Standard Edgewise Technique

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BONWILL HAWLEY ARCH FORM

Orthodontic arch is the form which moulds the dental arch with every bend reflected in the position of the teeth

- Angle "if an archwire is placed in brackets with uniform slot depths, it must take the form of the outline of the buccal & labial surfaces of the teeth"
- Unique alignment of upper lateral incisor thinner labio-lingually & short crown length
- Contact points lie on an ellipsoid curve
- There is a straight line from canine to mesio buccal cusp of first molar, but beyond that it curves inward progressively
- Bonwill-Hawley diagram is widely used to decide arch form
- General pattern decided by studying the original models & of the muscle behavior of the patient rather than based upon widths of teeth themselves













Final Bownwill's Archform



1st, 2nd & 3rd ORDER BENDS IN AN IDEAL ARCHWIRE

Three orders of tooth movement

• Movements necessary to bring the teeth into the line of occlusion are of three kinds first, second and third order.

First order bends:-	In and Out bends	
	(Bucco-lingual / Labio-lingual)	
	(Rotational movement)	
Second order bends:- Tip bends		
	(Mesio-distal movements)	
Third order bends:-	Torque	



First order bends-

- Horizontal change relative to the line of occlusion.
- Also called in -out bends.
- Do not alter the horizontal plane of the wire.
- The action & reaction of these bends affect expansion or contraction.
- Used to move individual teeth.
- The interaction of bends can affect the third order position of the teeth if expansionary forces are used.

Purpose:-

- To contour the arch wire in accordance to the buccal surfaces of teeth, which vary in their labio-lingual thickness and do not conform to an arch.
- The extent of each bend is dictated by the labio-lingual thickness of individual teeth so that a smooth curve of incisors and canines on their lingual surface can be achieved.
- First order bends also help in derotation(**Molar offset**).
- First order bend in between pre-molar and molar is also known as anti-rotation or toe-in bend and the size vary from individual to individual.
- First order bends in the maxillary and mandibular arch must be co-ordinated.
- In pre-adjusted edgewise appliance system, first order bends are built in the bracket bases and buccal tube base.
- However these may have to be bent depending on individual requirements of a malocclusion or while finishing.

First order bends are-

- Lateral inset
- Canine eminence
- Molar offset
- Antirotation bend

First Order Bends Maxillary Archwire

1. Straddle mark between right central and right lateral incisors with the arch bending pliers $\underline{No 142}$, looking down on gingival surface of wire.



2. With forefinger of left hand on median line press arch wire towards you until you feel a gentle bending of the wire.

3. Place wire on the graph to see if right leg lies on Point 1.



4. With thumb of left hand on right lateral cuspid area of arch wire forward or away from yourself.

5. Check on the graph to see if right leg is on point O.



6. Straddle mark between lateral incisor and cuspid. With thumb of left hand against lateral incisor area of arch wire push forward or away from yourself.

7. Check on the graph to see if right leg of arch wire is on point 3.



8. With forefinger of left hand press distal leg toward yourself gently. Slide holding pliers distally 0.5mm, several times and continue pressure of left forefinger, gently whipping in a curvature distributed over the mesial half of cuspid area.

9. Check on graph to see if distal leg of arch wire is on point O.













10. Grasp the arch wire 0.5mm mesial to mark between the second bicuspid and first molar. With thumb of left hand press mesial end of arch wire outward slightly.

11. Check on graph to see if distal leg is on point 5.

12. With forefinger of left hand whip distal end of arch wire in or towards yourself. Slide pliers distally step by step and distribute first molar curvatures over mesial half of first molar area.1.

13. Repeat these bends on left leg of arch wire.



14. Check on graph to see if distal graph to see if distal leg is on Point 6.

bends.



15. Completed maxillary arch wire blank with first order arch wire



First Order Bends Mandibular Arch

1. Slightly flatten incisal curvature so that incisal curvature of arch wire is 1mm, side Bonwill Hawley graph and rest of mandibular blank lies inside but tangent to

chart.

2. Hold left leg of arch wire in left hand with

distal ends of arch wire pointed towards you and slide holding pliers just distal to mark between right lateral incisor and right cuspid.

3. With forefingers of left hand start whipping in a cuspid curvature by pressing distal end of arch wire towards you in area of first biscuspid . Slide holding pliers distally 0.5mm at a time and distribute curvature over mesial half of cuspid area.

4. Arch wire with cuspid curvature complete.

5. Slide holding pliers distally, straddling mark between cuspid and first bicuspid. With thumb of left hand push out away from you from you very slightly against cuspid area of arch wire.

> 6. With forefinger of left hand press gently inward or toward you on distal leg of arch wire. Slide pliers distally 0.5 mm at a time and whip in a first bicuspid offset, distributing curvature over mesial half of first bicuspid area.

7. Arch wire showing first bicuspid offset completed on right leg of arch wire.

8. Slide holding pliers distally 1mm past second bicuspid first molar mark. With thumb of left hand on second.













9. Bicuspid area of arch wire, push out or away from you.

10. With holding pliers in same position and using forefinger of left hand, press distal end of arch wire towards you. Slide, holding pliers distally at 0.5mm intervals and whip in a

first molar offset bend over mesial half of first molar area.



11. Completed molar offset bend . Check on graph . Incisal curvature should be 1mm lingual to graph curvature In cuspid area mandibular arch wire should lie approximately 2mm lingual to graph. Distal leg of mandibular arch wire should diverge from cuspid area and become tangent to maxillary arch wire from first molar area distally . Check on graph and coordinate to maxillary

arch wire from first molar area distally. Check on graph and coordinate to maxillary arch wire.

12. Repeat on left side. Completed first order bends in mandibular arch wire.

Co-ordinated upper and lower arch wire with first order bends.





Second order bends

- Represent a vertical change
- Also called tip/angulation
- Used to tip posterior teeth
- Mesially or distally-may be
- Tip back or tip forward bends
- Bends in the occluso-gingival direction to maintain the final angulation of teeth.
- In the incisal area, second order bends (artistic bends) provide the ideal angulation to these teeth.
- In posterior region, second order bends maintain the distal tipping of the pre-molars and molars and cause bite opening (pseudo bite opening).





V-bend

- To differentiate between anterior and posterior segment.
- To give separate anterior and posterior root torque.
- For soldering attachments.

Steps in formation of V bend

1. The first step in 2^{nd} order bending techniques is formation of right and left V bends. Use of a No.139 pliers, placing beaks at right angles to arch wire and pointing directly towards you with a flat beak at gingival surface of the arch wire. Place the wire distal but tangent to the mark between maxillary left cuspid and left lateral incisor.





2. With thumb of left hand press upwards on distal leg of arch wire until distal leg of arch wire is distorted 45° upwards from horizontal.

3. With pliers in same position bend downward mesial to pliers with forefingers of left hand until anterior segment is distorted downwards 45° forms horizontal.





4. This makes actual 90° bend.

5. Slide holding pliers mesially until beaks are mesial but tangent to mark.

6. With the thumb press upwards on the underside of the arch wire mesial to plier until the wire is again horizontal.

7. Completed v bend.







In pre-adjusted edgewise system, second order effects (tip) are incorporated in the bracket base/slot but may be useful in some cases to achieve better finish in terms of angulation of teeth.

Second Order Bends Maxillary Arch wire

1. Approach arch wire from lingual side with holding pliers in right hand, beaks at a right angle to arch wire and tangent to mark between first and second molars.

> 2. With beak pointed directly towards you, approach left leg of arch wire from lingual side. Holding pliers should be held in right hand and at right angle to arch wire, the legs of which

will point to the right. Beaks of pliers must grasp arch wire distal but tangent to mark between first and second molars.

Press up on distal end of arch wire with thumb of left hand until distal end 3. of arch wire is distorted upward approximately 30 degree.

> 4. With forefingers of same hand press downward an identical amount on arch wires just mesial to holding pliers.

5. Slide across opposite leg of arch wire for alignment.

6. Slide holding pliers mesially and straddle mark between second bicuspid and first molar. With thumb of left hand press up on distal leg of arch wire until it is distorted approximately 30 degree.

7. With forefinger of same hand downward on arch wire just mesial to holding pliers on identical amount.

8. Slide holding pliers mesially and straddle mark between the first and

second bicuspid. Press up with the thumb on distal side and down with forefinger on mesial side. Slide holding pliers mesially and straddle mark between cuspid and first bicuspid. Press up 30 degree with thumb on distal side and down an identical amount with forefinger on mesial side.













9. Second order bends completed on left leg of arch wire, showing relationship with opposite leg at this step.



10. Repeat bends on opposite leg. To do so distal ends of arch wire will be pointed to your left.

- 11. Second order bends completed on right and left sides.
- 12. Check torque in anterior segment.

Second Order bends- Mandibular arch

1. V bends are placed in mandibular archwire before second order bending exercise.



2. With distal ends of arch wire pointing to right approach arch wire from lingual side, with holding pliers grasping wire distal and tangent to mark between second and first molars. With forefinger

of left hand press down on distal end of arch wire until wire is distorted downward 30 degree from horizontal.

3. Press up on mesial portion of arch wire on identical amount.



4. Slide holding pliers mesial to but do not straddle mark between first molar and second bicuspid and press downward on distal end with forefinger. Again distort arch wire 30 degree from horizontal.

5. Press upward on identical amount on mesial





end.







6. Slide holding pliers forward, this time straddling mark between first and second bicuspids. Press down on distal side and up on mesial side.

7. Straddle mark between cuspid and first bicuspid. Press down on distal side and up on mesial side.



8. Repeat on opposite leg. Have legs of arch wire pointed to your left.

9. Second order bends completed on both legs of mandibular arch wire.





Coordinated continuous second order Tip Back bends- Maxillary archwire

1. To convert step bends just described into distal tipping bends, distal leg of V bends are lengthened

and entire posterior segment of arch wire distal to V bend is bent upward 30 degree. Grasp distal leg of V bend with pliers and bend distal leg of arch wire upward with thumb until wire is distorted 30 degrees from horizontal. This converts step bends into coordinated continuous distal tipping bends.

2. Repeat on opposite side and arch wire now looks like this.



Coordinated continuous second order Tip Back Bends- Mandibular Arch

1. Lengthen distal legs of V bend to convert step up bends into distal tipping bends.

2. Grasp distal leg of V bend with holding pliers and press downward with forefinger, distorting distal portion of arch wire downward 30 degree from horizontal to achieve.

Second order bends Upper wire

Biomechanical effects of second order bends

• An intrusive force for bite opening is also produced in the anterior segment which is accompanied by a labial crown torque.

• Labial crown torque is controlled by Class II Elastics in the Upper arch and in lower arch with molar tieback.

Third order bends

- Torsional change (with the line of occlusion serving as axis) also called torque or inclination movement.
- Used to obtain axial changes in the bucco-lingual or labio-lingual root & crown axis on one or more teeth
- Involves twisting of the wire

Basically two types of torque depending on the type of tooth movement:-

- Buccal (Labial) / Palatal (Lingual) root torque.
- Buccal (Labial) / Palatal (Lingual) crown torque
- Torque may be:-
- Passive or active torque.
- Continuous or progressive torque.

Active torque

• Torque in an arch wire is said to be active when it is capable of affecting a torque movement of teeth in a segment.

Passive torque

• A passive torque in an arch wire is said to be present when the torque in it does NOT produce torque movement on full engagement of the wire. The purpose of the passive torque is to maintain the already achieved torque.

In pre-adjusted edgewise appliance system, torque values are built-in in the brackets. However, a variation of torque in a segment or for an individual tooth may be required for proper finishing of the case.





TECHNIQUE FOR GIVING A THIRD ORDER BEND FOR VARIOUS THIRD ORDER MOVEMENTS

Third order bend maxillary arch

Placing lingual root torque in maxillary anterior segment

1. Place holding pliers just mesial of V bend and bend mesial part of arch wire in a gingival direction with thumb.



2. The pliers are moved in slight steps towards midline, being bent in a gingival direction with thumb. This procedure is repeated until midline is reached, then repeat from opposite V bend to midline.

3. The entire arch with root torque.







4. The omega loops are no longer vertical but should have slight lingual inclination. With holding pliers in left hand, place beaks just mesial to one of V bends, left hand rests on bench holding arch wire so that it is parallel to top of bench.

5. With rotating plier held in right hand

just distal to the V bend, twist in an incisal direction until the omega loop is again vertical. Repeat this procedure on opposite side.





6. This removes lingual root torque from posterior legs but maintain torque in incisal segment.

7. To increase lingual root torque in central incisor area, place holding pliers in

left hand with beaks just distal to mark between lateral and central incisors. Hold arch wire so that it is parallel to bench.



8. With torque pliers held in right hand, place beaks just mesial to and parallel with beaks of holding pliers.



9. Twist mesial pliers slightly in an upward direction. Repeat on opposite side.

10. This increases lingual root torque of central incisor segment of arch wire.

11. When lingual root torque is used in incisor segment, it is placed before artistic bends. After torquing and placing artistic bends, omega loops assume a buccal

inclination. Correct this by holding mesial to V bends and twisting just distal to V bends until omega loops are again vertical





12. The arch is now carefully checked on

typhodont. With arch wire in central and lateral brackets, distal legs should be higher than molar tubes. This is due to lingual root torque in anterior segment. Any discrepancy should be corrected at this time.

13. The posterior segments are checked by placing one end of arch wire into its buccal tube. The free ends of arch wire should be at same level as opposite buccal tube. This

Testing the buceal torque action on right side.

is passive torque in posterior segment.





CONTINOUS POSTERIOR TORQUE

1. Grasp the arch wire with holding pliers in right hand just distal to distal leg of



V bend of left side. Hold wire firmly with pliers horizontally.



2. With bending pliers in left hand approach wire from lingual side with pliers placed just distal to holding pliers.

3. Bend upward with left hand until distal leg on left side is bent to proper



degree of torque. This places same degree of torque in entire posterior segment. Repeat same procedure on opposite side. This places lingual crown torque in this

segment. To place lingual root torque follow the same technique, except downward with left hand instead of upwards.

POSTERIOR PROGRESSIVE TORQUE

1. Grasp the end of the wire with a plier.



2. Grasp the anterior segment of the wire with left hand.





3. Bent entire arch wire downwards to place lingual crown torque or upwards to place labial crown torque.





4. This procedure places progressive torque from second molar forward, which is progressively, less dissipated at about cuspid area. Repeat same procedure on opposite side to coordinate.

Artistic positioning bends Maxillary arch

1. Grasp with arch wire legs pointed away from you. Approach arch wire from lingual side, straddling mark between central incisors, and with forefinger of left hand press downward and equal amount on both left and right sides of arch wire.







2. Slide holding pliers to mark between left central and lateral incisors straddling the mark.



3. Now bend up with thumb of left hand on mesial side of arch wire and down with forefinger on distal end an equal amount. Repeat on opposite side.







4. Completed artistic positioning bend.

Second order bend Vs Tip-back bend

Types of second order bends:-

- Short second order bends
- Long second order bends
- Step Up Bends, Step Down: V Bends
- Tip Bends
- Artistic Positioning bends, Long V Bend

Analysis of Tip Back second order bends

• Second order Tip-back bends are utilized to prepare anchorage.

- The degree of tip-back on the terminal molars should be such that when the arch wire is placed in the buccal tubes, it will cross the cuspid teeth at their dento-enamel junctions.
- After placing the arch wire in the molar tubes of the terminal molars when it is raised and ligated to the two brackets on the first molar teeth, the mesial cusps of the terminal molars are elevated and the first molars are depressed. At this point the arch wire will lie gingival to the brackets on the second pre-molar teeth.
- When the arch wire is placed in the slots of the second premolar brackets, first molars are elevated and the second premolars are depressed. Thus, the force necessary to tip the terminal molars transferred to the second premolar teeth. Now the arch wire lies gingival to the first premolar brackets.
- When the arch wire is ligated to the first premolar brackets, first premolars are depressed and second premolars are elevated. Thus terminal molars are being tipped distally at the expense of depressing the first premolar teeth. Now arch wire lies gingival to the canine brackets.
- When canines are engaged, the canines are depressed and the

first premolars are elevated. Thus, all the distal tipping forces on premolars

and molars are neutralized by the depressing force on the canines. This depression is neither too rapid as it has very large root with well supported alveolar bone. Now arch wire lies gingival to the incisors brackets.

• When arch wire ligated to the incisors brackets, the action is elevation of the canines and depression of the incisors. These teeth are too small and depressed very rapidly.

• As the canine and incisor

- brackets slots are at same level, the cuspid and both incisors reacts as single unit to resist the depressing action of the distal tipping of the terminal molars.
- At this time there is alteration of the occlusal plane. It has dropped down in its anterior quadrant.
- If no force other than those within the arch wires are utilized and if the arch wires are left in the mouth for a long period of time, the end result will be bite opening and this is not desirable.









- The alteration of occlusal plane, however, can be maintained by the anterior box elastics.
- By doing this, the roots of the mandibular buccal quadrants



displace mesially without much distal tipping of the crowns.







• However, when Class-III elastics are applied along with anterior box elastics

the crowns of the mandibular buccal segment is tipped distally to the desired degree of anchorage preparation with minimum amount of mesial root displacement.

• If second order bends are placed in the maxillary arch without Class-II elastics, the uncontrolled forces move the root apices of the teeth in the buccal segment in mesial direction without distal movement of the crown. In such instances it will lead to mesial displacement of the teeth in the buccal quadrants of both arches with resulting bimaxillary protrusion.





CURVE OF SPEE MAXILLARYARCH

Grasp maxillary arch at median line with right hand, using hand as holding pliers.





Place arch wire between forefinger and

thumb of left hand with forefinger on gingival or upper surface of right leg of arch wire . With forefinger on cuspid area of arch wire, press down with

forefinger, up with thumb and pull from cuspid area to distal end of arch wire. Repeat on left leg of arch wire . The position of forefinger of left hand in relation to thumb is about $\frac{1}{2}$ inch forward of thumb.

Placing a curve of spee in arch wire gives progressive distal tipping action to arch wire.

REVERSE CURVE OF SPEE IN MANDIBULAR ARCH

Grasp arch wire firmly in right hand with free ends of arch wire to your left. Using forefingers of left hand on upper surface of arch wire placed 1/2 inch behind thumb which is on the lower surface of arch wire.

Press upward with thumb and downward with forefinger of left hand. At the same time pull arch wire through fingers with right hand.



Repeat on opposite leg. Mandibular arch wire now has reverse curve of Spee, which incorporates a progressive distal tipping action into mandibular arch wire.





TYPODONT EXERCISE: STANDARD EDGEWISE TECHNIQUE

TEETH SET UP





BANDING AND BONDING

Bracket Positioning, Sequence of Mechanics in Edgewise Mechanics Tweed:

Mandibular arch:

- Bracket slot should be 3.5mm from incisal edge or cuspal tip
- On molars -Between occlusal and middle third

Maxillary arch:

• Bracket slot 3.5mm from incisal edge of cuspal tip except on lateral incisor (3.0mm) and canine (4.0mm).

	Upper arch	Lower arch
Central	3.5mm	3.0mm
Lateral	3.0mm	3.0mm
Canine	4.0mm	3.5mm
Premolar	3.5mm	3.0mm
Molar	3.0mm	2.5mm



Step 1 Long Axis of the teeth and position of the slot Is Marked According to the chart above.









Step 2 Brackets Are Positioned As Above.

ALIGNMENT & LEVELING

Goals of first phase

- Bring the teeth in alignment and correct vertical discrepancies by leveling out the arches
- Labiolingual discrepancies (crossbites)
- Axial discrepancies (mesio-distal)
- Correct rotations

Loop mechanics

- A loop reduces force and increases range by adding wire in inter-bracket span.
- A loop may be open or closed type. •
- Open loops are most efficiently activated through compression of the legs. •
- The force of any loop may be reduced by coiling the wire at the apex one or more times.
- The force developed in loop or arch wire is transmitted to the tooth through the bracket attachment • resulting tooth movement.

Clinical applications of loops

Movements

Loop

- Labial - Double vertical- open •
 - Double vertical- open Lingual
- Elevation

•

- Depression •
- Rotation •
- Root tipping •
 - Canine Retraction
 - Ricketts Spring **Incisor Retraction** - T loops /double key hole loops
- Mesial or distal movement (such as midline correction): double vertical loop against bracket or fixed to the contained section of the arch, activated by tying back or compression.

- Double horizontal or Box - Double horizontal or Box

- Box or double horizontal

- Double vertical-open or box

Combination of open and closed vertical loops

- Space closure (contraction of the arch): closed vertical loop, tied back.
- Space opening (expansion of the arch): open vertical loop, with stops. •
- Bite opening: T-loops mesial to the canine. Note that the arch wire in anterior section between the • two loops should have reverse curve to transmit the pressure equally to all 4 incisors.

Principles in the choice of alignment arches

- Initial arch wires for alignment should provide light, continuous forces to produce the most • effective tooth movement. Heavy force in contrast should be avoided.
- The arch wire should be able to move freely within the brackets. For mesiodistal sliding along • an arch wire, at least 2 mil clearance between the arch wire and bracket is needed, and 4 mil clearances is desirable.
- Rectangular wire particularly those with a tight fit within the bracket slot so that the position of the root apex could be affected normally should be avoided. Copper Ni Ti or Bio Force are the exceptions.
- Round wires are preferred for alignment.

SET 1 Levelling & Alignment

MAXILLARY:

- Multiple loop 0.016" stainless steel arch wire
- Bent in tie back stop loops
- Vertical loops 5mm in length, bent mesial & distal to both maxillary lateral incisors
- Arch wire made in ideal form
- Anti-rotation bends
- Mild curve of spee

MANDIBULAR:

- Multiple loop 0.016" stainless steel arch wire
- Bent in tie back stop loops
- Vertical loops between cuspids and 1st premolars on either side
- Tip-back bends
- Terminal molars anti-rotation bends

SET 1 A

Multiple loop arch wire (0.016") - Molar tie back ,Vertical loops, L loops

<u>UpperArchform</u>







LowerArchform





BEFORE MOVEMENT





AFTER MOVEMENT







SET 1 B

• Multiple loop wire given again to correct further rotations.



SET 1 C

- Leveling with 0.018" Arch wire •
- Molar stops, First order bends, Second order bends Curve of spee- upper, Reverse curve of spee- lower •
- •

UPPER





LOWER





Coordinated Upper And Lower Archwires





0.018" Wire After Ligation But Before Movement



0.018" Arch wire after movement

Set 1. Maxillary Ligation

Method of ligation : Distal rotation ties are made on right and left lateral incisors and mesial rotation ties are made on the right and left central incisors. Both right and left terminal molars are tied to the arch wire to protect the wire from distortion in the unbanded second premolar areas.

Set 1. Mandibular Ligation

The arch wire is ligated to the teeth and distal rotation ties are made on the right and left cuspid teeth. Exact arch length is important.

SET 2 Levelling & Alignment

MAXILLARY:

- 0.020" arch wires
- Bent in stop loops
- Archwire somewhat flattened in the incisal curvature
- Mild second order bends in the buccal segment
- Terminal molar tip back bends twice as great in degrees as in cuspid and premolar areas
- Artistic bends incorporated in incisal area

- Bent in tie-back stop loops
- Coordinated tip back bends with molar tip back coordinated
- Arch wire is offset occlusaly 1mm between cuspids and 1st premolars
- Reverse curve of spee bent into the archwire

Typical Upper and lower leveling wire often used in Edgewise appliance just before insertion of the Edgewise wire.





BEFORE MOVEMENT



AFTER MOVEMENT



<u>Set 2. Maxillary/ Mandibular Ligation</u> The arch wire is ligated to the terminal molars to prevent any mesial migration of the arch wires.

HEADGEAR & ELASTICS

SET 3

Mandibular Anchorage preparation

- MAXILLARY:
- 0.0215×0.0275 inches stabilizing arch
- Tie back loops
- Mild second order bends in the buccal segment
- Terminal molar tip back bends twice as severe as other second order bends
- Curve of spee bent in
- Hooks soldered

MANDIBULAR:

- 0.020×0.026 inch working arch
- Bent in stop loops
- Mild coordinated second order bends
- Terminal molar tip back bends twice as severe as other second order bends
- Brass hooks soldered for intermaxillary elastics

Types of Anchorage

First degree

- Minimal anchorage preparation,
- Applicable to all malocclusion with ANB =0 to 4 degree
- Total discrepancy does not exceed 10 mm
- Terminal molars must be uprighted &\or maintained in an upright position to prevent their being elongated when Class II
- Intermaxillary force is used.

Second degree

- For malocclusions with ANB more than 0° to 4°
- Facial esthetics requires to move point B anteriorly & point A posteriorly i,eClass II cases.
- Usually accompanied by Type A, Type A subdiv, Type B & Type B subdiv.
- Degree of distal tipping of mandibular molars more severe than first degree
- Anchorage preparation molars should be tipped so that their distal marginal ridges are at gum level.

Third degree

- Severe discrepancy cases 14-20 mm or more
- ANB does not exceed 5°
- Generally Class I Bimaxillary cases
- Sliding jigs are necessary
- 2nd, 1st molars & 2nd premolar must be tipped to such an extent that the distal marginal ridges are below the gum level
- Also called *total anchorage preparation*

BEFORE MOVEMENT

AFTER MOVEMENT

SET - ANCHORAGE PREPARATION

Set 3. Maxillary / Mandibular Ligation

The sequence of ligation in the mandibular arch wire is as follows

- 1. Four incisors
- 2. Right and left cuspids
- 3. Right and left first premolars
- 4. Right and left second premolars

Do not tie the terminal molar to the arch wire. The reason for this sequence in ligating the teeth to the mandibular arch wire is that arch length had been slightly increased and it is desirable to transmit force of equally on the terminal molars to start their distal tipping action

SET 4 Distal Enmasse Movement

MAXILLARY:

- 0.019×0.025 inch stainless steel wire
- All necessary primary, secondary bends incorporated
- Bent in molar stop loops
- Intermaxillary brass hooks for intermediate head gear
- Curve of spee incorporated

MANDIBULAR:

- 0.019×0.025 inch stainless steel wire
- First and second order bends
- Mild coordinated second order bends
- Molar stops

BEFORE MOVEMENT

AFTER MOVEMENT

SET OF DISTAL ENMASSE MOVEMENT

INDIVIDUAL CANINE RETRACTION

- U/L .019 X .026 archwires with second order bends & open coil springs compressed mesial to canines are inserted
- Cl. III elastics aid in distal movement of mandibular canine
- Headgear applied to upper arch aids in upper canine retraction

SET 5 Partial Retraction Of Mandibular Cuspids

MAXILLARY:

- 0.019×0.025 inch stainless steel wire
- Bent in Tie back loops adjacent to molar tubes
- Identical second wire as the previous wire
- Hooks for intermediate head gear soldered

Class II elastics

- 0.018×0.025 inch stainless steel wire
- Long second order bends
- Jigs of 0.022 inches dimension
- Jigs designed so that the anterior eyelet is 3mm to second premolar

AFTER MOVEMENT

SET 6 Partial Retraction Of Maxillary Cuspids

MAXILLARY:

- 0.019×0.025 inch stainless steel wire
- First and second order bends
- Retraction of cuspids
- Partial retraction done using jigs and open coil spring

- 0.019×0.025 inch stainless steel wire
- First and second order bends
- Class II elastics

AFTER MOVEMENT

Set 7 Maxillary/MandibularLigation

A 0.007 inch ligature wire is criss-crossed under the wings of the four mandibular incisors to tightly bind these teeth together and to avoid their undesirable migration along the arch wire

SET 7 Complete Retraction of Cuspids

MAXILLARY:

- Identical wire as previous wire
- Complete retraction of cuspids using open coil springs

- Identical wire as previous wire
- Complete retraction of cuspids using open coil springs

AFTER MOVEMENT

SET 8 Partial Retraction of Incisors

MAXILLARY:

- 0.019×0.025 inch stainless steel wire
- First and second order bends incorporated
- T loops between incisors and cuspid
- Molar stops before molar tube

- 0.019×0.025 inch stainless steel wire
- First and second order bends incorporated
- Bull loop between incisors and cuspid
- Molar stops before molar tube

AFTER MOVEMENT

Set 8 Maxillary Ligation

The four incisors are held in contact by lacing them with a 0.007 inch steel ligature before inserting the arch wire.

- 1. The four maxillary incisors are tied.
- 2. The vertical loops are activated 1mm, by ligature ties from the distal end of molar tubes to the bent in tie back loops.
- 3. The first molars and second premolars are ligated, seating the arch wire into the bracket slots.
- 4. To prevent mishaps, a ligature is used to lightly tie the cuspid bracket to the arch wire. Do not seat the arch wire in the bracket slot.

SET 9 Complete retraction of incisors

MAXILLARY:

- $0.019" \times 0.025"$ inches wire
- First and second order bends incorporated
- T loops between incisors and cuspid
- Molar stops before molar tube / wire synched distal to molar

MANDIBULAR:

- $0.019" \times 0.025"$ inches wire
- First and second order bends
- Bull loop between incisors and cuspid
- Molar stops before molar tube / wire inched distal to molar

BEFORE TREATMENT

AFTER TREATMENT

Set 9 Maxillary Ligation

The four maxillary incisors are lightly braided together using a 0.007 inch steel ligature to prevent undesirable migration of these teeth along the arch wire. The arch wire is then ligated to the four incisors, the cuspids the molar tie back T loops, the first molar and finally the second molar.

Set 9 Mandibular Ligation

The four incisors are tightly ligated to one another with 0.007 inch stainless steel ligature to prevent their migration along the arch wire. A 0.007 inch ligature tie is made from the distal step of the cuspid to prevent rotations from developing as the cuspids are moved distally. After the tie is made, the ends of the ligature wire are brought forward and lightly tied to wings of the cuspid brackets. The excess ligature material is removed and the ends are tucked under the arch wire. Another 0.007 inch stainless steel ligature is wrapped around the arch wire one and half times between the sections of open coil and the lateral incisor bracket in such manner that the ligature wire will lie lingual to arch wire. The steel ligature wire is then passed under the wings of the cuspid brackets, crossed over the arch wire and tied to the second premolar brackets. The mesial bracket of first molar is next to be ligated to the arch wire. The ends of this ligature are then brought forward and tied to the bracket of the second premolar tooth.

The final ligature tie is made from the distal end of the molar tubes to the <u>T-stop</u> located on the arch wire 1mm mesial to the molar tubes. The tie wire is brought forward and tied to the distal bracket on the first molar.

SET 10 Torquing Wire - Detailed Tooth Positioning

 0.019×0.026 inch maxillary & mandibular stainless steel arch wire is used. MAXILLARY:

- First order bends
- Mild second order bends
- Arch wire to level stop created by T loop
- Wire inched distal to molar

MANDIBULAR:

- First order bends
- Mild second order bends
- Arch wire to level the arch
- Wire inched distal to molar

BEFORE TREATMENT

AFTER TREATMENT

Set 10 maxillary Ligation

The arch wire is ligated to the teeth in the following manner:

- 1. Using the tourquing key, both maxillary central incisors are ligated to the arch wire.
- 2. Then both lateral incisors are ligated to the arch wire.
- 3. The coils are compressed against the stops 2.5mm mesial to the second premolar brackets by means of a 0.007 inch ligature wire. The ligature is then lightly tied to the the second premolar brackets.
- 4. The next tie is made from the hook of the first molar to the bracket of the second premolar.
- 5. The final ties are made from the distal end of the second molar tube to the distal bracket on the first molar band. This tie should hold the arch wire in the bracket but not bind them in slot.

SET 11 Finishing and detailing

MAXILLARY:

- First and mild second order bends
- Torque incorporated wherever required

MANDIBULAR:

- First and mild second order bends
- Torque incorporated wherever required

BEFORE MOVEMENT

AFTER MOVEMENT

SET 11 - TORQUING STAGE

Set 11 Maxillary Ligation

Prior to ligating the teeth to the arch wire a 0.007 inch ligature is passed around the wing s of four incisor brackets to keep these in contact.

The arch wire is ligated to the teeth in the following manner

- 1. The four incisors are tied
- 2. Ties from distal staple on the cuspid band to the arch wire are made with a 0.007 inch ligature. The ligature is given one turn with the pliers and its end is brought forward and lightly tied to the cuspid bracket.
- 3. Another 0.007 ligature wire inch is wrapped one and half times around the arch wire mesial to coil spring. The ligature is made to lie lingual to the arch wire. The coil is compressed against the cuspid and ligated to the arch wire in the premolar bracket with this light ligature.
- 4. The arch wire is next ligated from the distal end of the molar tube to the soldered stop 1mm anterior to the molar tube . The tie is made snugly and the ends of the ligature wire are then tied to the distal brackets on the first molar seating the arch wire in that bracket.
- 5. The final wire is made by ligating the arch wire to the mesial bracket of the first molar. The ends of the ligature are then brought forward and crossed over the arch wire and tied to the wings of the

second premolar bracket. The arch wire is thus firmly seated in the bracket slot and the 0.007 inch ligature used to compress the coil lies under this last tie where it is protected.

DEBONDING

