MOLAR UPRIGHTING SIMPLE TECHNIQUE [M.U.S.T] A SHORT TERM CLINICAL EVALUATION

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ABSTRACT

Loss of first permanent molar is a frequent problem in adults. The sequel to this is tipping, drifting, or rotation of the adjacent teeth . This depends on the position, age & the number of teeth lost. This study was done to evaluate the treatment efficiency of M.U.S.T with least armamentarium and time. Five patients, one male and four females were selected randomly, all were having missing first permanent molar or second Premolar. The permanent molar adjacent to the space was having a mesial Inclination with a fair periodontal condition. All were treated with M.U.S.T. for a period of two months and a careful appraisal and evaluation was done of the study cast, lateral cephalograms and intra oral radiographs. Materials used were two molar tubes of 0.018''x 0.025'' with 0 ° torque, super elastic 0.016''x 0.022'' Nickel titanium wire, Molar band 180'' x 0.005'' & Glass Ionomer Cement. The paired-t test was done after super imposition of the pre-post cephalograms and study models. 95% change in crown angulations was noted but the root movement was non-significant.

Keywords : M.U.S.T, Mesial Inclination, Treatment Efficiency, Superimposition

INTRODUCTION

Vanarsdall & Swartz[1] said that due to early loss of permanent molars the adjacent teeth tilts mesially , molar uprighting involves the correction of these mesially tilted molars. M.U.S.T was originally done by Elie Capelluto & Isabelle Lauweryns[2] to upright mesially tilted molars without extrusion. In the study by Drescher & colleagues only the burstone uprighting spring made of TMA wire produced an intrusive force during the molar uprighting. However this spring required delicate control since small differences in the bending angles could change the force delivery considerably. Recently they introduced a new uprighting spring consisting of a titanium wire connected to mesial & distal stainless steel wire which are fixed to attachments on the premolar & second molar. While the spring was shown to produce both an up righting moment & an intrusive force on the molars , it is still difficult to adjust in mouth . Melsen & colleagues pointed out the significant changes in a geometry V force system delivered by a T loop or V bend that are caused by displacing the loop to one side or the other. They suggested a two cantilever system for uprighting molars. Since both the forces produce uprighting moments, activation is controlled by varying the relative moment to force ratios of the cantilevers. This method although provides better control of the moments, is difficult & complex in execution.

Edward H. Angle[3] called the first molar the "key to occlusion". Graber.T.M[4] said that the early loss of first permanent molars leads to mesial migration of the adjacent teeth that is the second permanent molar and the third permanent molars are tipped mesially or rotated. These are in such position that is conducive neither to a long term health nor to simple restorative procedures. In addition the premolars may have drifted distally and rotated, resulting in open contacts in poor marginal ridge relationships. The opposing teeth may supra erupt into the edentulous space further complicating the situation.

These mesially tipped or tilted molars cannot be used as an anchor molar as the forces will lead to further tipping of the molars. As the teeth moves mesially the adjacent tissue becomes folded and distorted forming a plaque harboring pseudo pocket which may be virtually impossible to clean thus leading to accumulation of bacterial plaque which damages the periodontium by stimulating an immune response.

AIMS AND OBJECTIVES

This study was conducted to –

1. Evaluate the efficiency and performance of molar up righting simple technique M.U.S.T without extrusion.
2. Evaluate the model, and cephalometric changes encountered during the molar up righting.

MATERIALS AND METHODS

1. Two molar tubes

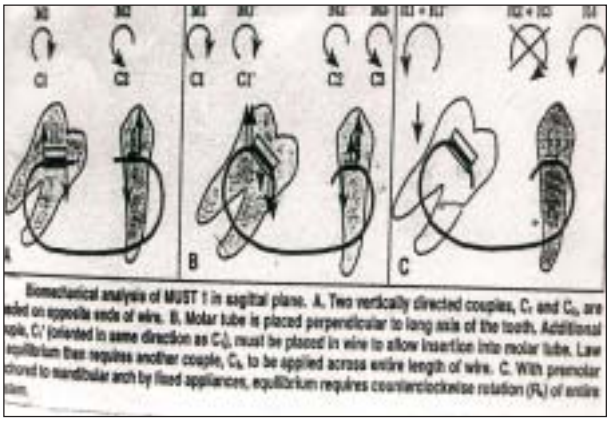
   Size-0.018'' x 0.025''

   Torque - 0 degree torque
2. Active Component

   Super elastic 0.016'' x 0.022'' nickel titanium wire
3. Glass ionomer cement

   Powder + liquid
4. Molar Band

   Size-180'' x 0.005''



Biomechanical analysis of MUST I in sagittal plane. A, Two vertically directed couples, C_1 and $C_{1'}$, are ...ded on opposite ends of wire. B, Molar tube is placed perpendicular to long axis of the tooth. Additional ...ple, C_1' (oriented in same direction as C_1), must be placed in wire to allow insertion into molar tube. Law ...equilibrium then requires another couple, C_4, to be applied across entire length of wire. C, With premolar ...cured to mandibular arch by fixed appliances, equilibrium requires counterclockwise rotation (R_4) of entire ...tem.

Figure - 1

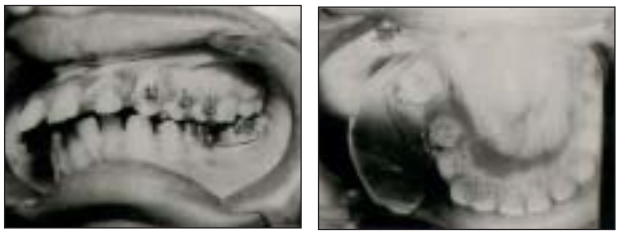


Figure - 2

APPLIANCE DESIGN AND BIOMECHANICS

One 0.018'' x 0.025'' molar tube is soldered cervically to the molar tube parallel to the occlusal plane .A shorter 0.018'' x 0.025'' tube is soldered horizontally to the cervical area of the premolar. Both the tubes have a 0^0 torque. The active component 0.016'' x 0.022'' super elastic nickel titanium wire extends from the mesial of the premolar tube to the distal of molar tube. Each end of the wire is covered with glass ionomer cement to avoid irritation and distortion. The area anterior to the molar can be stabilized with lingual bar or lingual button connected with passive elastic chain or with anchorage to the fixed appliance. (Fig – 1). pre treatment & post treatment intra oral periapical radiographs were taken for all of the patients . (Fig – 2) . pre treatment & post treatment intraoral photographs were taken for all the patients . (Fig – 3) & (Fig – 4) . pre treatment & post treatment cephalogram were superimposed . (Fig – 5)

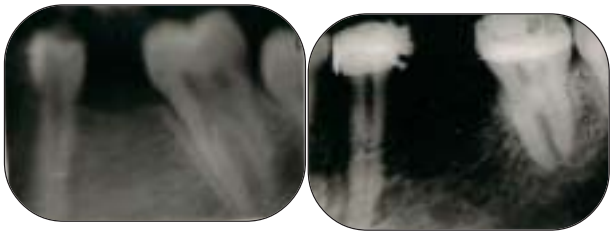
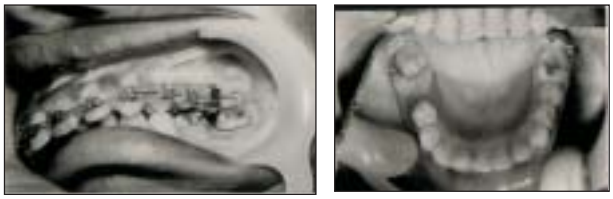


Figure - 3



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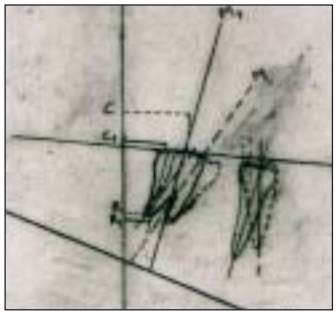

Figure - 5

TABLE I: CEPHALOMETRIC LANDMARKS FOR UPPER MOLARS

R	Distance between distal root tip of molar and PTV line (Pre-treatment)
R_1	Distance between distal root tip of molar and PTV line (Post-treatment)
C	Distance between distal cusp of molar and PTV line (Pre-treatment)
C_1	Distance between distal cusp of molar and PTV line (Post-treatment)
M	Angle between a line passing through centre of molar bisecting the palatal plane (Pre-treatment)

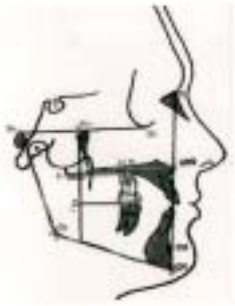

Figure - 6

TABLE II: CEPHALOMETRIC LANDMARKS FOR LOWER MOLARS

R	Distance between distal root tip of molar and PTV line (Pre-treatment)
R_1	Distance between distal root tip of molar and PTV line (Post-treatment)
C	Distance between distal cusp of molar and PTV line (Pre-treatment)
C_1	Distance between distal cusp of molar and PTV line (Post-treatment)
M	Angle between a line bisecting the centre of molar and passing through the mandibular plane (Pre-treatment)
M_1	Angle between a line bisecting the centre of molar and passing through the mandibular plane (Post-treatment)

Figure - 7

NOTE: PTV line was drawn perpendicular to Frankfort plane.

STUDY MODELS

According to "Hom and Turley"[5] the mesiodistal distance from the contact point of molar to contact point of the other teeth beyond the spacing was measured with the help of vernier caliper. The distance between their cervical regions was also measured. (Fig – 8)

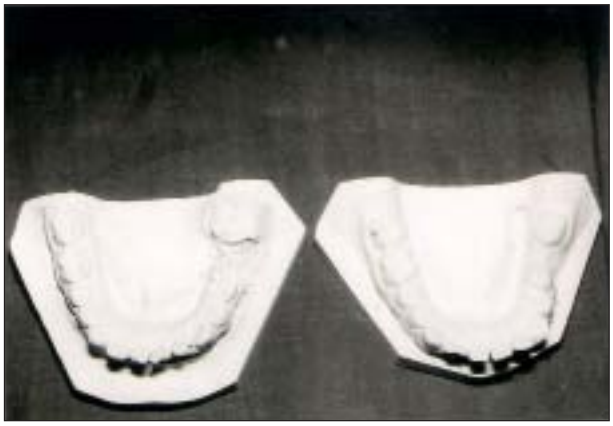

Figure - 8

TABLE III: MEASUREMENT OBTAINED BY STUDY MODELS

		Contact Point Distance	Cervical Distance
Case 1	Pre	3mm	4mm
	Post	5mm	5mm
Case 2	Pre	4mm	4mm
	Post	7mm	5mm
Case 3	Pre	3mm	4mm
	Post	7mm	8mm
Case 4	Pre	7mm	7mm
	Post	10mm	8mm
Case 5	Pre	7mm	6mm
	Post	6mm	7mm

TABLE IV: MEASUREMENT OBTAINED AFTER CEPHALOMETRIC SUPERIMPOSITION

	M	M1	C	C1	R	R1
Case 1	97°	86°	19mm	16mm	11mm	12mm
Case 2	145°	122°	7mm	3mm	10mm	8mm
Case 3	90°	85°	9mm	7mm	10mm	12mm
Case 4	96°	79°	17mm	11mm	5mm	7mm
Case 5	95°	85°	19mm	16mm	6mm	8mm

STATISTICAL ANALYSIS [CEPHALOGRAMS]

1 Cephalogram Angular measurement
Mean – 11.2°
S.D – 10.4°
P < 0.05

2 Linear measurement of distal cusp tip of molar
Mean – 3.6mm
S.D – 1.73mm
P < 0.05

3 Linear measurement of distal root tip of molar
Mean – 1mm
S.D – 1.73mm
P < 0.05

STATISTICAL ANALYSIS [STUDY MODELS]

1 Contact Point Distance
Mean – 2.2mm
S.D – 1.9mm
P is less than 0.05

2 Cervical Distance
Mean – 1.2mm
S.D – 1.9mm
P is less than 0.05

RESULT

95% change in crown angulations was noted but the root movement was non significant.

DISCUSSION

A variety of appliances had been proposed to upright tipped molars "Levitas" [6] and "Sim [7] advocated twisting and inserting a brass wire into the contact area of the impacted permanent first molar and the second primary molar so as to force the permanent molar to move distally. "McDonald and Avery" [8] modified it by using self locking separating springs. "Braden" [9] recommended a fixed lingual arch with finger spring to move the molar distally. "Halterman" [10] used elastic stretched between a long hook soldered to the lingual surface of primary second molar and a button bonded to the first permanent molar. Most of the techniques caused occlusal crown movement that is along with up righting slight extrusion was also noted. M.U.S.T appliances are easy to use and the superelastic nickel titanium wire produces a distalizing force against the molar tube and an opposing force to the centre of resistance. The more activation is applied more the distalization will occur. The movement delivered by this couple will accentuate the suprighting movement in sagittal plane. Advantages of M.U.S.T was patient comfort, there was no occlusal interference, neither was any wire deformation from mastication.

Intra oral activation was fast and treatment time was relatively short. Furthermore the integrity of the molar was preserved so that no occlusal recontouring was needed after up righting. Findings in this study indicates that orthodontic molar up righting can be achieved with this technique as all the five cases showed significant molar up righting with a mean of 11.2° angular changes and a mean linear change of 3.6mm in just two months. No root movement was noted. Almost all cases had some pain during the treatment but for a lesser duration. The appliance was well accepted by all as there was no breakage or dislodgement & no periodontal damage was noticed.

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