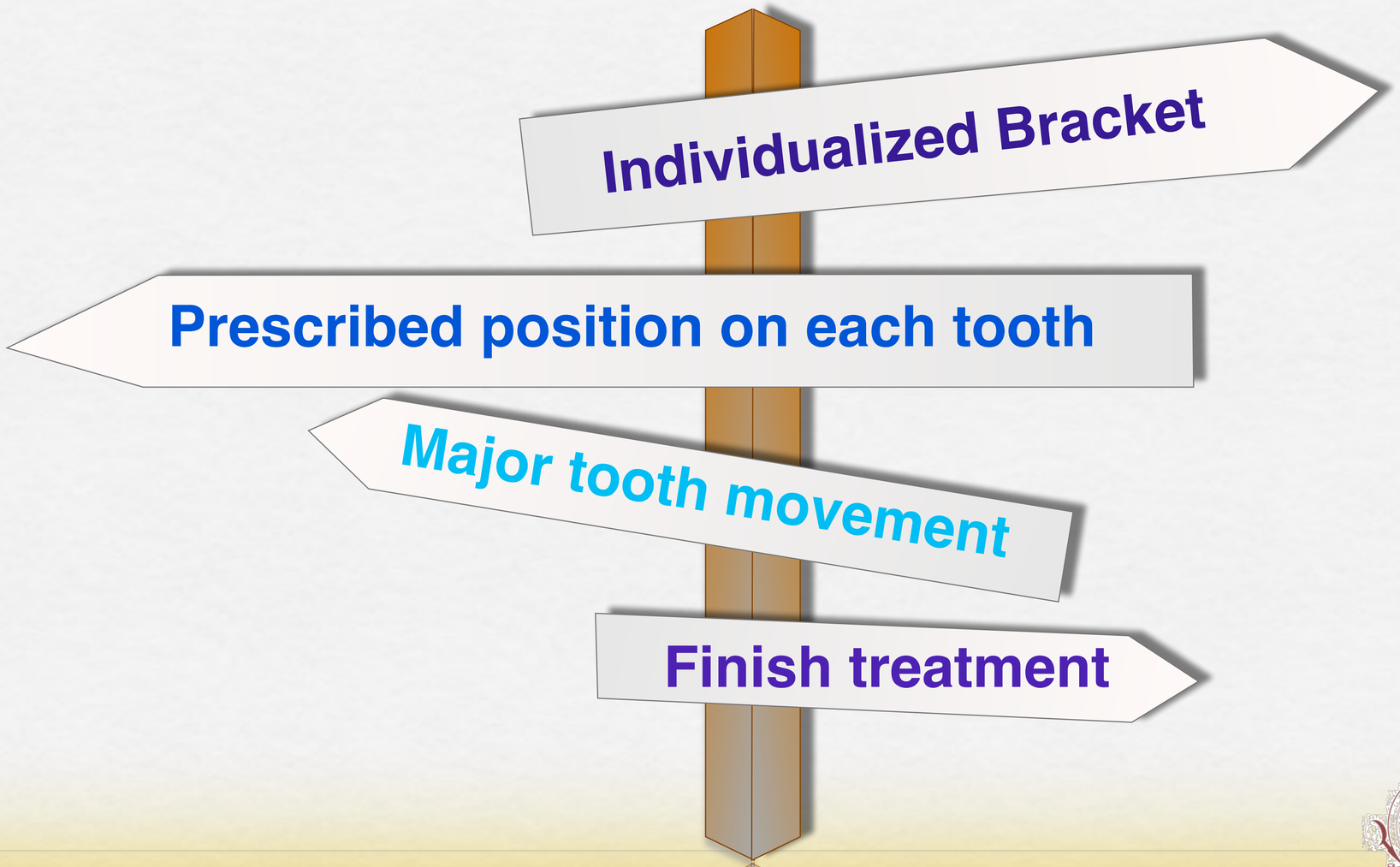
Functional Occlusion

the Roth bracket setup and his mechanics

Roth's technic Concept & Philosophy

The Straight wire means appliance, not a technic

The Roth bracket setup and his mechanics



Functional Occlusion

- Increasing awareness and fear
- Roth's interests
- Belief that functional dynamics of occlusion improves for **stability** ✓
- To **prove** that no harm was being done to his patients. ✓
- To **disprove** that PM extractions could cause TMD ✓

Functional Occlusion

- Equilibration
- Less time consuming and difficulty
- Only possible if there are minor problems
- Jaws had to have stable relation – i.e.. after growth.
- More important to straighten teeth better.

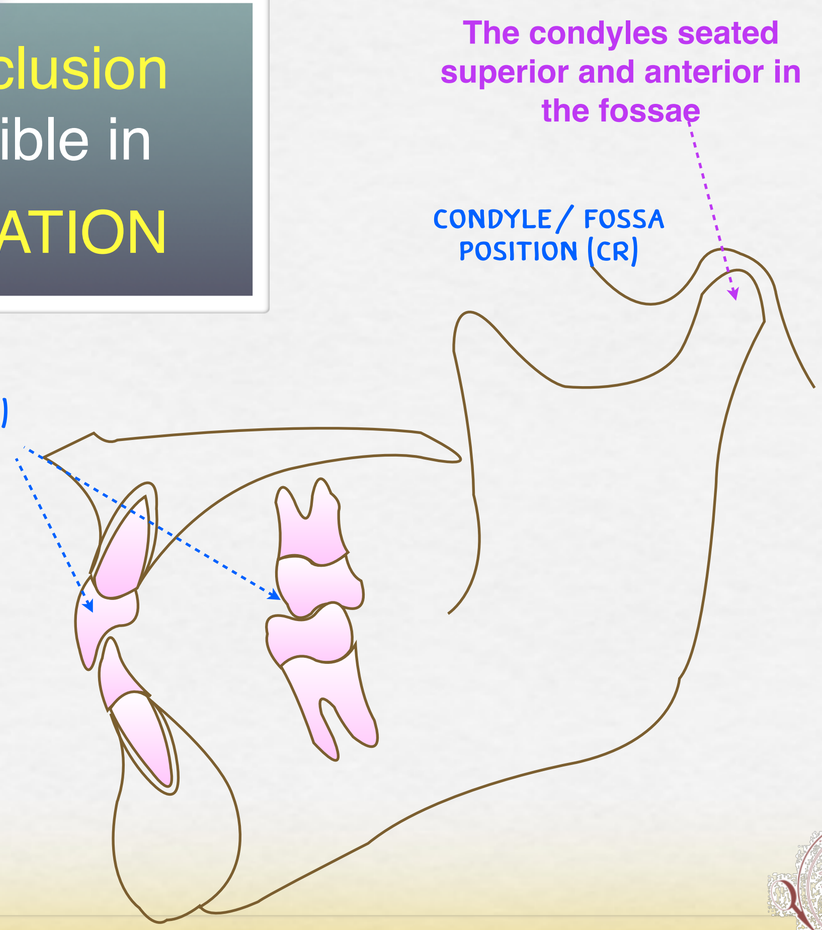
Functional Occlusion

By Roth's Concept

Six Keys of Occlusion with the mandible in CENTRIC RELATION

$CR=CO$

The condyles should be seated superior and anterior in the fossae against the articular disks and the distal slope of the articular eminence, and centered transversely.



Functional Occlusion

By Roth's Concept

* Incisors in Class I occlusion

- 4 mm overbite

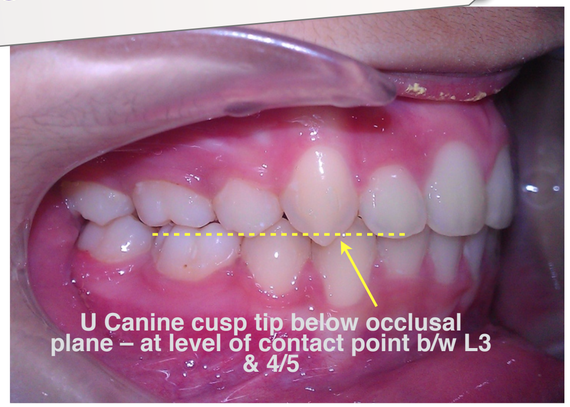
- 2-3mm over-jet at incisors

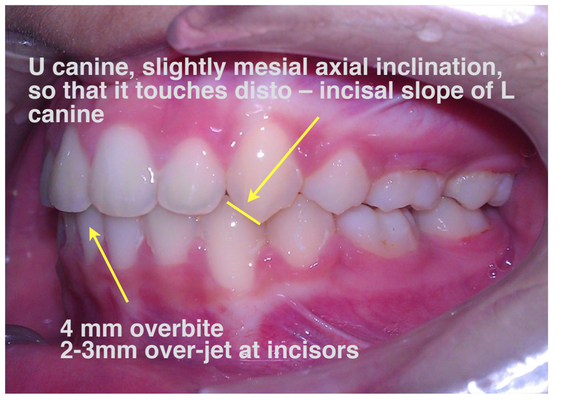
- 1mm over-jet at canines

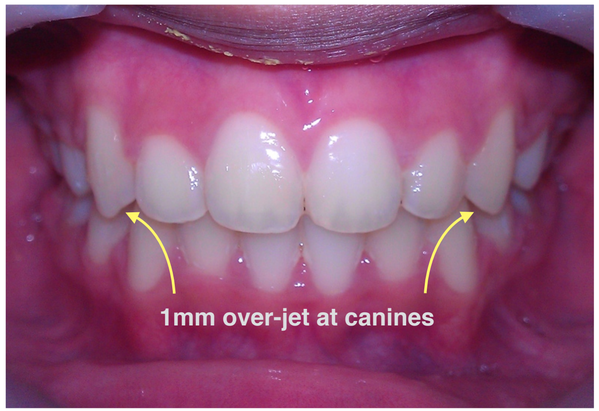
* U Canine cusp tip below occlusal plane – at level of contact point b/w L3 & 4/5

* U canine, slightly mesial axial inclination, so that it touches disto – incisal slope of L canine

Functional Occlusion







Functional Occlusion

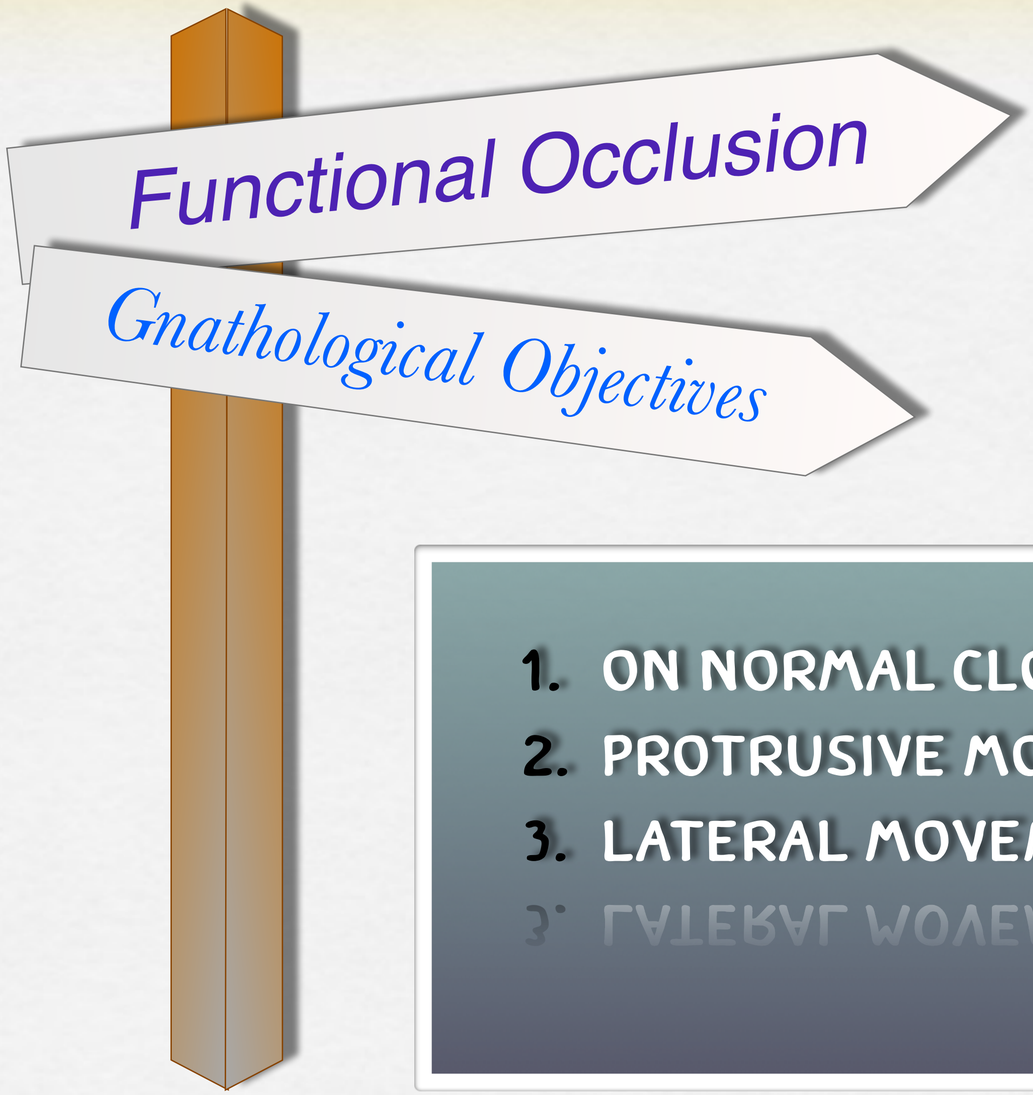
Signs that mand. is not in centric

- OCCLUSAL WEAR
- EXCESSIVE TOOTH MOBILITY
- TMJ SOUNDS
- LIMITATION OF MOUTH OPENING
- MYOFACIAL PAIN
- TIGHTNESS OF MANDIBULAR MUSCULATURE

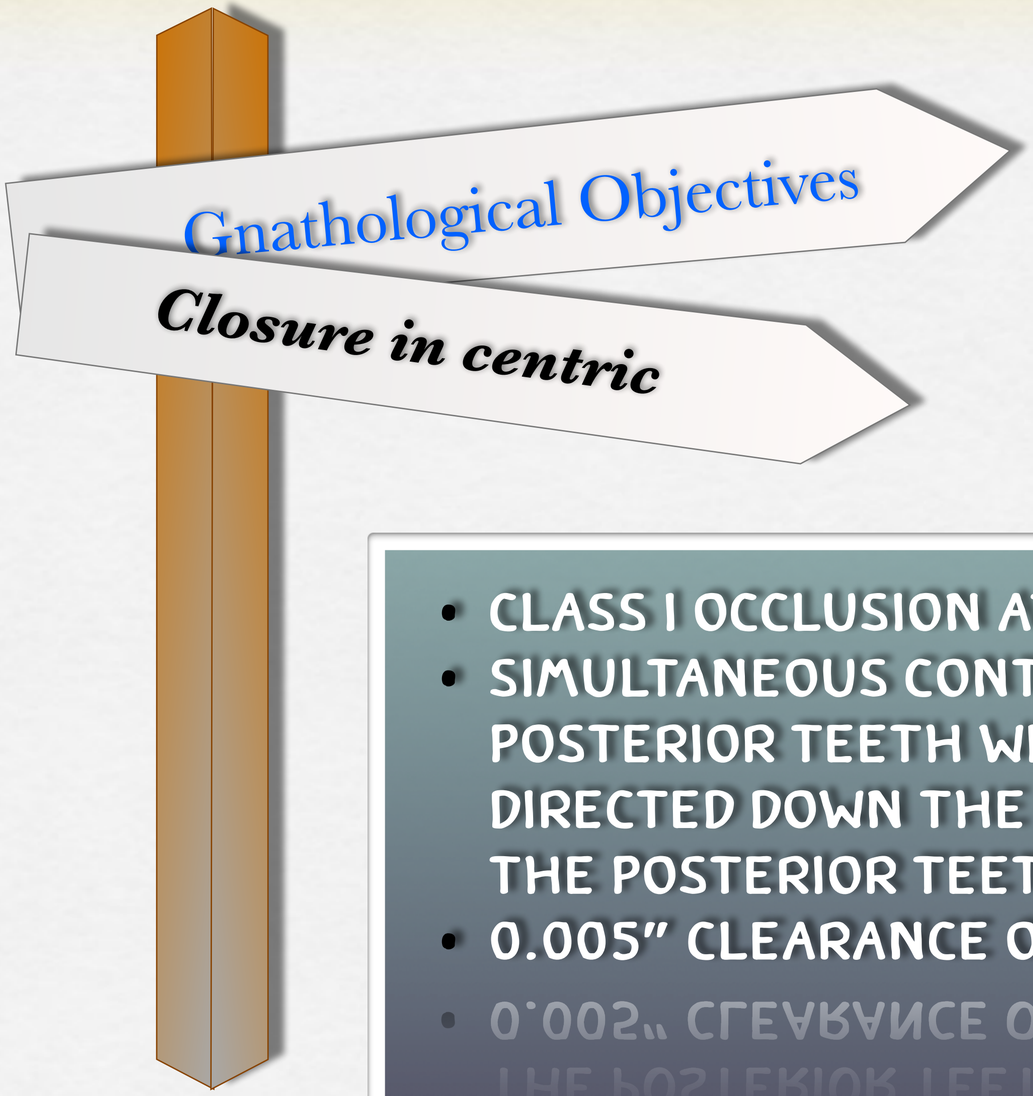
- GUIDE MANDIBLE INTO CENTRIC, AND CHECK FOR FIRST TOOTH CONTACT
- ARTICULATOR MOUNTING MAY BE NECESSARY.
- SPLINT THERAPY MAY BE NEEDED.

Functional Occlusion

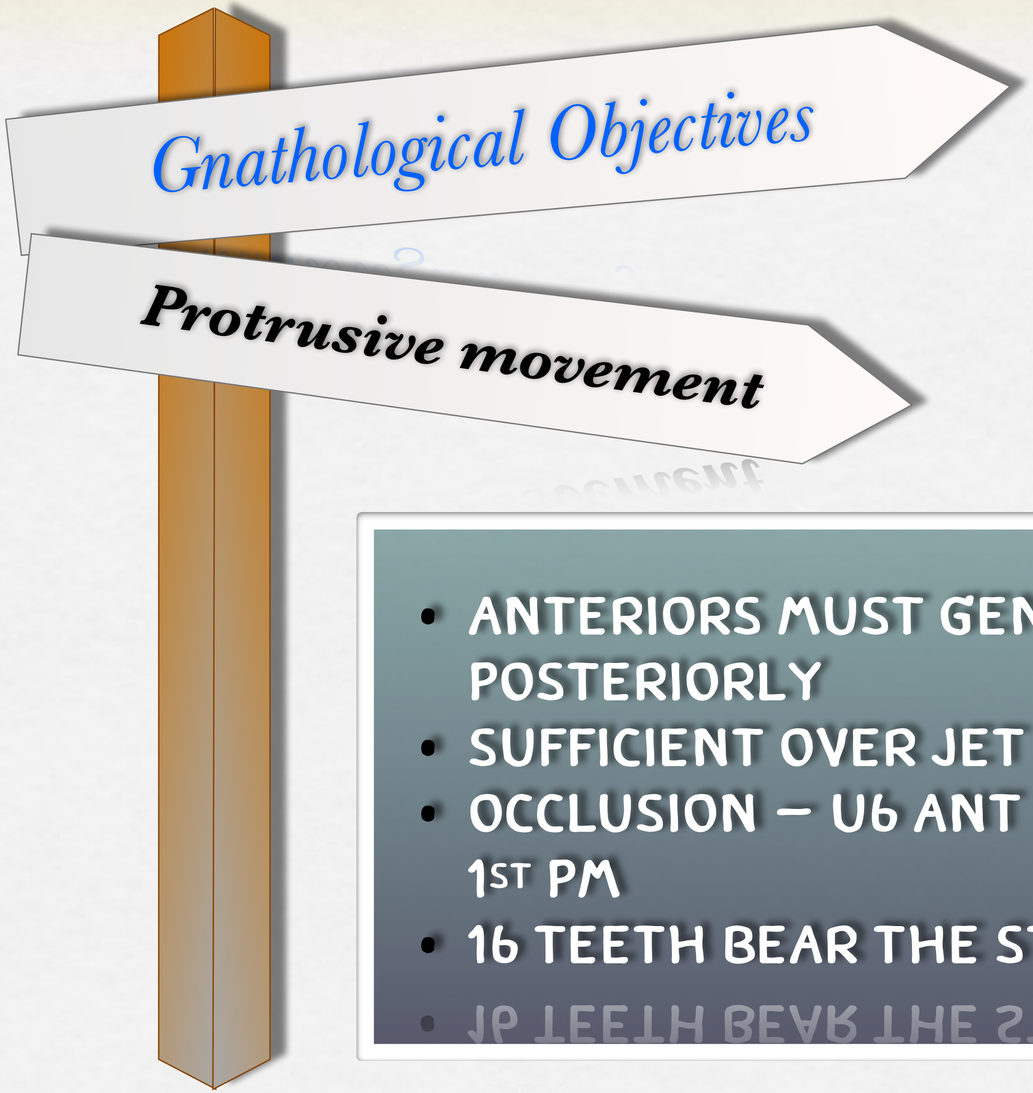
- ONCE MANDIBLE IS STABILIZED IN CENTRIC, TREATMENT PLANNING CAN BEGIN.
- IF LARGE DIFFERENCE, CEPHALOGRAM SHOULD BE TAKEN IN CENTRIC, OR ADJUSTED ACCORDINGLY.



1. ON NORMAL CLOSURE IN CR
2. PROTRUSIVE MOVEMENT
3. LATERAL MOVEMENT



- CLASS I OCCLUSION AT CENTRIC
- SIMULTANEOUS CONTACT OF ALL POSTERIOR TEETH WITH FORCE DIRECTED DOWN THE LONG AXIS OF THE POSTERIOR TEETH
- 0.005" CLEARANCE OF ANTERIORS



- ANTERIORS MUST GENTLY DIS-OCCLUDE POSTERIORLY
- SUFFICIENT OVER JET AND BITE
- OCCLUSION – U6 ANT WITH L6 ANT AND 1ST PM
- 16 TEETH BEAR THE STRESS

The Roth Prescription

- TOO MANY BRACKETS IN ANDREWS' PRESCRIPTION
- TRANSLATION – FRICTION
- ROTH DID NOT TRANSLATE TEETH
- OVER-CORRECTION
- WANTED 1 PRESCRIPTION FOR ALL HIS PATIENTS.

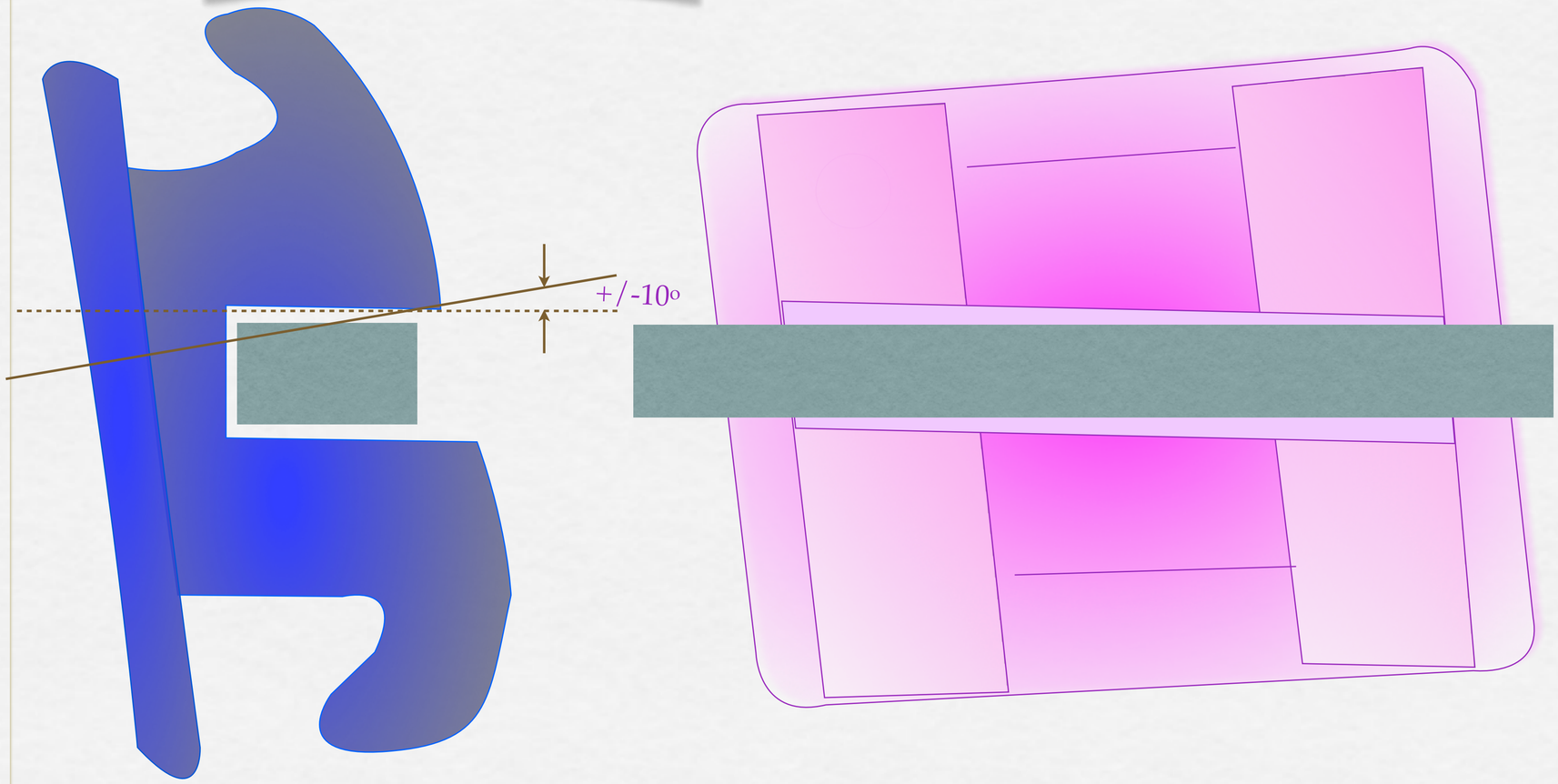
Why overcorrection ?

1. BRACKETS DO NOT EXPRESS THEMSELVES – PLAY
2. BEFORE COMPLETE EXPRESSION – FORCE LEVELS DROP
3. TENDENCY OF TEETH TO RELAPSE
4. SETTLE BACK OF OVERCORRECTED TEETH

Play angle

PLAY ANGLE (SLOPE) = 10°

.019X.025 IN .022 SLOT SIZE



Overcorrection

Roth's Bracket Prescription

- 5° more torque in upper incisors (7°>12°)
- 5° Less torque in upper canines (-7°>-2°)
- 2° more tip in canines (11°>13°)
- 2° anti-rotation in canines and PMs
- 2° Upright (Tip) posterior segments (2°>0°)
- Over-correction of U molar torque (-9°>-14°)

	Roth	Andrews	Roth	Andrews
Maxilla	***Tip***	***Tip***	***Torque***	***Torque***
Central incisor	5°	5°	12°	7°
Lateral incisor	8°	9°	8°	3°
Canine	13°	11°	- 2°	- 7°
1.Premolar	0°	2°	- 7°	- 7°
2. Premolar	0°	2°	- 7°	- 7°
1. Molar	0°	5°	- 14°	- 9°
2. Molar	0°	5°	- 14°	- 9°
Mandible	***Tip***	***Tip***	***Torque***	***Torque***
Central incisor	0°	2°	- 1°	- 6° -1°
Lateral incisor	0°	2°	- 1°	- 6° -1°
Canine	5°	5°	- 11°	- 11°
1.Premolar	0°	2°	- 17°	- 17°
2. Premolar	0°	2°	- 22°	- 22°
1. Molar	0°	2°	- 30°	- 30°
2. Molar	0°	2°	- 30°	- 35°

The Roth Prescription : Offset

Tooth	II molar	I Molar	II PM	I PM	Canine	Lateral	Central
Maxillary	0/-14 (10^o offset)	0/-14 (10^o offset)	0/-7	0/-7	13/-2 (-2^0 offset)	8/8	5/12
Mand.	0/-35 4^o offset	0/-30 4^o offset	0/-22	0/-17	5/-11	0/-1	0/-1

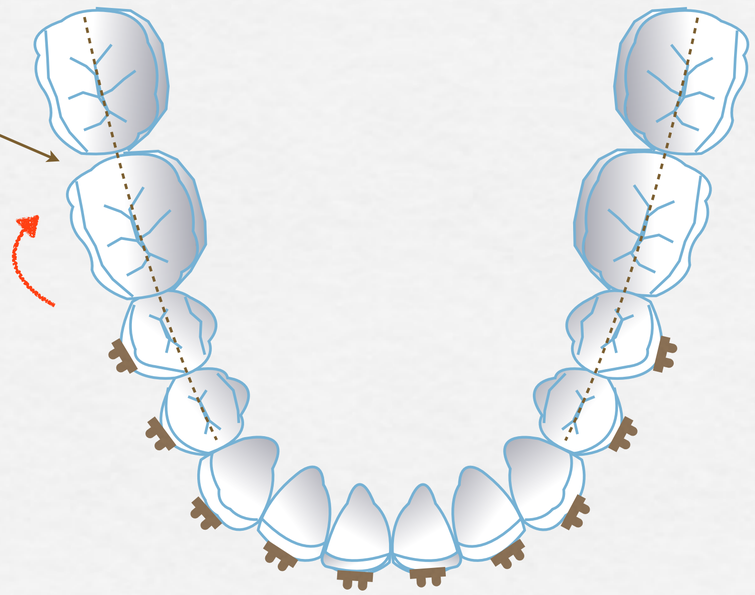
Molar Mesio-distal rotation = 10^o offset / 4^o offset

Canine Disto-mesial rotation = -2^0 offset (Anti-rotation)

Lower posterior offset

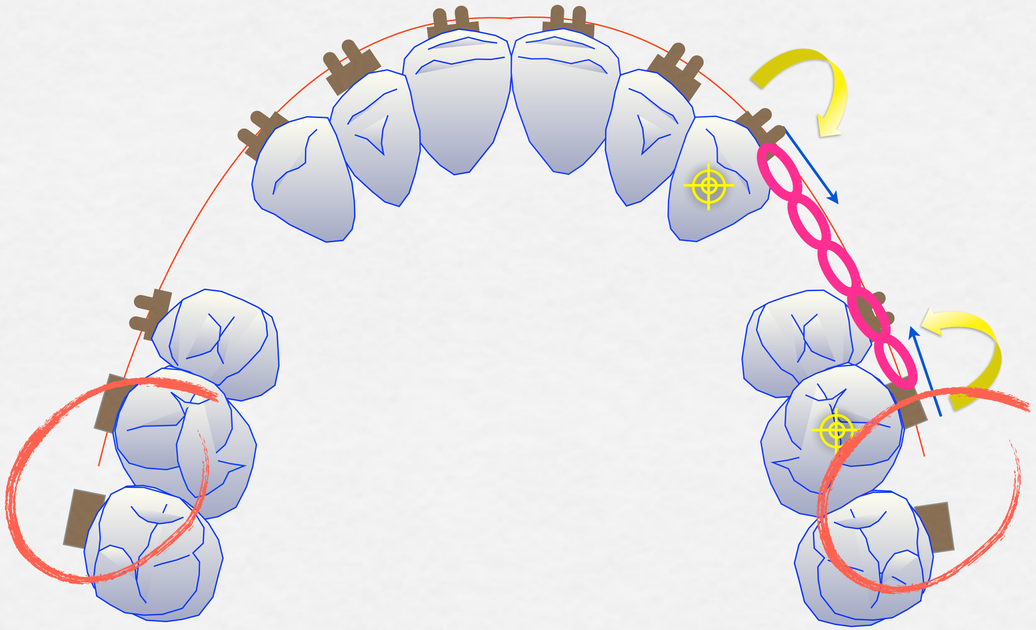
Mesial Rotation of lower 1st molar during anterior retraction

4⁰ distal offset to prevent the broken contact



The broken contact occurs in opposite direction (distal rotation) due to #7 boding.

Why Roth need canine and molar offset ?



Canine	II molar	I Molar
13/-2 (-2^0 offset)	0/-14 (+10^o offset)	0/-14 (+10^o offset)

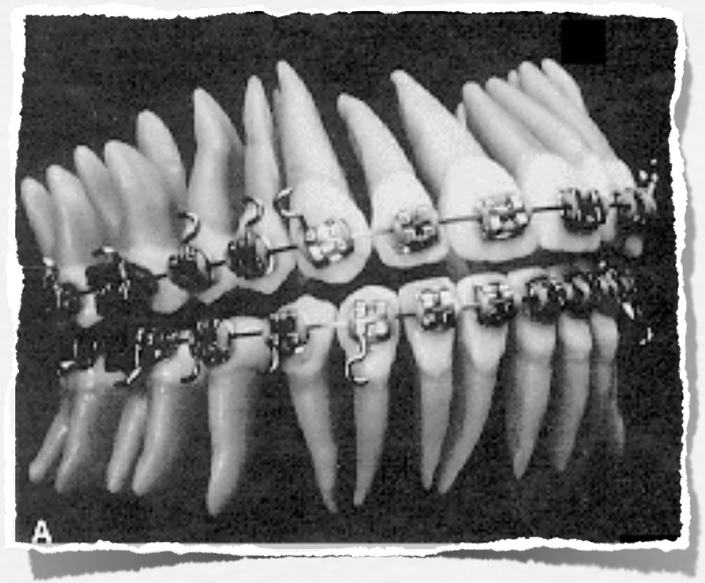
The Roth Prescription

Also available –

- *Molar tubes with no upper molar offset*
- *"Super torque" anterior brackets*
- *Canines with 0° tip ??*

Wanted 1 prescription for all his patients.

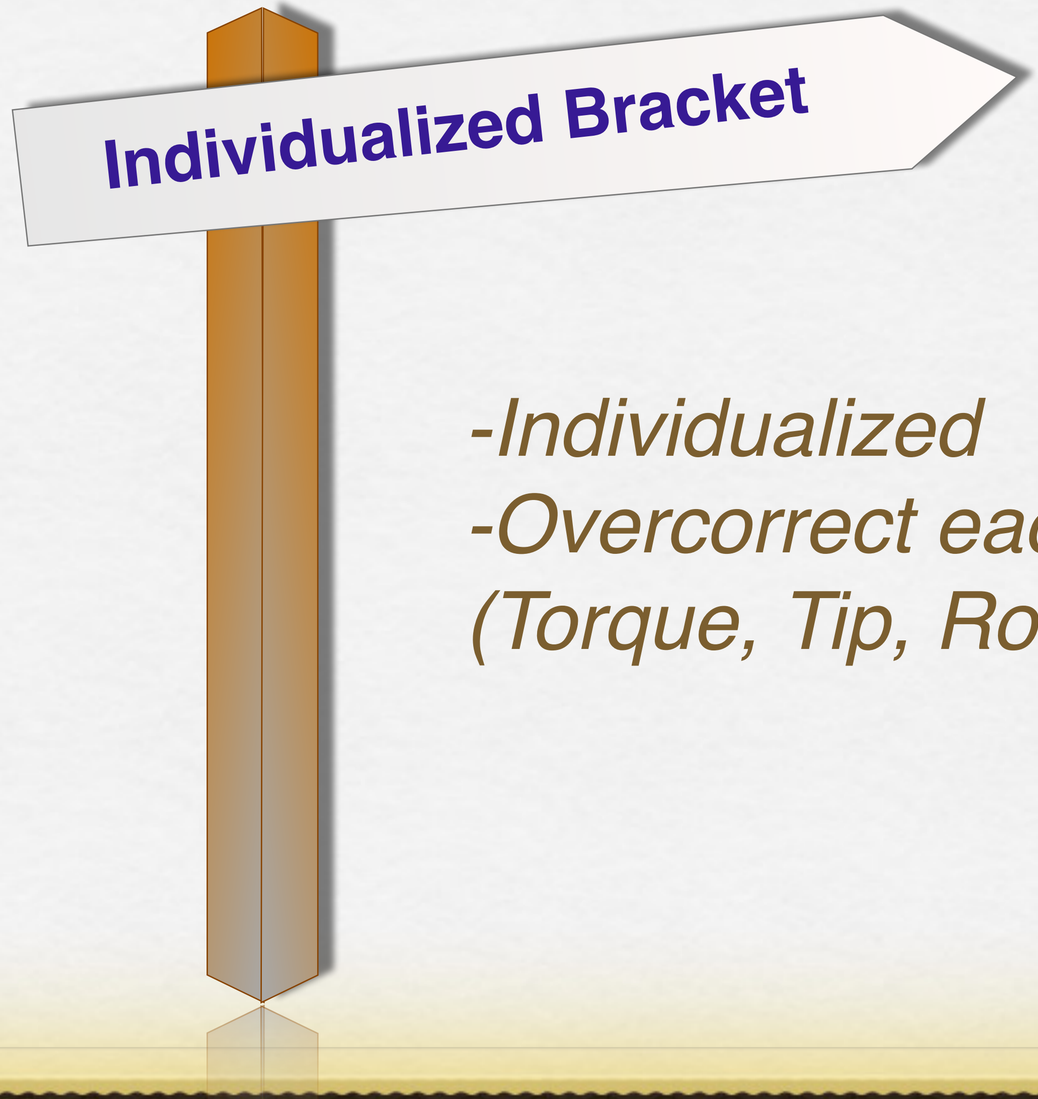
Can we guess which case treated by Roth technique and vice versa ?



Roth

Andrews

The Roth bracket setup and his mechanics



-Individualized
-Overcorrect each tooth (Torque, Tip, Rotation)

Prescribed position on each tooth

accurate placement =
the pre-adjusted bracket.

Bracket placement as advocated by Andrews – except –

- ***Upper anterior and lower incisors bonded more incisally***
- ***Lower canines bonded slightly more gingivally***

Finish treatment

overcorrection and the final detailing following major tooth movement completed.

1) A full size straight wire
2) sufficient time
3) Wire bending to compensate mal-positioned bracket

"End of Appliance Therapy Goal."

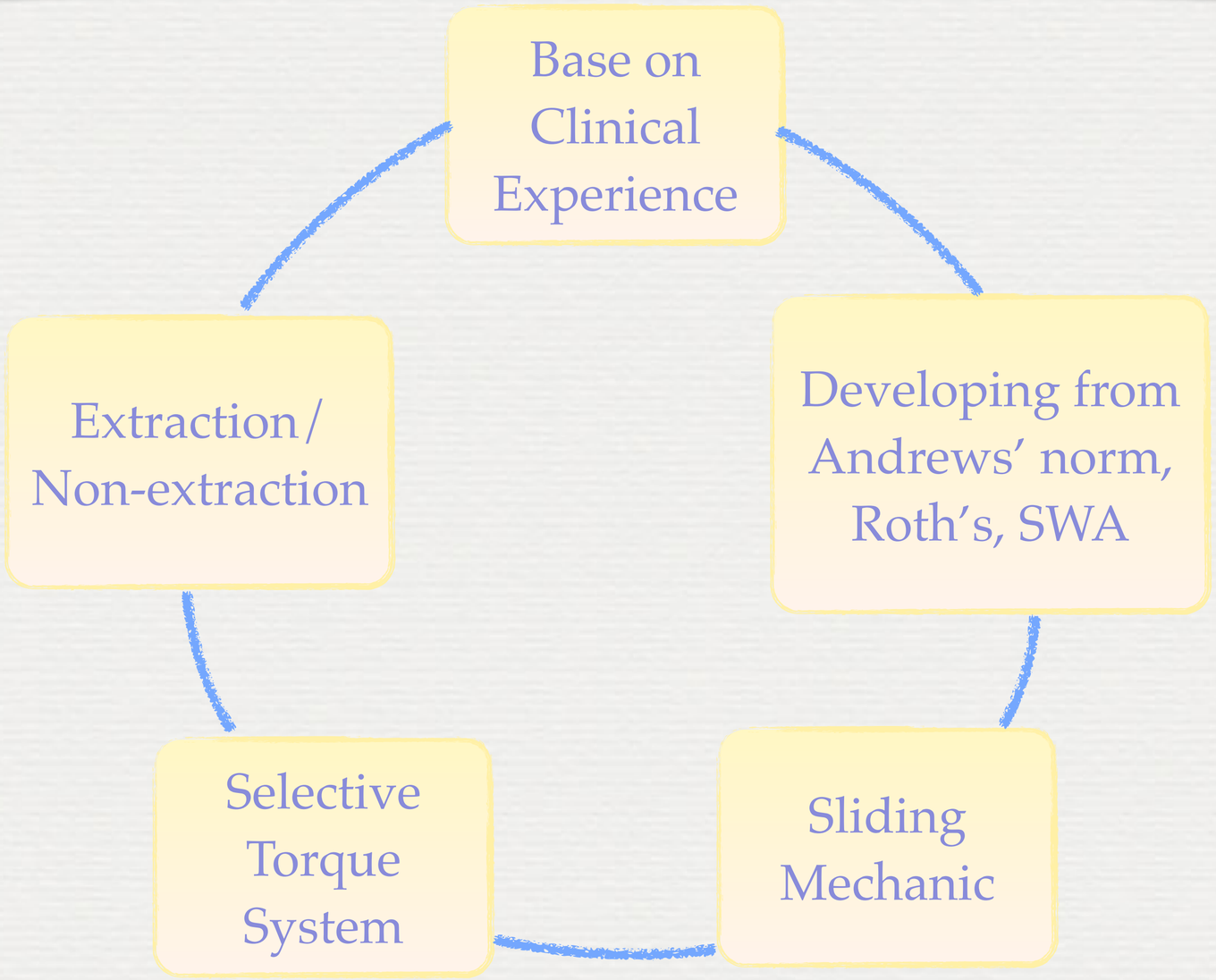
MBT Prescription

Richard **McLaughlin**

John **Bennett**

Hugo **Trevisi**

MBT Bracket Prescriptions Development



Incisors Torque

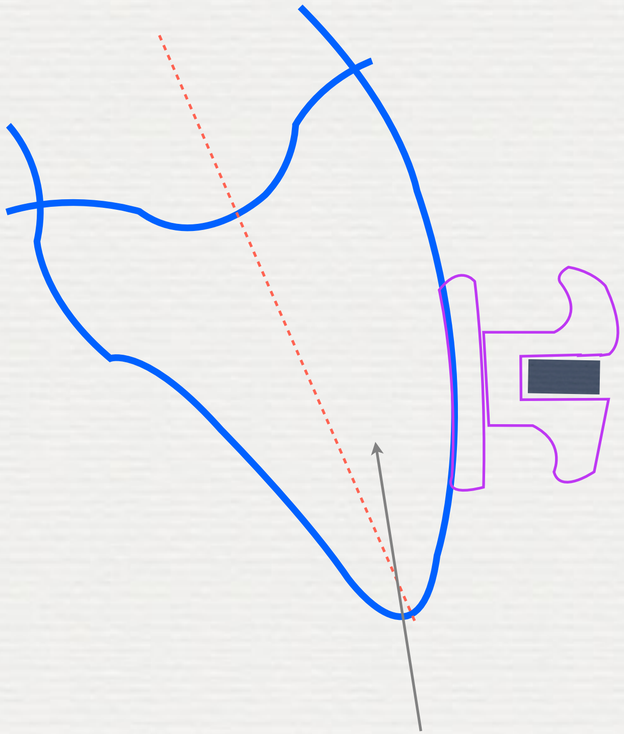
Treatment Challenge:

Torque Loss in Upper Anterior Teeth,
Flaring of Lower Anterior Teeth

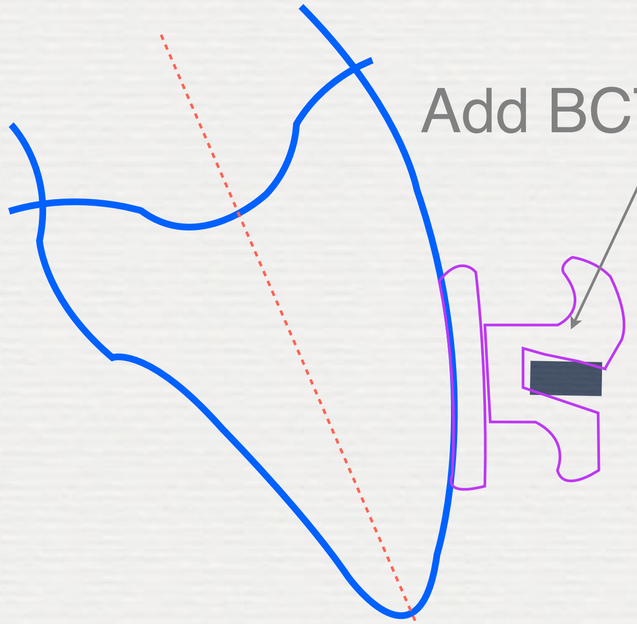
Clinical Experience

-Poorly controlled by SWA (Ant incisors retraction)
-Difficult to get Torque Movement (Edgewise – Slot)
-Lower incisors tend to procline (Leveling-COS &Crowding)
-Anchorage loss due to excessive incisors torque

Poorly controlled by SWA (Ant incisors retraction)

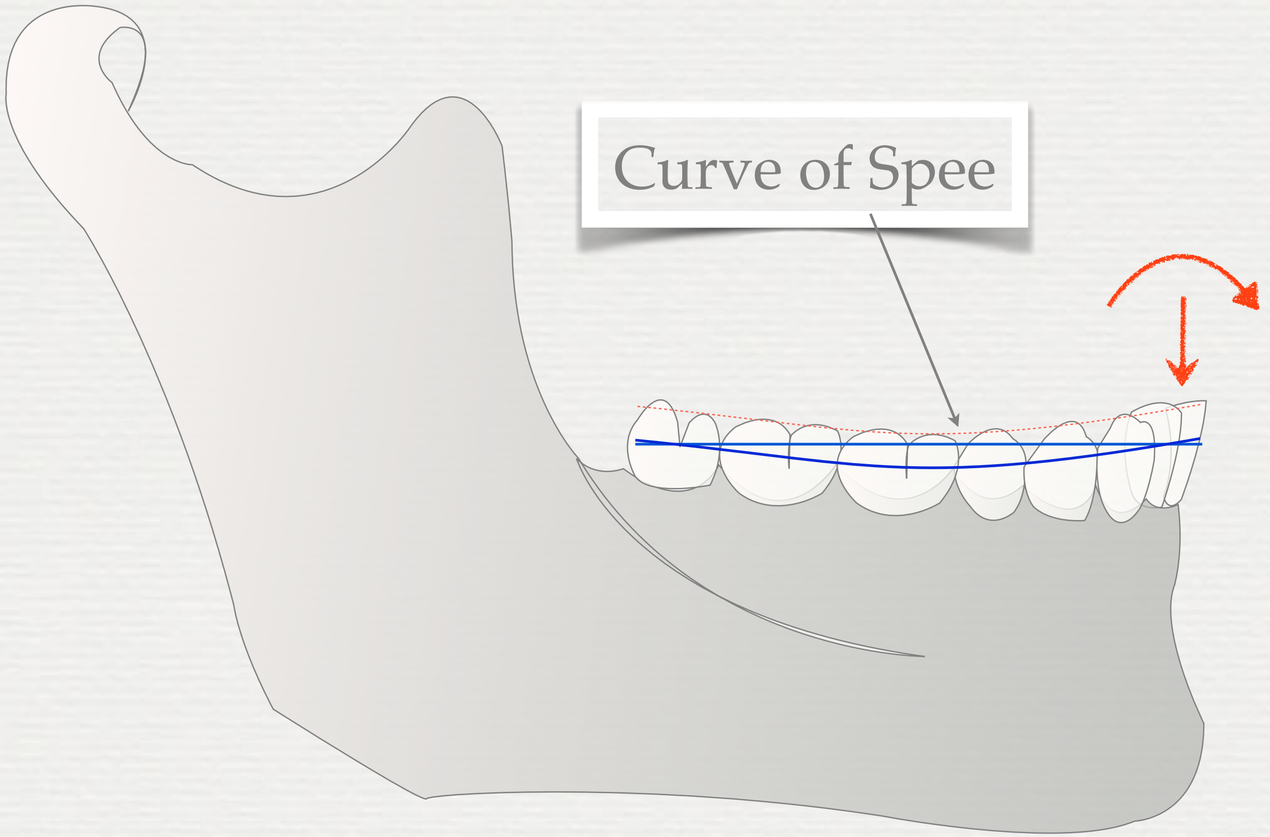


Loss torque control

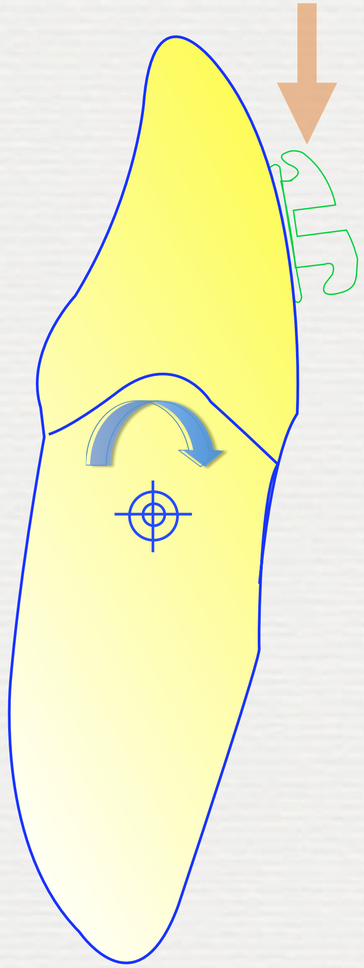


Add BCT torque

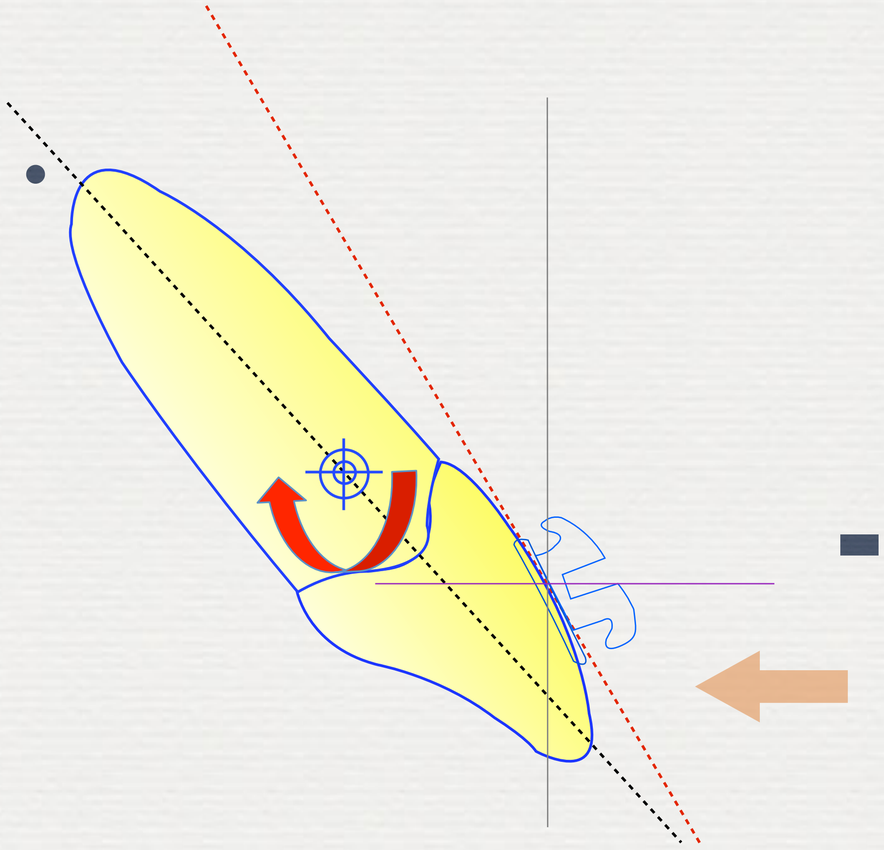
Lower incisors tend to procline (Leveling-COS &Crowding)



Flaring of Lower Anterior Teeth during leveling

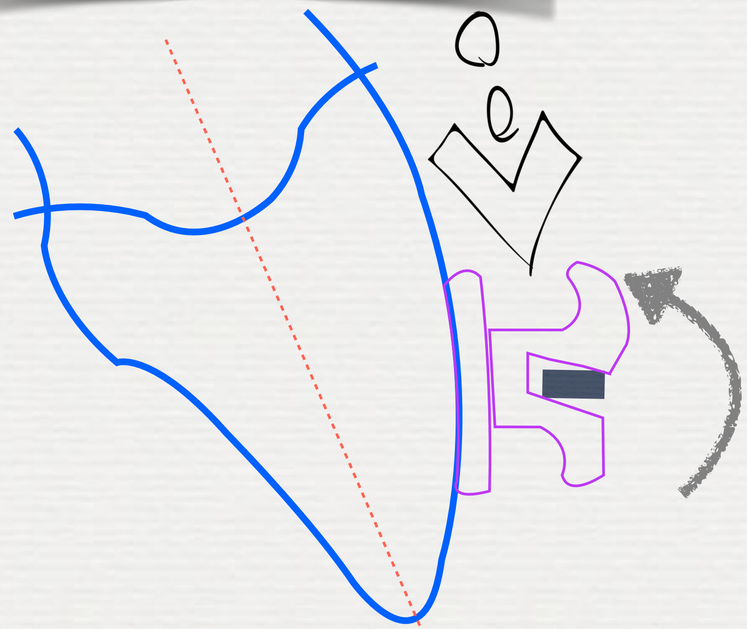


Torque Loss in Upper Anterior Teeth Retraction

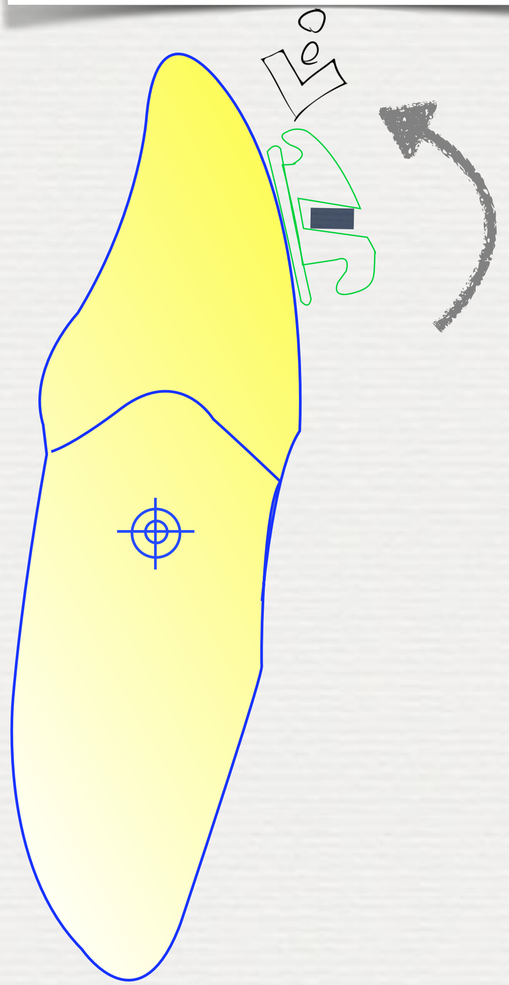


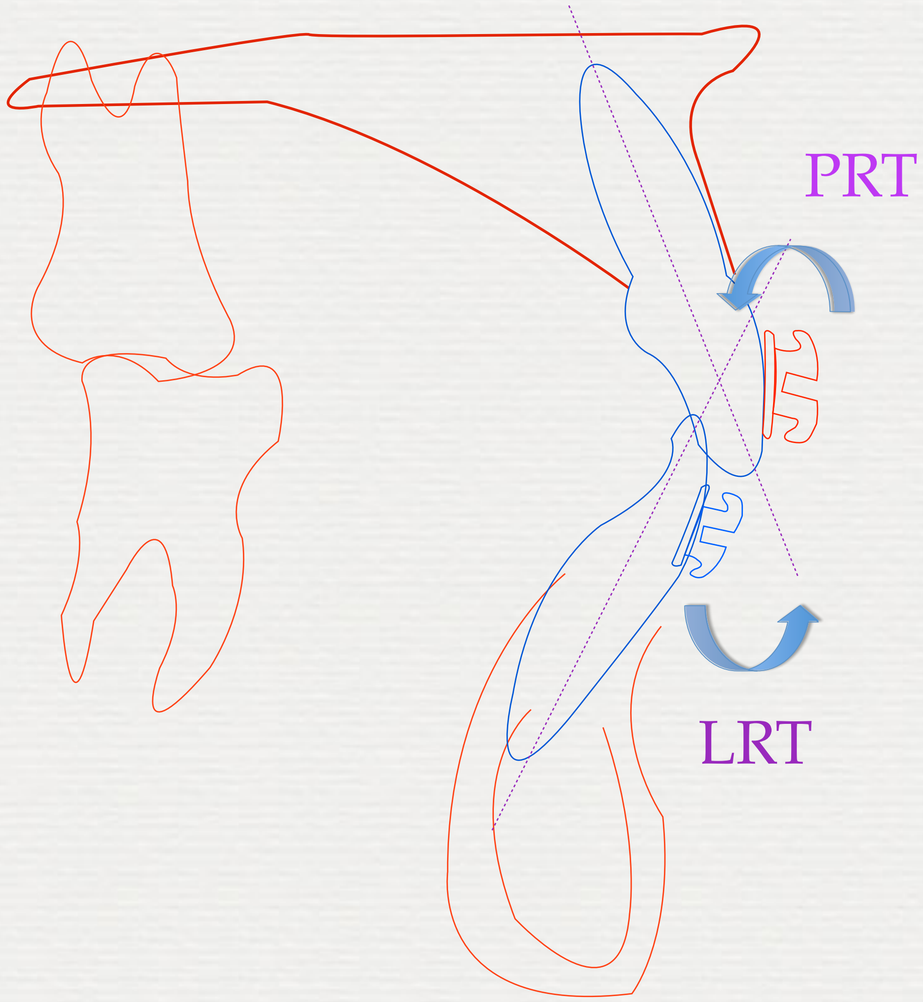
Solutions

greater palatal root torque of the upper incisors



labial root torque for more uprighting of the lower incisors.





Palatal Root Torque
Vs
Labial Root Torque

-
-

MBT Incisors Torque Prescription

+17° of torque for the upper central incisors

+10° of torque for the upper lateral incisors

-6° of torque for the lower incisors.

	Anterior Torque			
	Upper Central	Upper Lateral	Lower Central	Lower Lateral
Andrews' norms	6.11°	4.42°	-1.71°	-3.24°
Original SWA	7.0°	3.0°	-1.0°	-1.0°
Roth SWA	12.0°	8.0°	-1.0°	-1.0°
MBT	17.0°	10.0°	-6.0°	-6.0°

Who right or who wrong

Incisors Tip

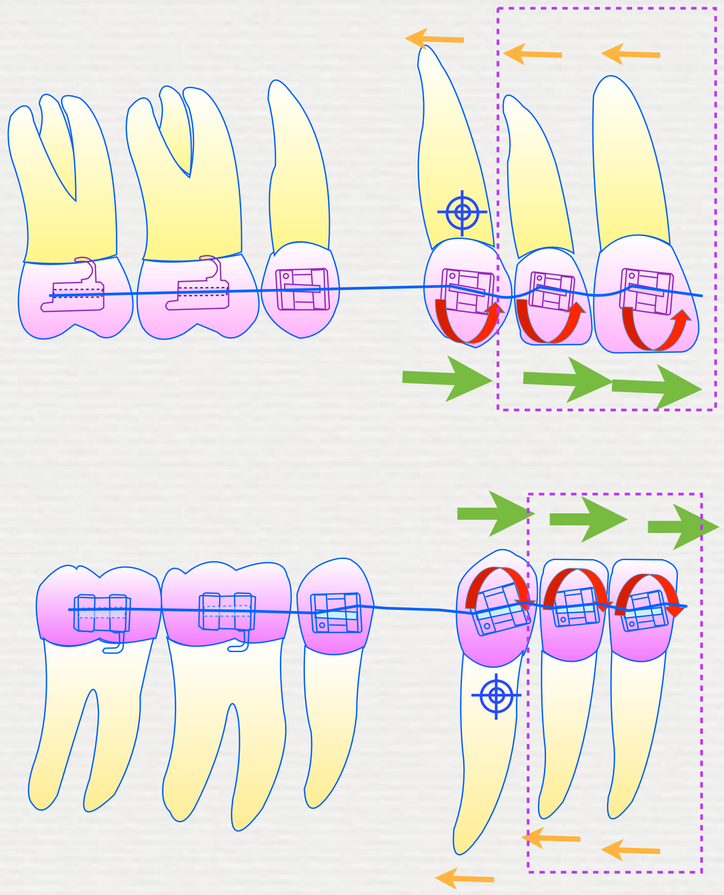
Treatment Challenge:

Reduced Upper and Lower Anterior Tip

Clinical Experience

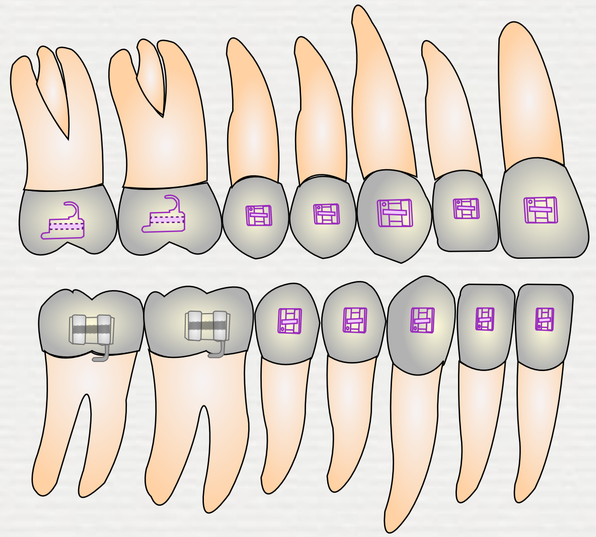
Anchorage Loss during levelling stage
MBT = Andrews' original research figures, no compromise in ideal static occlusion.
-if the condyles are in centric relation, there is no compromise in ideal functional occlusion as described by Roth.

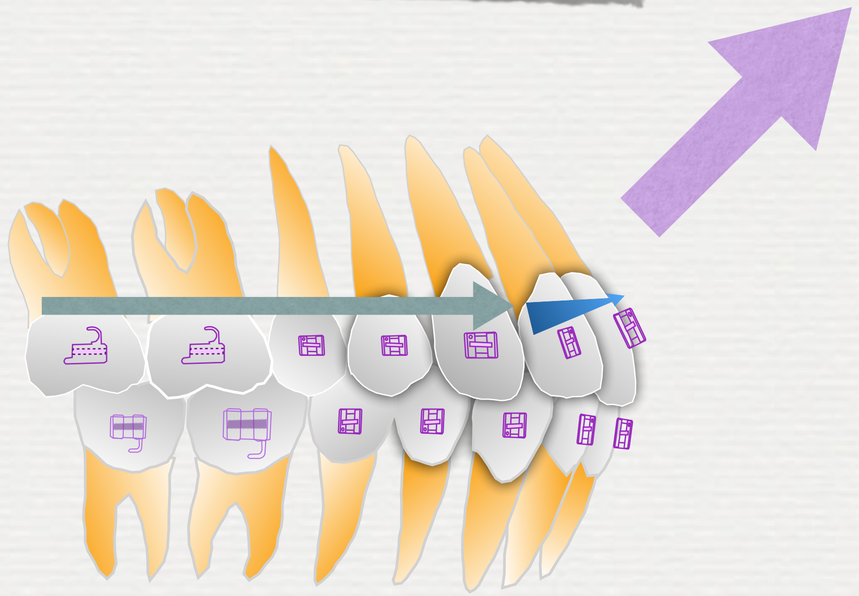
Anchorage Loss during levelling stage

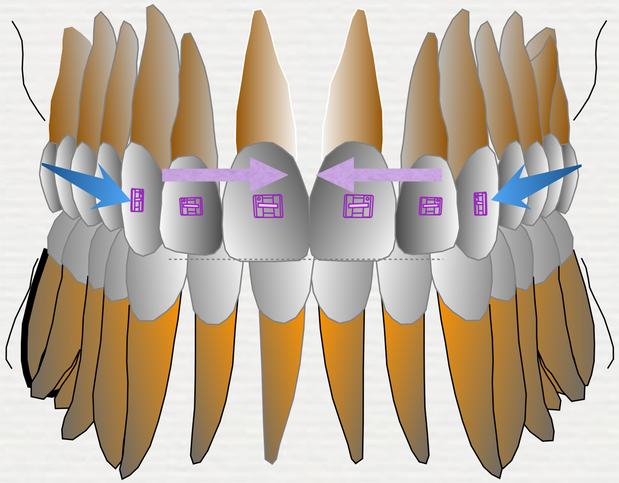


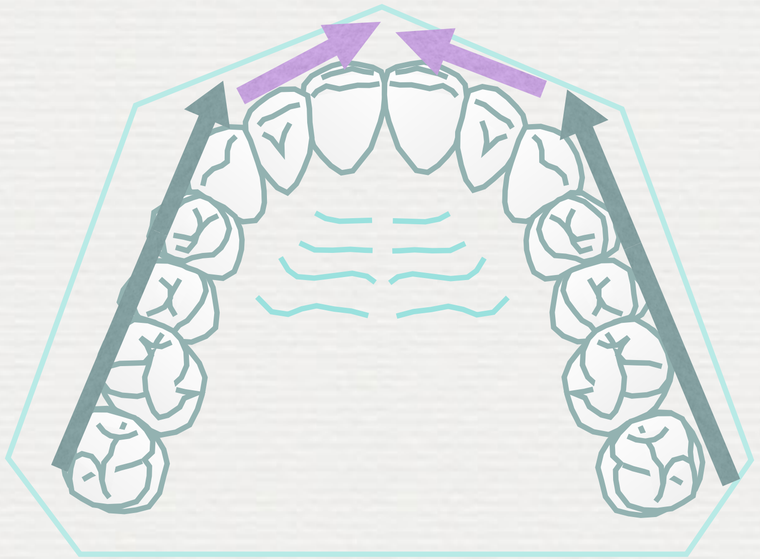
- The increased tip built into anterior brackets tend to tip forward of anterior teeth
- The tipping effect of 4 anterior incisors is questionable

The tipping effect of 4 anterior incisors is questionable



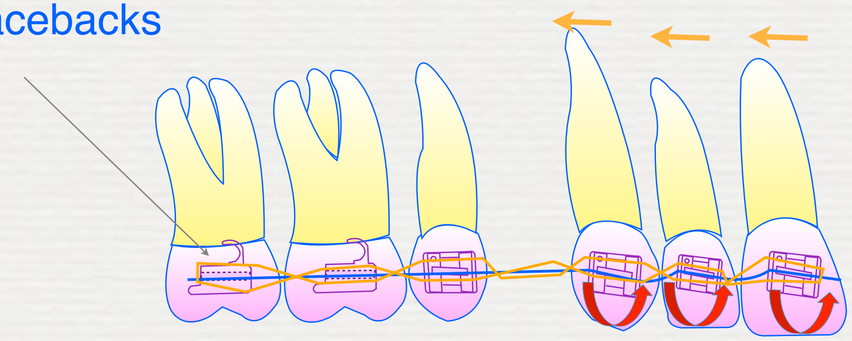




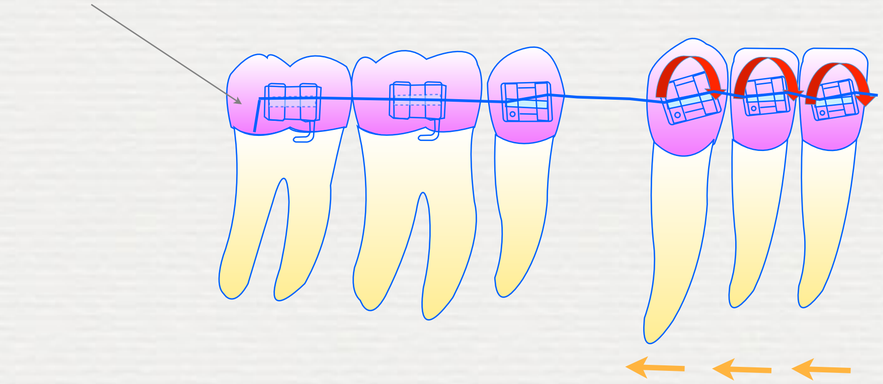


Solutions

Lacebacks



bendbacks



-“lacebacks” during leveling and aligning

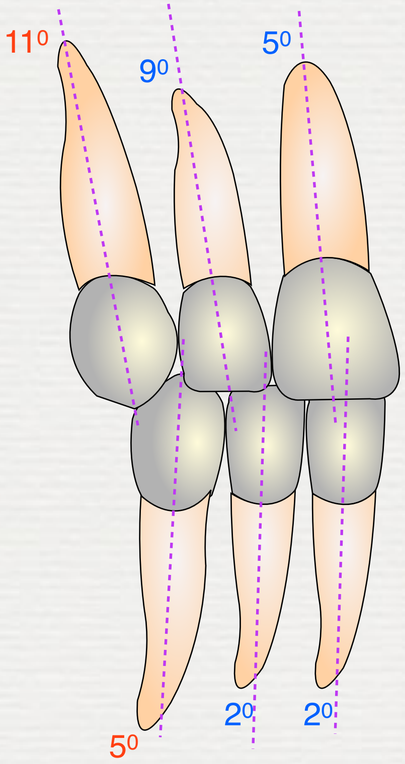
-Tie-backs and “bendbacks”

- No guarantee of anchorage loss

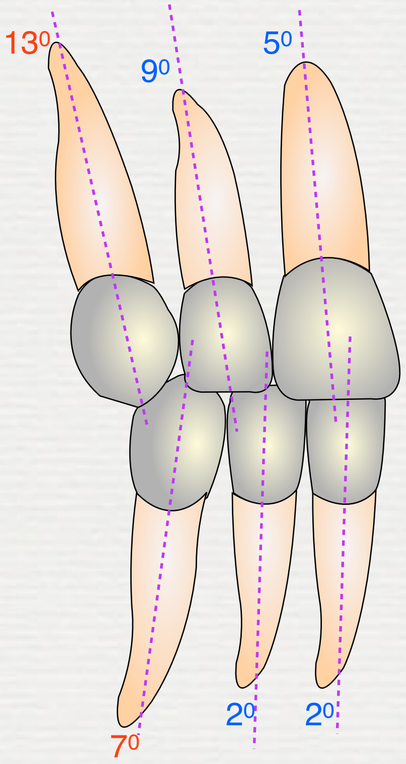
- use light continuous force to decrease the moment of couple (torque) effect

	Upper Anterior Tip			Lower Anterior Tip		
	Central	Lateral	Cuspid	Central	Lateral	Cuspid
Andrews' norms	3.59°	8.04°	8.4°	0.53°	0.38°	2.5°
Original SWA	5.0°	9.0°	11.0°	2.0°	2.0°	5.0°
Roth SWA	5.0°	9.0°	13.0°	2.0°	2.0°	7.0°
MBT	4.0°	8.0°	8.0°	0°	0°	3.0°

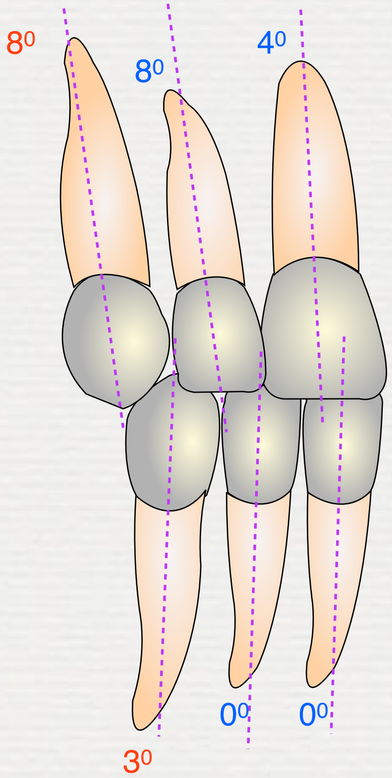
Incisors Tip Comparison



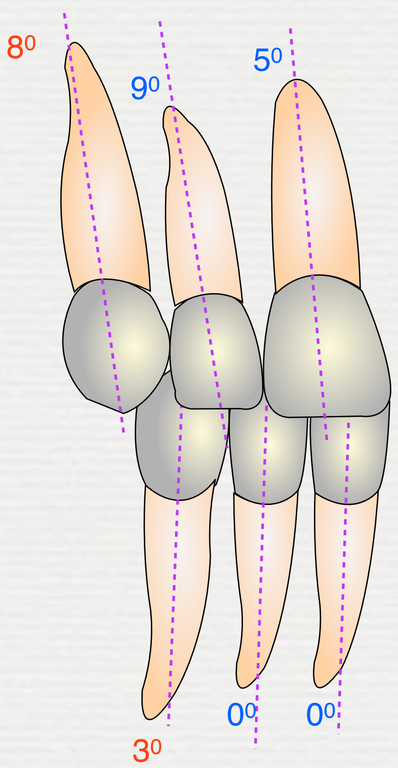
SWA



Roth



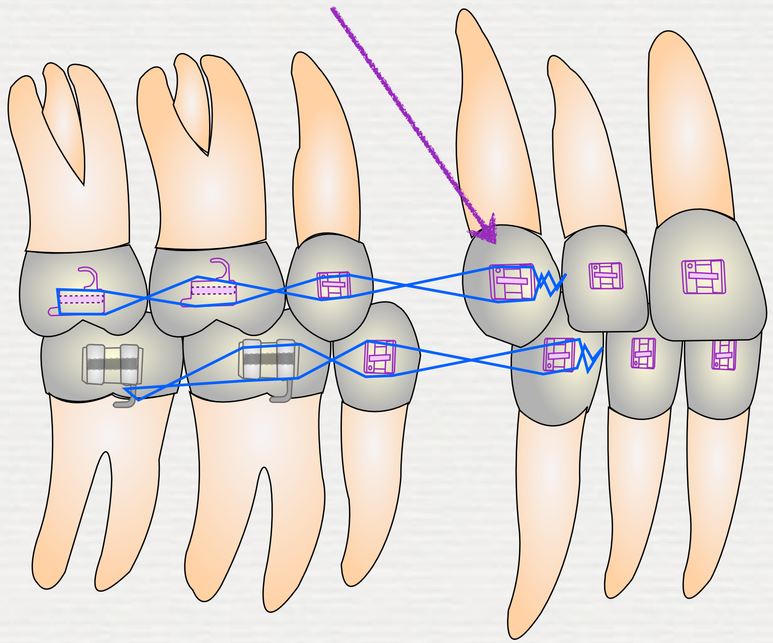
MBT

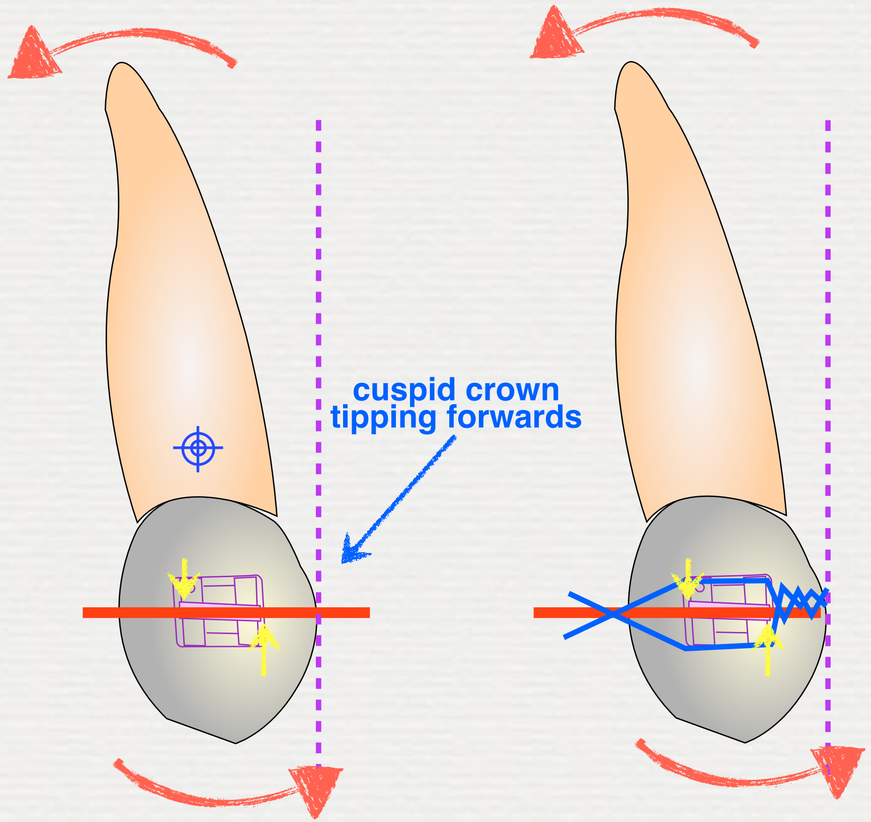


AVS

Less anterior tip reduced tip provides a significant reduction in anchorage needs.

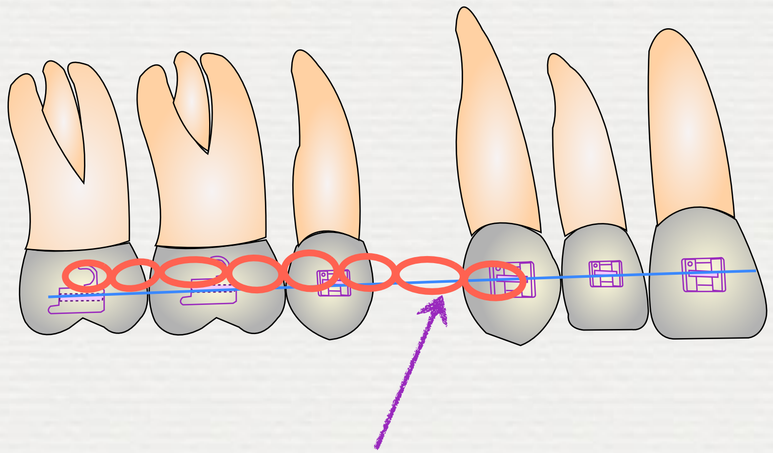
Laceback:



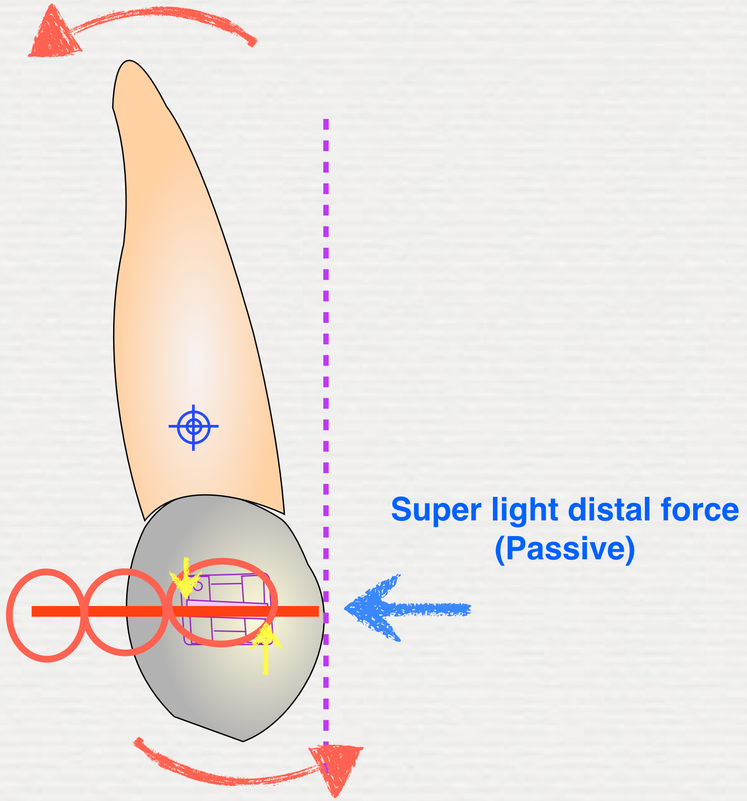


.010 ligature wires use to prevent cuspid crown tipping forwards during levelling and aligning

Passive power chain (AVS)

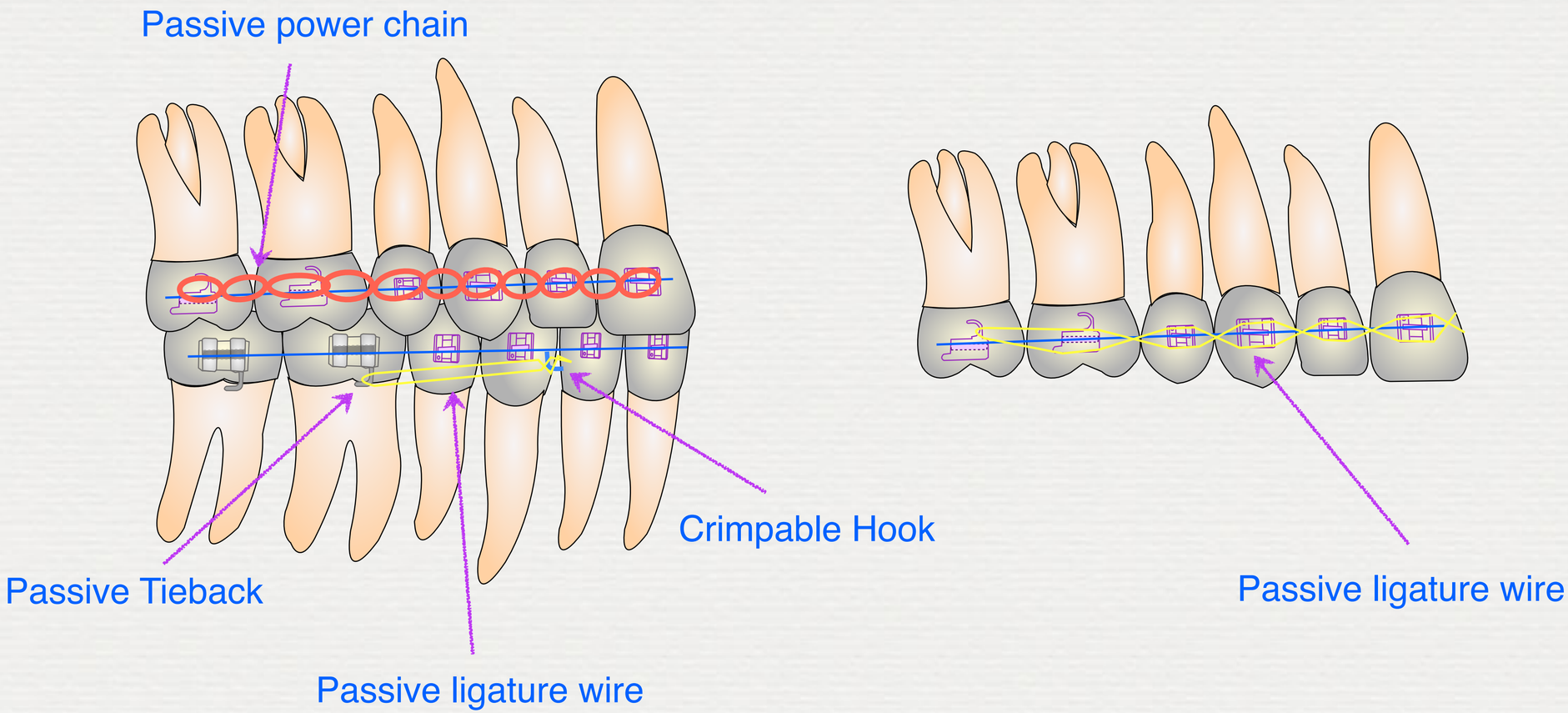


Passive chain:



Passive power chain (super light distal force) instead of laceback (completely passive force) can not only prevent cuspid crown tipping forwards

Passive tieback
Passive ligature wire and Passive power chain



Upper Posterior Torque

Treatment Challenge:

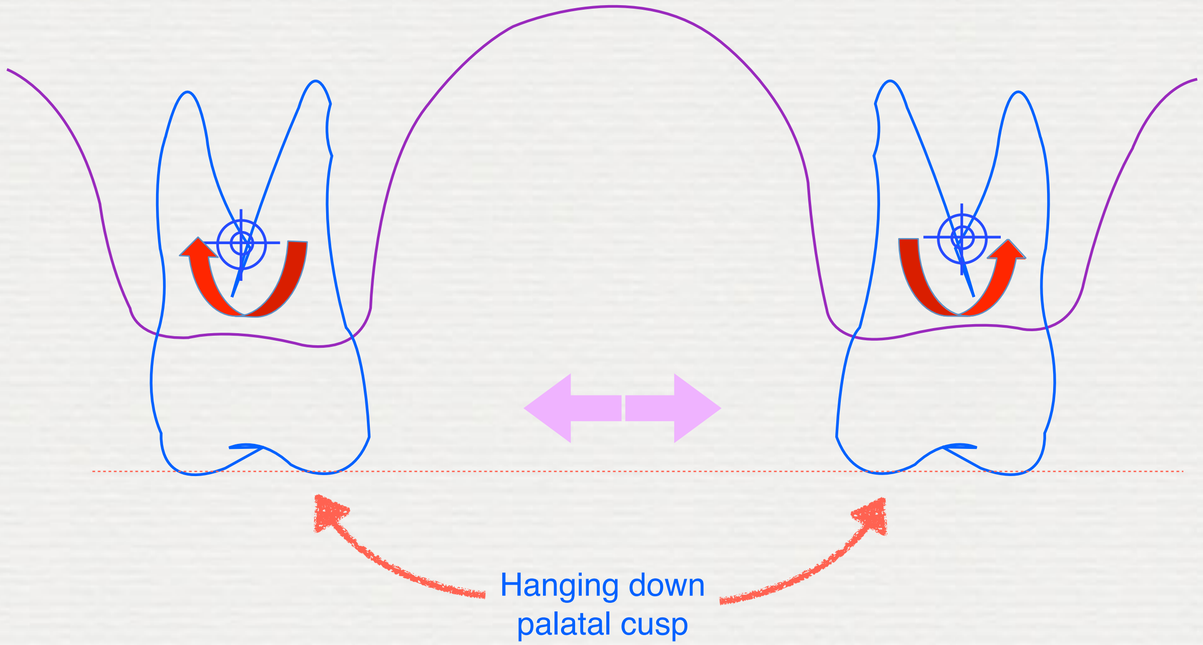
Palatal Cusp Interference

Clinical Experience

-The upper cuspid and bicuspid torque values of 7^0 have proven to be satisfactory in most cases

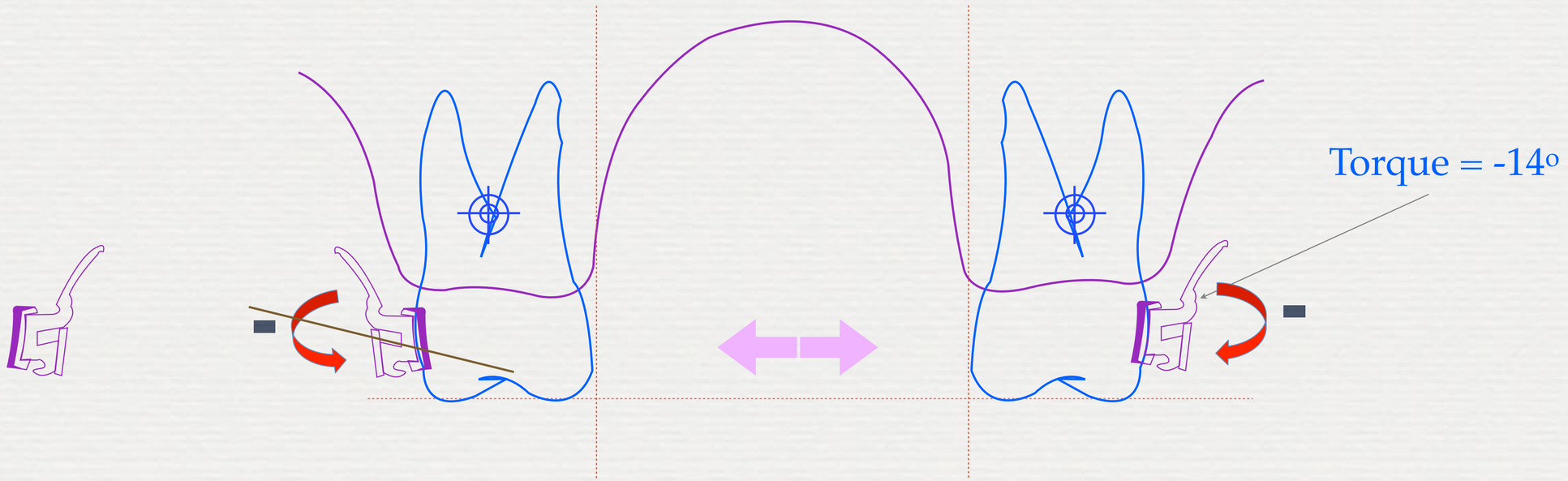
-The upper molars show excessive buccal crown torque with palatal cusps “**hanging down**” which creates centric, balancing side and working side interferences.

Hanging down effect



Expansion of molars by tipping makes consequently extrusion of palatal cusps.

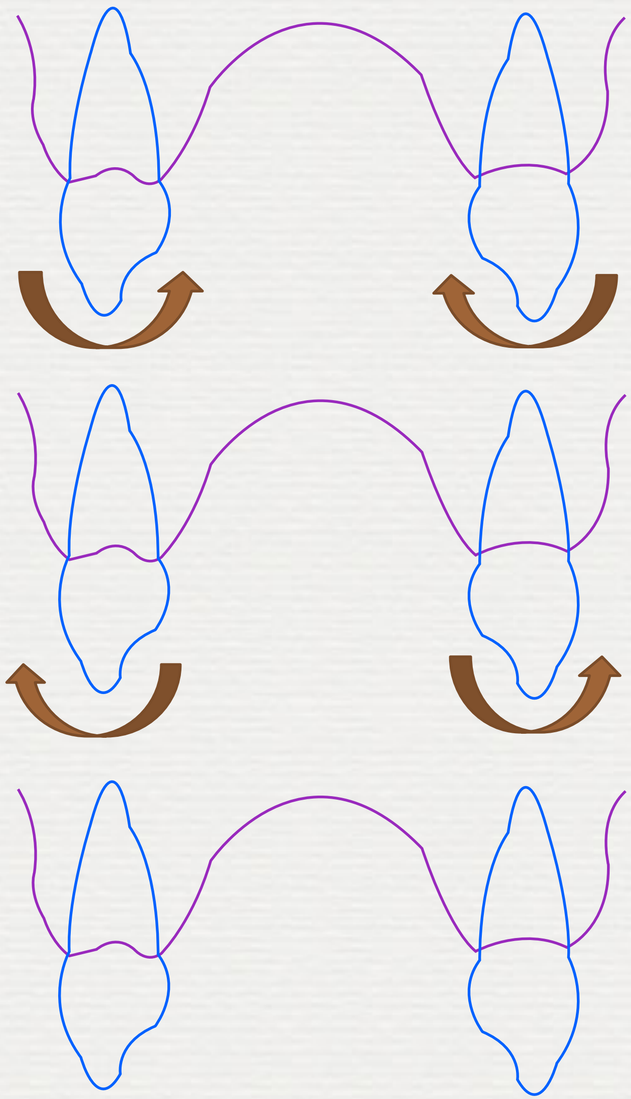
Solutions for hanging down effect



The MBT™ System increases the buccal root torque of the upper molars, reducing the possibility of palatal cusp interferences.

	Upper Posterior Torque				
	Cuspid	1st Bi	2nd Bi	1st Molar	2nd Molar
Andrews' norms	-7.3°	-8.5°	-8.9°	-11.5°	-8.1°
Original SWA	-7.0°	-7.0°	-7.0°	-9.0°	-9.0°
Roth SWA	-2.0°	-7.0°	-7.0°	-14.0°	-14.0°
MBT	-7.0°	-7.0°	-7.0°	-14.0°	-14.0°
	0				
	+7.0°				

Cuspid Bracket Variation



Normal Bracket -7^0 Torque

Inverted Bracket +7^0 Torque

Bracket 0^0 Torque With Hook

Upper Posterior Tip

Treatment Challenge:

Inter-Cuspation Interference

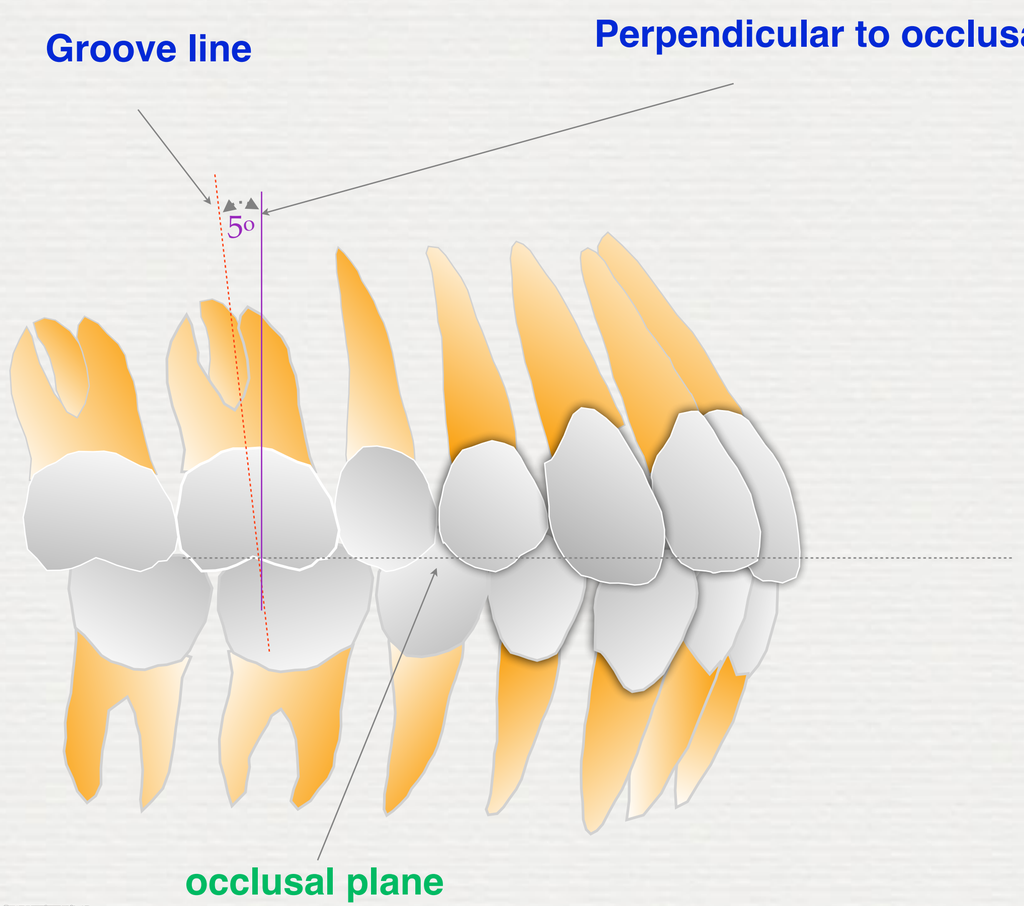
Clinical Experience

Disto-buccal cusp of upper molars occlude too low creating inter-cuspation interference

	Upper Posterior Tip			
	1st Bi	2nd Bi	1st Molar	2nd Molar
Andrews' norms	2.7°	2.8°	5.7°	0.4°
Original SWA	2.0°	2.0°	5.0°	5.0°
Roth SWA	0°	0°	0°	0°
MBT	0°	0°	0° *	0° *

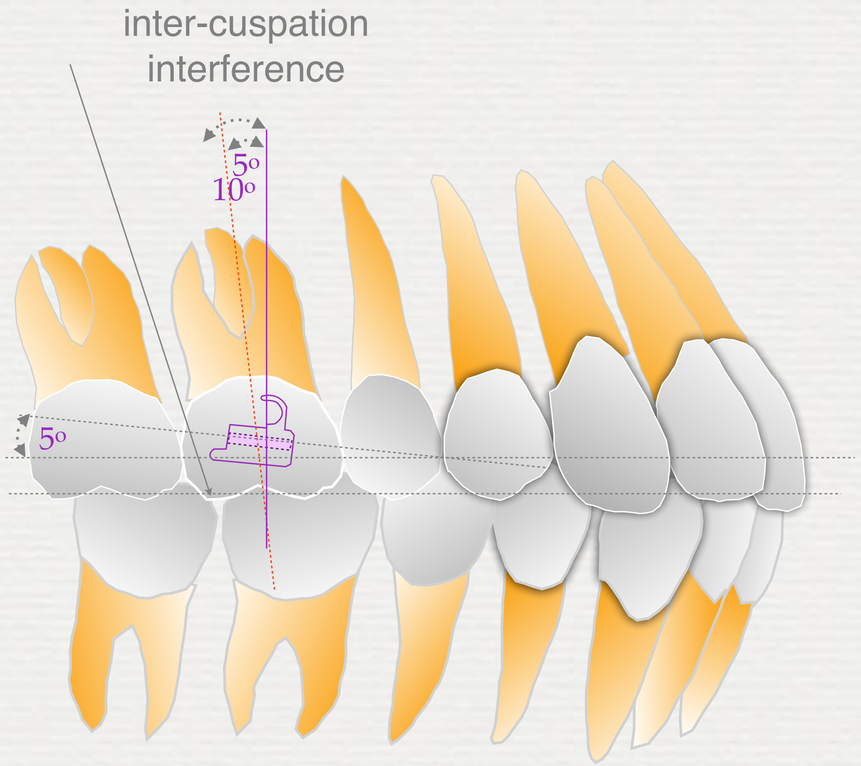
* Effective tip is 5°

Buccal groove & Long Axis



-The buccal groove is the reference for crown tip in the upper molars.
-This buccal groove shows a 5° angulation to a line drawn perpendicular to the occlusal plane.

Solutions



When using a 5º tube, if the band is placed parallel to the buccal cusps, it will effectively deliver a 10º tip to the first molar. Thus a **0º tip tube**, seated parallel to the buccal cusps, delivers the ideal 5º of tip.

Lower Posterior Torque

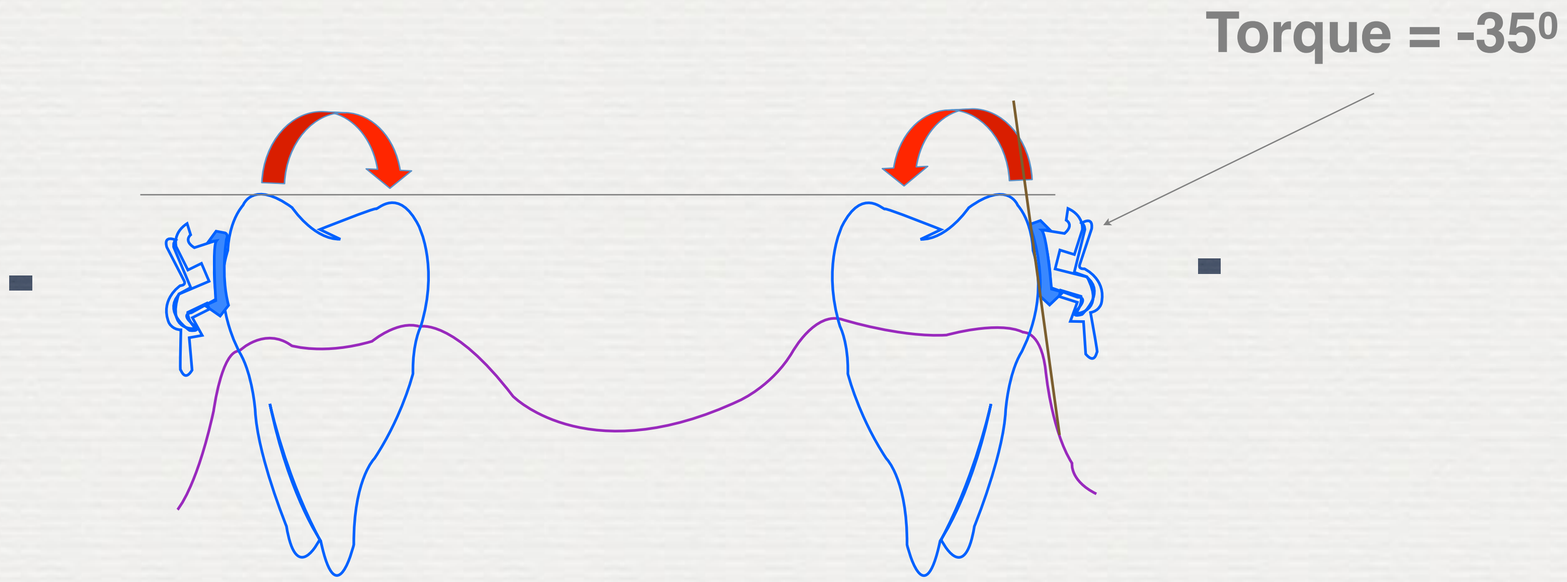
Treatment Challenge:

Lingual Rolling of the Lower Posterior Teeth

Clinical Experience

-lower cuspids and bicuspids gingival recession.
-Lower second molars with -35^{o} of torque consistently **“roll in” lingually.**
-Roll-in lingually of the lower posterior segments makes the maxillary arch narrow.

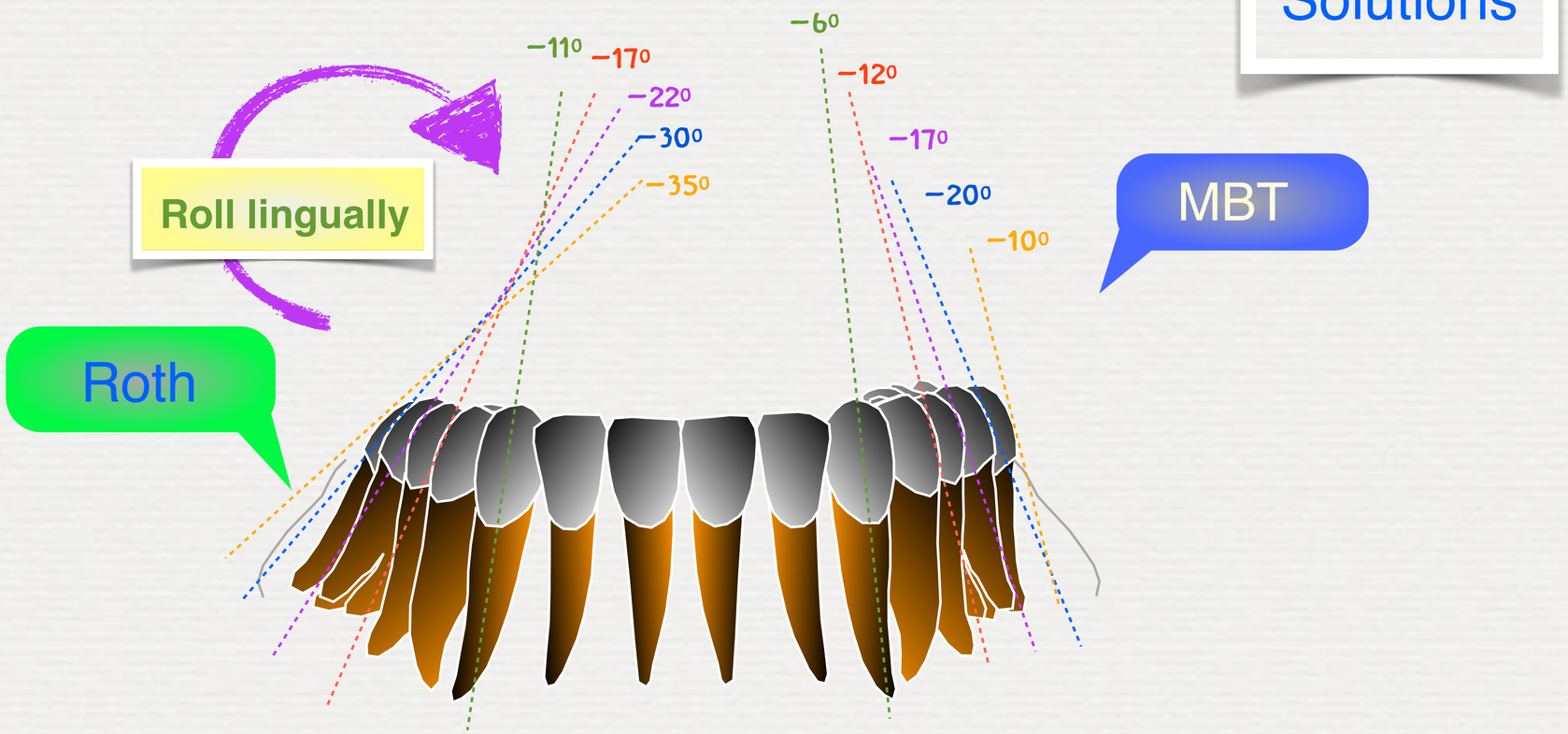
Roll in lingually



Lower second molars with -35⁰ of torque consistently “roll in” lingually.

PROBLEM OF TORQUE IN THE POSTERIOR SEGMENTS

Solutions



Excessive torque in the posterior segments influences the teeth to roll lingually. The MBT™ provides reduced torque values in this area, allowing uprighting of the teeth.

	Lower Posterior Torque				
	Cuspid	1st Bi	2nd Bi	1st Molar	2nd Molar
Andrews' norms	-12.7°	-19.0°	-23.6°	-30.7°	-36.0°
Original SWA	-11.0°	-17.0°	-22.0°	-30.0°	-35.0°
Roth SWA	-11.0°	-17.0°	-22.0°	-30.0°	-30.0°
MBT	-6.0°	-12.0°	-17.0°	-20.0°	-10.0°

Lower Posterior Tip

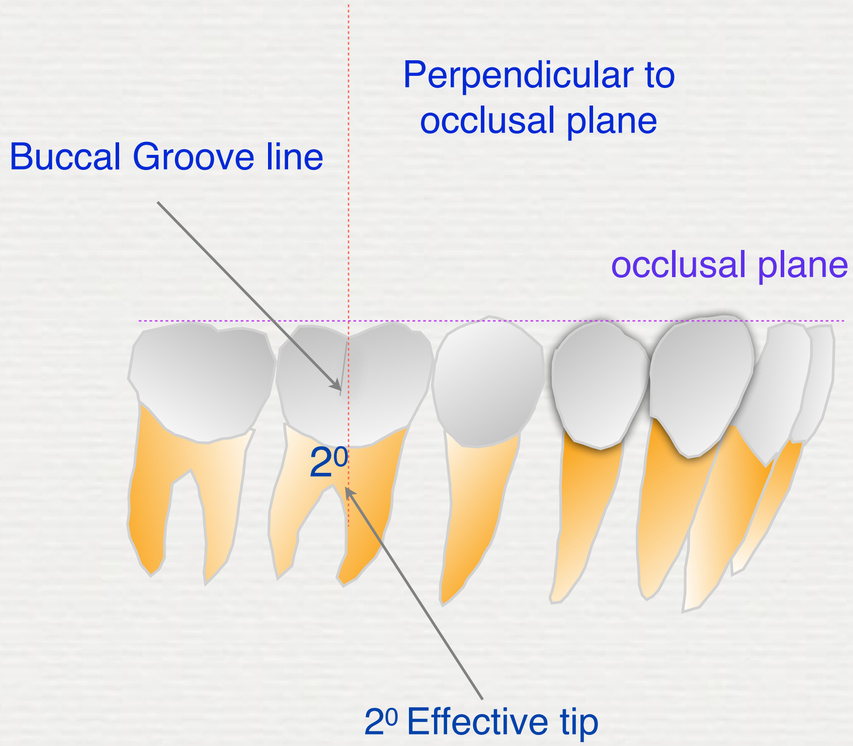
Treatment Challenge:

Achieving a Class I Relationship Efficiently

Clinical Experience

- 2^0 of mesial crown tip in the lower bicuspids moves them more in a Class I direction.
- $2^0$of tip is also preferred in the lower first and second molars.

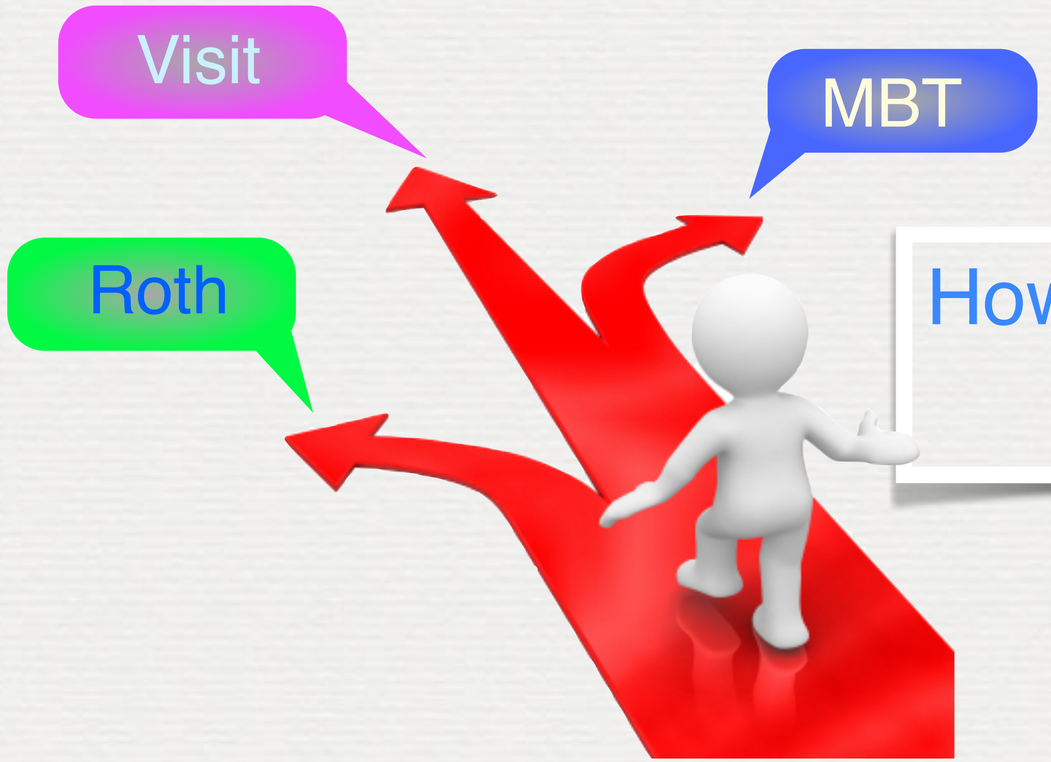
Solutions



2^0 of mesial crown tip at the lower bicuspid brackets.The lower buccal groove lies 2^0 off of a line drawn perpendicular to the occlusal plane. Therefore, the lower molars can be accomplished by placing 0^0 crown tip (2^0 effective tip) with the brackets parallel to the occlusal plane.

	Lower Posterior Crown Tip			
	1st Bi	2nd Bi	1st Molar	2nd Molar
Andrews' norms	1.3°	1.54°	2.0°	2.9°
Original SWA	2.0°	2.0°	2.0°	2.0°
Roth SWA	-1.0°	0	° -1.0°	-1.0°
MBT	2.0°	2.0°	0° *	0° *

* Effective tip is 2°



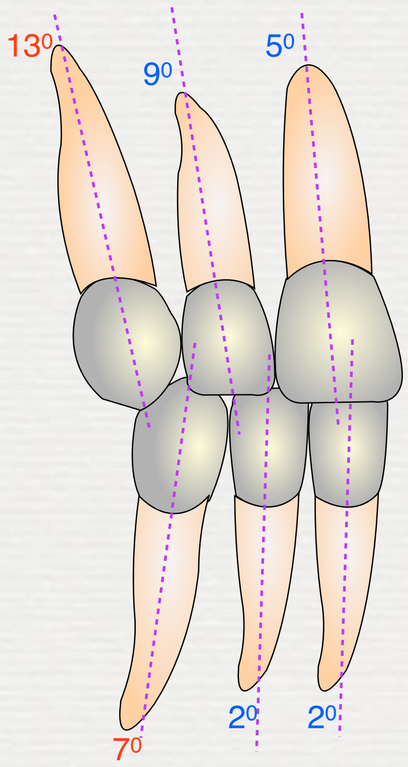
How to select the bracket prescription ?

The orthodontists should **select the specific bracket prescription** as **his own practice** to meet **his own needs relative to his treatment mechanics** as well as to meet the **specific priorities of his patients**

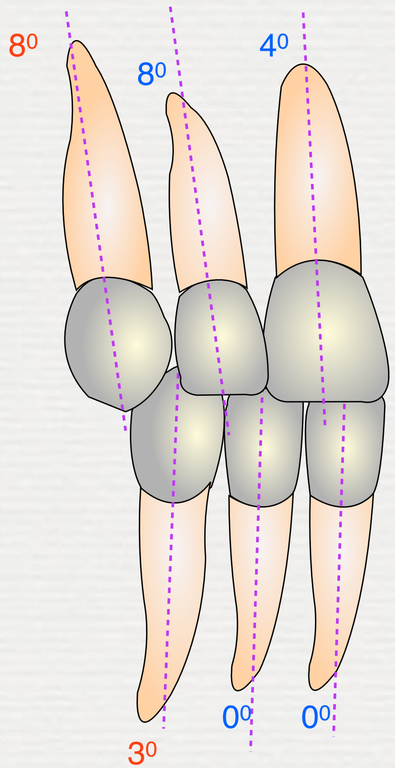
MY FAVORITE BRACKET PRESCRIPTION

	Torque				Tip		
Max	Roth	MBT	Visit		Roth	MBT	Visit
			Retract	Protract			
Central incisor	12	17	12	+2	5	4	5
Lateral incisor	8	10	8	-2	8	8	8
Canine	-2	-7, 0, +7	+7	0	13	8	8
1st Premolar	-7	-7	-7		0	0	0
2nd Premolar	-7	-7	-7		0	0	0
1st Molar	-14	-14	-14		0	0(5*)	0
2nd Molar	-14	-14	-40		0	0(5*)	0
Mand							
Central incisor	-1	-6	+6	-6	0	0	0
Lateral incisor	-1	-6	+6	-6	0	0	0
Canine	-11	-6	-6		5	3	3
1st Premolar	-17	-12	-12		0	2	2
2nd Premolar	-22	-17	-17		0	2	2
1st Molar	-30	-20	-20		0	0(2*)	0
2nd Molar	-35	-20	-10 (+30)		0	0(2*)	0

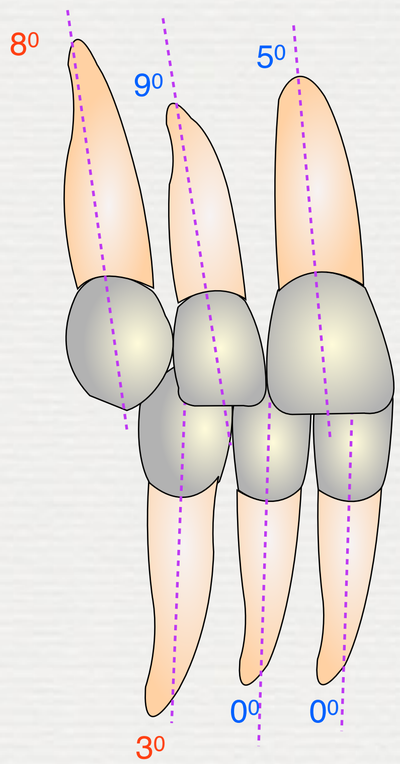
Incisors Tip “AVS”



Roth



MBT



AVS

Less anterior tip reduced tip provides a significant reduction in anchorage needs.

Bracket Chart for VISIT's Hybrid System (VHS)

ANGULATION	0	0	0	0	8	8	5	5	8	8	0	0	0	0	ANGULATION
TORQUE	-14 (-40)	-14	-7	-7	7	8 (-2)	12 (2)	12 (2)	8 (-2)	7	-7	-7	-14	-14 (-40)	TORQUE
PRECRIPTION	AVS	MBT	MBT	MBT	MBT/AVS	Roth /AVS	Roth /AVS	Roth /AVS	Roth /AVS	MBT/AVS	MBT	MBT	MBT	AVS	PRECRIPTION
SLOT SIZE	22x25	22x25	22x25	22x25	22x25	18x22	18x22	18x22	18x22	22x25	22x25	22x25	22x25	22x25	SLOT SIZE
# ซี่ฟัน	#17	#16	#15	#14	#13	#12	#11	#21	#22	#23	#24	#25	#26	#27	# ซี่ฟัน
# ซี่ฟัน	#47	#46	#45	#44	#43	#42	#41	#31	#32	#33	#34	#35	#36	#37	# ซี่ฟัน
SLOT SIZE	22x25	22x25	22x25	22x25	22x25	18x22	18x22	18x22	18x22	22x25	22x25	22x25	22x25	22x25	SLOT SIZE
PRECRIPTION	MBT/AVS	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT/AVS	PRECRIPTION
TORQUE	-10 (+30)	-20	-17	-12	-6 (+6)	-6	-6	-6	-6	-6	-12	-17	-20	-10 (+30)	TORQUE
ANGULATION	0	0	2	2	3	0	0	0	0	3	2	2	0	0	ANGULATION

Bracket Chart for VISIT's Hybrid System (VHS)

Set ES : Cl.1,3

ANGULATION	0	0	0	0	8	8	5	5	8	8	0	0	0	0	ANGULATION
TORQUE	-40	-14	-7	-7	0	-2	2	2	-2	0	-7	-7	-14	-40	TORQUE
PRECRIPTION	AVS	MBT	MBT	MBT	MBT	AVS	AVS	AVS	AVS	MBT	MBT	MBT	MBT	AVS	PRECRIPTION
SLOT SIZE	22x25	22x25	22x25	22x25	22x25	18x22	18x22	18x22	18x22	22x25	22x25	22x25	22x25	22x25	SLOT SIZE
# ซี่ฟัน	#17	#16	#15	#14	#13	#12	#11	#21	#22	#23	#24	#25	#26	#27	# ซี่ฟัน
# ซี่ฟัน	#47	#46	#45	#44	#43	#42	#41	#31	#32	#33	#34	#35	#36	#37	# ซี่ฟัน
SLOT SIZE	22x25	22x25	22x25	22x25	22x25	18x22	18x22	18x22	18x22	22x25	22x25	22x25	22x25	22x25	SLOT SIZE
PRECRIPTION	MBT	MBT	MBT	MBT	AVS (MBT)	AVS (MBT)	AVS (MBT)	AVS (MBT)	AVS (MBT)	AVS (MBT)	MBT	MBT	MBT	MBT	PRECRIPTION
TORQUE	-10 (+30)	-20	-17	-12	+6	+6 (Flip)	+6 (Flip)	+6 (Flip)	+6 (Flip)	+6	-12	-17	-20	-10 (+30)	TORQUE
ANGULATION	0	0	2	2	3	0	0	0	0	3	2	2	0	0	ANGULATION

Set EX : Cl.2

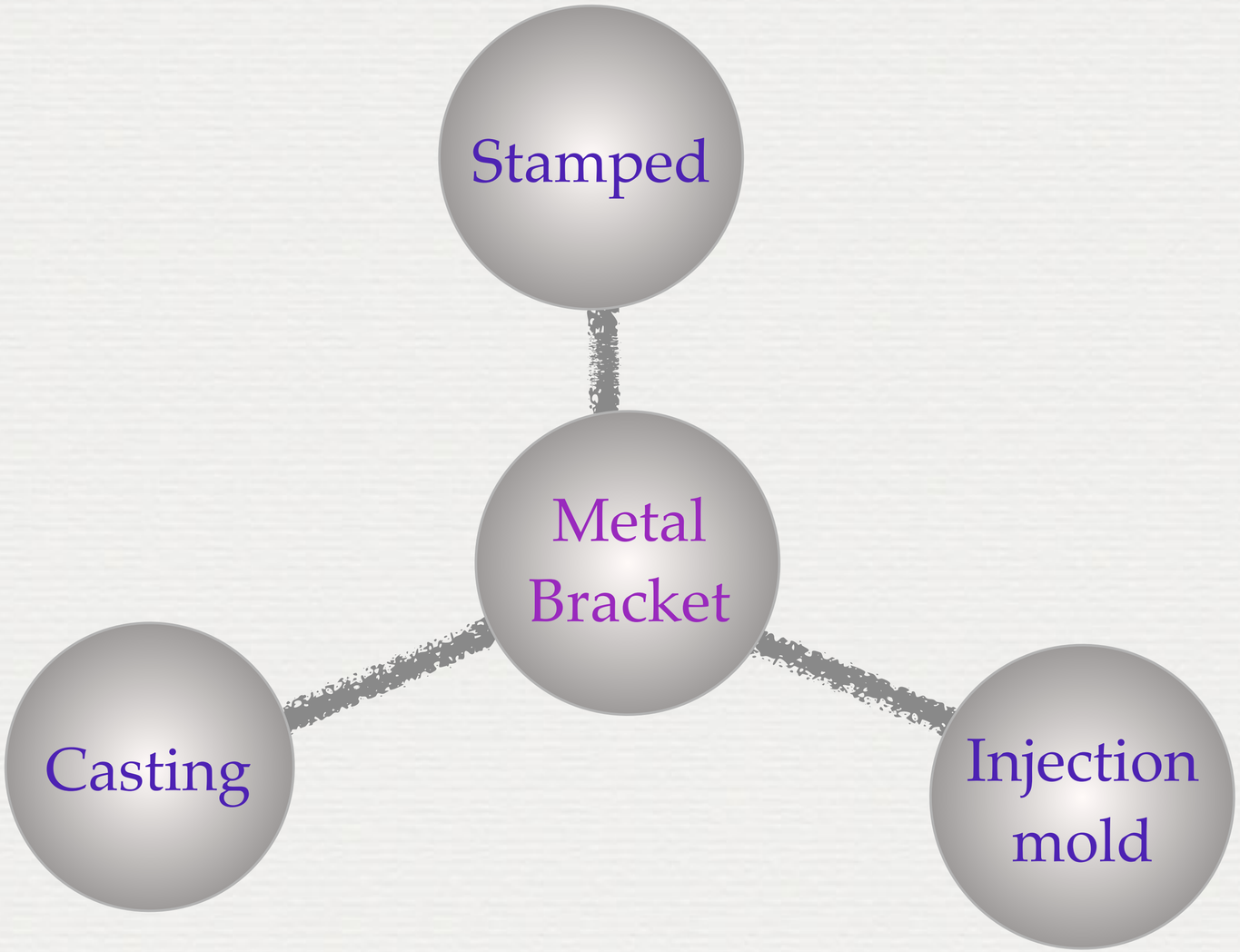
ANGULATION	0	0	0	0	8	8	5	5	8	8	0	0	0	0	ANGULATION
TORQUE	-40	-14	-7	-7	+7	8	12	12	8	+7	-7	-7	-14	-40	TORQUE
PRECRIPTION	AVS	MBT	MBT	MBT	AVS	Roth	Roth	Roth	Roth	AVS	MBT	MBT	MBT	AVS	PRECRIPTION
SLOT SIZE	22x25	22x25	22x25	22x25	22x25	18x22	18x22	18x22	18x22	22x25	22x25	22x25	22x25	22x25	SLOT SIZE
# ซี่ฟัน	#17	#16	#15	#14	#13	#12	#11	#21	#22	#23	#24	#25	#26	#27	# ซี่ฟัน
# ซี่ฟัน	#47	#46	#45	#44	#43	#42	#41	#31	#32	#33	#34	#35	#36	#37	# ซี่ฟัน
SLOT SIZE	22x25	22x25	22x25	22x25	22x25	18x22	18x22	18x22	18x22	22x25	22x25	22x25	22x25	22x25	SLOT SIZE
PRECRIPTION	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	MBT	PRECRIPTION
TORQUE	-10 (+30)	-20	-17	-12	-6	-6	-6	-6	-6	-6	-12	-17	-20	-10 (+30)	TORQUE
ANGULATION	0	0	2	2	3	0	0	0	0	3	2	2	0	0	ANGULATION

BRACKET Classification

- **Prescription**
  - Andrews
  - Roth
  - MBT
- **Material**
  - Metal (SS)
  - Plastic
  - Ceramic
- **Slot Size**
  - 18X22
  - 22X25
- **Ligation**
  - Conventional
  - Self ligation
- **Self Ligation**
  - Active
  - Passive

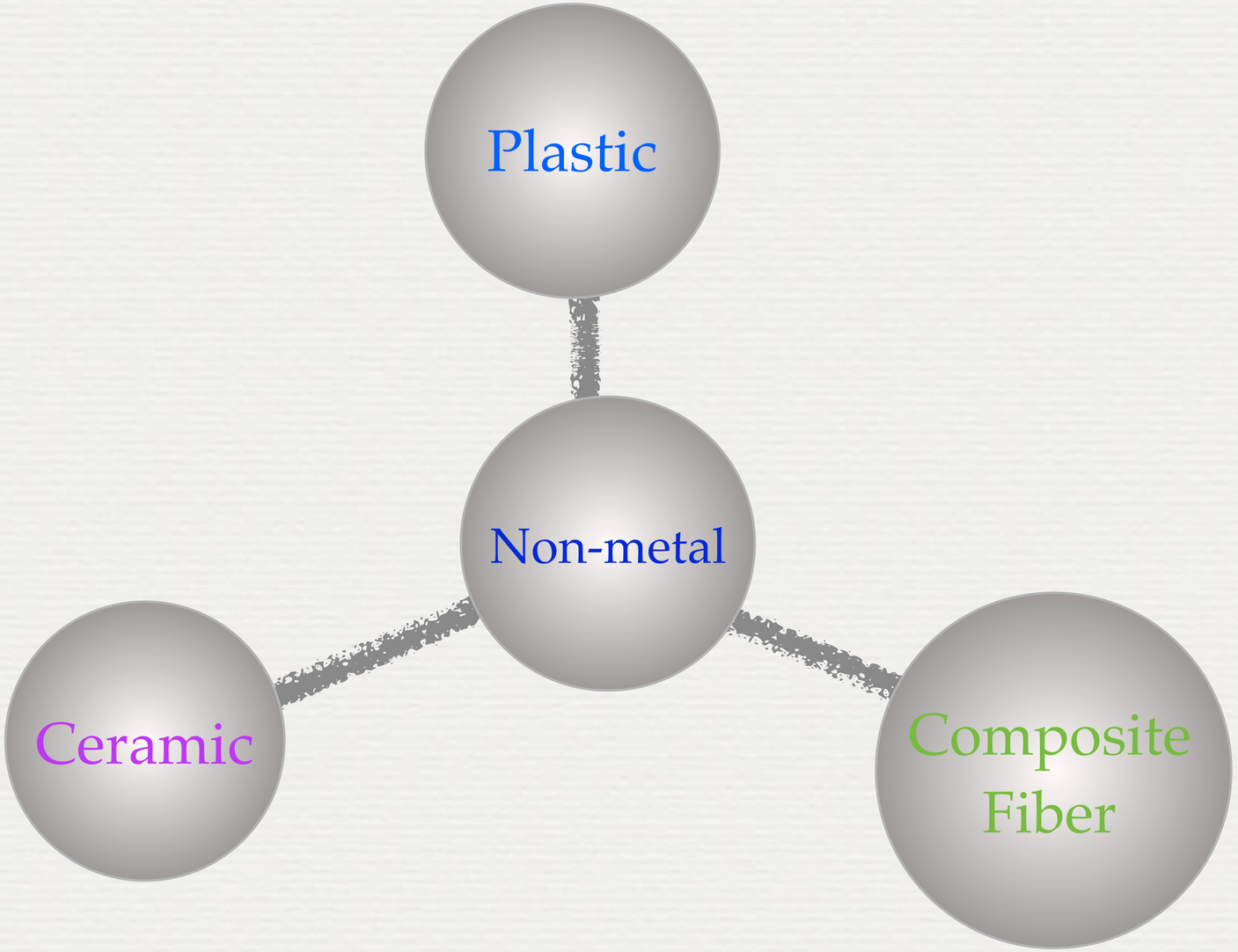
Metal Bracket Material

Material	Friction	Esthetic	Allergic	Dimensional Stability	Staining	Cost	Enamel Damage	Comfortable	Durability
SS	A	C	B	A	A	A	A	A	A
Titanium	C	C	A	A	A	B	A	A	A
Nickel Free	B	C	A	A	A	C	A	A	A


Stamped
Metal Bracket
Casting
Injection mold

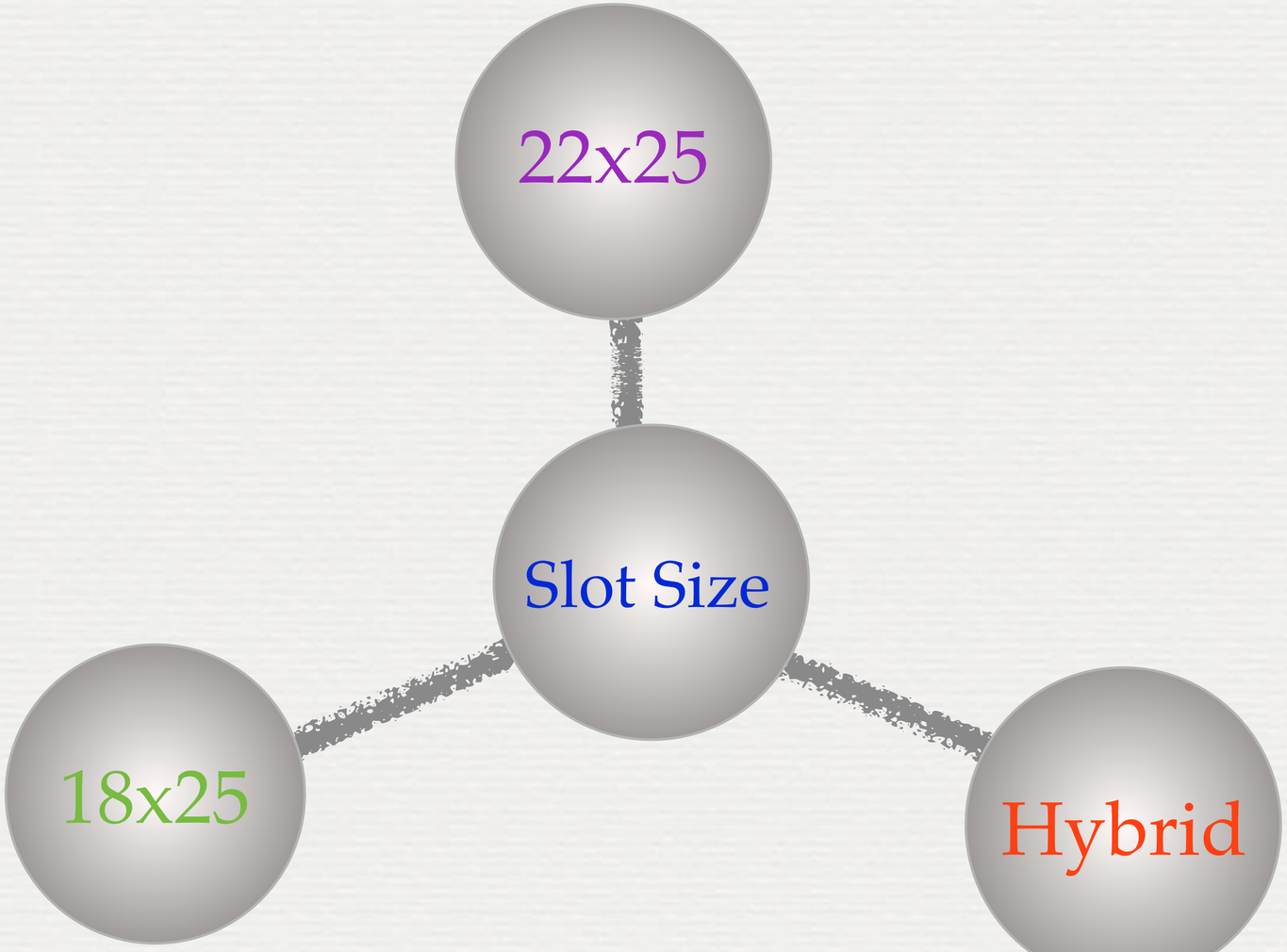
Metal Bracket Prefabrication

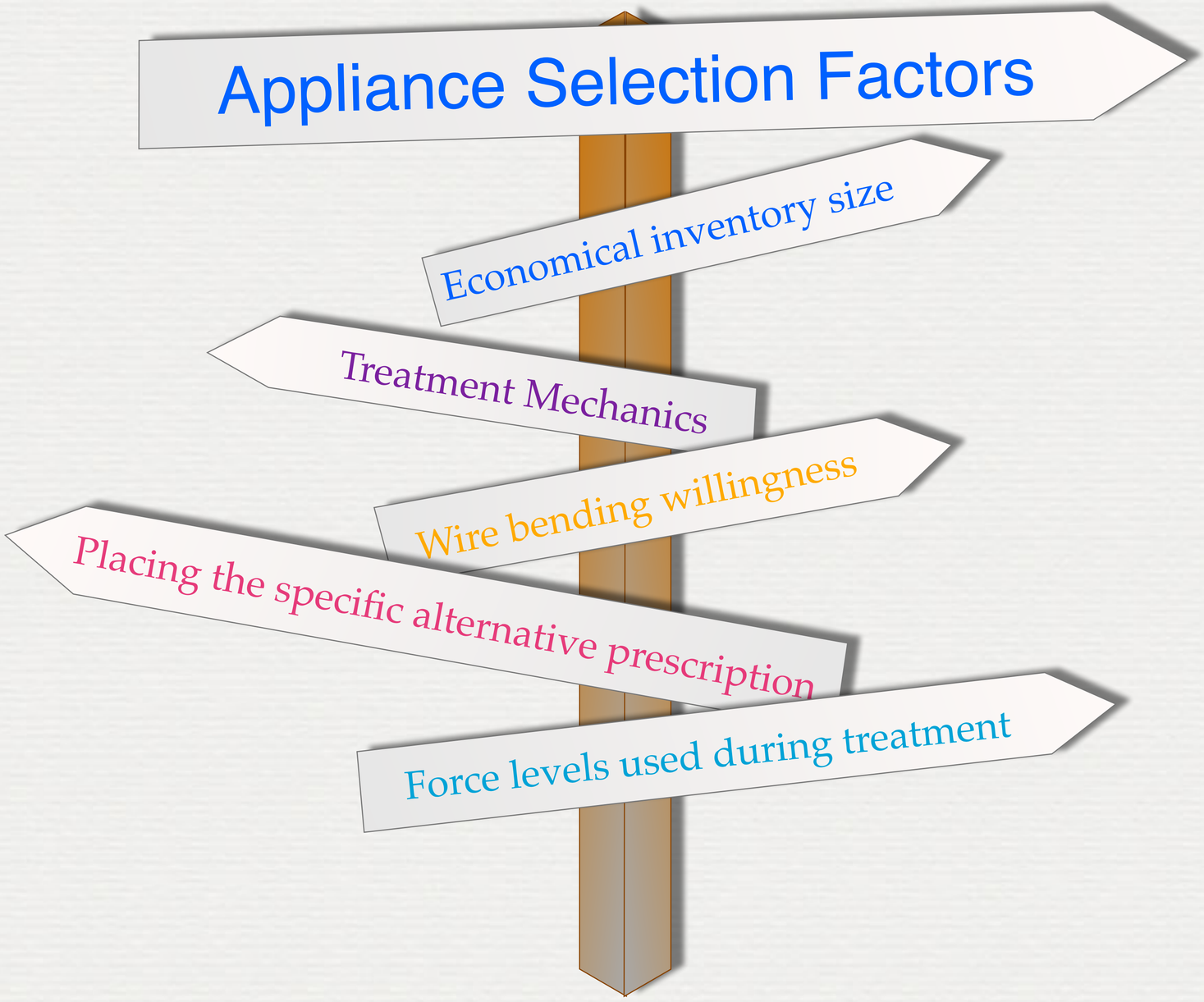
Prefabrication	Friction	Esthetic	Allergic	Dimensional Stability	Staining	Cost	Enamel Damage	Comfortable	Durability
Stamp	C	C	-	C	C	A	A	C	C
Casting	B	C	-	B	B	B	A	B	A
MIM	A	C	-	A	A	C	A	A	A


Plastic
Non-metal
Ceramic
Composite
Fiber

Non_metal Material

Material	Friction (Sliding Mech)	Esthetic	Allergic	Dimensional Stability	Staining	Cost	Enamel Damage (Tooth weariness)	Comfortable (Profile, Smooth)	Durability (Fragile)
Plastic	C	A	A	C	C	B	A	A	C
Ceramic	B	A	A	A	A	C	C	C	B
Composite Fiber	A	A	A	A	A	C	?	?	A


22x25
Slot Size
18x25
Hybrid


Appliance Selection Factors
Economical inventory size
Treatment Mechanics
Wire bending willingness
Placing the specific alternative prescription
Force levels used during treatment

The recommendation (my favorite) for selecting the appliance system

Slot size : **Cuspid & Posterior teeth .022x.028**

Anterior incisors .018x.022

Twin Bracket : **Antirotation**

Base of bracket : **Torque in base**

bracket positioning aid: **Long Axis Line, 2D Build-in**

Bracket shape : **Crown related (rhomboid)**

1st molar : ?? **Convertible slot**

Molar & Cuspid : **Hook equipped (? Bicuspid)**

Prescription : **Roth / MBT / AVS**

Build-in identification : **disto-gingival, Laser engraved**

Base surface of bracket : **mesh (Mechanical Lock)**

Andrew's torque norm		.018x.022 Slot size				Bracket torque commercial in the market					
Tooth number	Optimal Torque	Wire		Prescription (AVS)		Roth	MBT	Alexander	Damon Q		
				Retraction	Protraction				High	STD	Low
1/-	7	.016x.022	9.0	+16 (7+9)	-2 (7-9)	12	17	14	+22	+15	+2
		.017x.025	5	+12 (7+5)	+2.5 (7-4.5)						
		.018x.025	2	+9 (7+2)	+5						
2/-	3	.016x.022	9.0	12	-6	8	10	7	+13	+6	-5
		.017x.025	5	8 (3+5)	-2 (3-5)						
		.018x.025	2	5	+1						
3/-	-7	.016x.022	28	+21 (-7+28)	-35 (-7-28)	-2	-7, 0, +7	-3	+11	+7	-9
		.017x.025	18	+11 (-7+18)	-25 (-7-18)						
		.018x.025	15	+8 (-7+15)	-22 (-7-15)