"Early versus late Intermaxillary Elastics in patients with Class II Malocclusion"

A Research Protocol Submitted To Faculty of Dentistry

Ain-Shams University for Partial Fulfillment of the Master Degree

In Orthodontics

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B.D.S, 2016

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01/27/2021

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Introduction

Class II malocclusion is one of major problems that patients seek orthodontic treatment. The dental and skeletal factors ranging from mild to severe provide the multiple characters of this malocclusion.[1-2]

There are a number of orthodontic techniques and appliances for class II malocclusion treatment; among these are class II elastics. class II elastics correct a class II malocclusion by two actions: 1. maxillary retraction and clockwise rotation of the upper arch, and 2. mandibular arch protraction and clockwise rotation of the lower arch. This combination of antroposterior and vertical effects corrects this malocclusion.[3]

The force levels of elastics range from being light, medium, heavy and extra heavy. The force value of elastics should be provided by the manufacturers for different sizes. It is recommended to stretch the elastic to three times the original internal diameter to achieve the force stated on the package.[4] the regular change of elastics is very important because their force level decreases rapidly. So effective use of elastics needs excellent patient cooperation.

In spite of their popularity, there are no significant data to determine the most convenient protocols to correct class II malocclusion with class II elastics. there are many variables related to class II elastics such the mode of elastics wear, the force value and change of elastics.

Several side effects have been attributed from the use of Class II elastics—eg, loss of mandibular anchorage, proclination of Lower incisors, extrusion of upper incisors, and even worsened smile esthetics due to increased gingival exposure.[5-6]

According to the 20 principles of Alexander discipline, the premature use of class II elastics can be very dangerous if used with light arch wires that

cannot control torque. these elastics can cause proclination of the mandibular incisors, lingual tipping of maxillary incisors, mandibular molar extrusion and alteration of the occlusal plane. therefore, class II elastics should not be used until these factors under control.[7] Alexander used 1/4 inch; 6 Oz elastics extended from maxillary lateral incisor ball hook to mandibular first or second molar which. Class II elastics Traditionally run from the upper canine hook to the lower first or second molar hook on stainless steel rectangular wire.

Sabrina Huang from Taiwan advocated use of the early light short elastics and she suggested the ELSE (Elastic, Light, Short and Early) acronym some years ago[8]. Recently, the active early Protocol was introduced by Tom Pitts and Duncan Brown. This novel Protocol includes immediate light short elastics (ILSE) that allow the orthodontist to apply the elastics early from the first appointment. The authors mentioned the guiding principles of ILSE which include: shorter elastics is better than longer, full time wear, immediate elastics, lighter is better than heavier. They claim the active early Protocol is efficient, effective ad predictable producing outstanding results with more accurate and tightened slot.[9] But these claims are based only on their case reports and clinical articles with no evidence based.

 Therefore, the main objective of this study is to evaluate whether the use of immediate light short class II elastics can correct canine class II malocclusion without significant side effects when compared to the conventional longer and heavier elastics used with passive rectangular stainless-steel wire.

The review

The correction of class II malocclusion By Intermaxillary elastics is one of the popular orthodontic techniques. In 1955 Tovstein used Class II elastics In both growing and non-growing patients. He found that non-growing Patients with the greatest growth had the least change in the inclination of the occlusal plane; conversely, patients with the least growth had the

greatest change in the occlusal plane. However, changes in inclination of the occlusal plane have a tendency to return to the original condition.[10]

In 1984 Gianelly et al compared between Frankel, headgear and class II elastics for class II correction, The results indicate no treatment response that is uniquely related to a specific technique. .[11]

In 1986 Meistrell et al used 1-2 oz class II elastics, he found that the maxillary first molar maintained it's anteroposterior position at the same time that SNA was reduced. The mandibular first molar moved forward by 1.2 mm. Vertical change in both the maxilla and the mandible were within normal ranges. No significant change in occlusal or mandibular plane angles was observed.[12]

In 1999 Nelson et al used 1-2 oz class II elastics. He concluded that the changes contributing to Class II correction were mostly dental. Vertically, the net effects of treatment were increases in the mandibular plane angle and lower anterior facial height.[13]

In 2006 Combrink et al elastics were successful for the correction of Class II discrepancies, promoting mainly dentoalveolar effects.[14]

In 2007 Uzel et al compared between Class II elastics 3.5 oz 24 h/d and RMCC for treatment of Class II dental malocclusion, he found that both techniques are Effective for class II correction.[15]

In 2008 Serbesis-Tsarudis and Pancherz compared between both class II elastics and herbest[16] also in the same year Jones et al compared between class II elastics and forsus[17] both authors found no significant differences between the elastics and the appliance.

Recently many authors like Tom Pitts[18] and Duncan Brown[19] published many case reports and clinical articles in which they claimed the effectiveness and efficiency of early light short elastics starting. also chris chang, Eugene Roberts and Linda Tseng.[20]

So, class II elastics have been used for correction of both skeletal and dental class II for many years ago with different force levels, different amount of extension and different rate of elastics change.

Objective

The aim is to compare the effect of immediate light short elastics versus conventional elastics on the Inclination of upper incisors in patients with canine class II malocclusion.

Methodology

Study population:
This prospective clinical trial will be conducted on 30 patients both gender , divided into 2 groups:

Group 1: fifteen patients will wear immediate light short Class II elastics.

Group 2: fifteen patients will wear conventional elastics.

Selected from the outpatient clinic of the Orthodontic Department, Faculty of Dentistry, Ain Shams University.

The subjects will be selected to fulfill the following
 inclusion criteria:
1- Canine class II malocclusion.
2- Patients with permenant dentition.
3- Increased overjet.
4- Non extraction.

Exclusion criteria:

1-   Gummy smile.

2-   Gingival recession.

3-   Vulnerable patients.

Study procedure:

An informed consent will be signed by the patients' parents as well as an assent will be signed by young patients before their enrollment in the current study in which the aim of the study, the methodology and possible complications will be clearly described. This research will be reviewed by the Research Ethics Committee, Faculty of Dentistry, Ain Shams University.

Full orthodontic records will be taken for patients who meet the inclusion criteria. These records are:

1-   Extra-oral and intra-oral photographs.

2-   Orthodontic study casts.

3-   Panoramic radiograph: will be used to detect any dental or bone anomalies.

4-   Lateral cephalometric radiograph : for skeletal, dental and soft tissue assessment.

Procedure:

1- The full orthodontic records will be taken for every patient.
2- The patients will be randomly allocated by computerized allocation.
3- The fixed orthodontic appliance including *0.018*" Bracket slot Roth prescription will be applied.

4- For both groups the disocclusion (disarticulation) will be done by adding glass ionomer luting cement at posterior Region that unlock the occlusion for greater freedom of teeth movements helping for easier and faster teeth movements.

   The glass ionomer cement will be added at the central fossa of lower first molar to be more comfortable for patients.

   Medicim glass ionomer luting cement will be used.

   The disarticulation for group 1 will be done in the beginning of the treatment but in group 2 once Patients start to wear elastics at passive 0.016x0.022" stainless steel wire.

5- For group 1: the patients will be instructed immediately after bonding and initial wire placement to wear light short elastics from the upper first premolar to the lower first molar. The force level of elastics is within light range from 2oz - 3.5oz.

6- For group 2: the patients will be instructed to wear long elastics from the upper canine to the lower first molar, once the patients reach to 0.016x0.022" stainless steel passive wire. The force level of elastics is within medium range from 4oz -5oz.

7- The elastics force level will be measured every visit by gauge to ensure that it is within the range.

8- For both groups patients instructed and motivated to wear the elastics full time and change it every 12 hours . It is essential for the patient to demonstrate their ability to properly wear and remove the elastics before leaving the clinic.

9- Follow up charts will be given to the patients.

10- For both groups the following records will be taken before elastics wear and after, once patients reach to canine class I:

   1- The lateral cephalometric radiographs.

   2- Impressions For cast analysis.

   3- Standardized smile photographs.

Methods of assessment:

1- Pre-operative T1 and postoperative T2 lateral cephalometric radiographs measures are compared and assessed.
2- Pre-operative and postoperative casts are compared and assessed.
3- Pre-operative and postoperative smile photographs are compared and assessed.
4- Calculation of The total period of elastics wear till the class I canine relationship achieved for both groups is compared and assessed.

	Outcome	Measuring tool	Measuring unit
Primary outcome	• Upper incisor inclination (UI/PP) and (U1/SN). • Upper incisors inclination and position (U1/NA)	• Lateral cephalometry. • Lateral cephalometry.	• Degre • Degree/ mm

Secondary outcomes	• Lower incisor inclination (LI/MP). • Lower incisors inclination and position (L1/NB) • Occlusal plane inclination (anatomical occlusal plane).	• Lateral Cephalometry • Lateral cephalometry. • Lateral cephalometry	• Degree • Degree/ mm • Degree

	Op/(Me-Go) Op/FH Op/AB		
	• Mandible to cranial base (SNB)	• Lateral cephalometry.	• Degree
	• Mandible to cranial base (Pg to N perpendicular to FH).	• Lateral cephalometry.	• mm
	• Maxilla to cranial base (SNA).	• Lateral cephalometry	• Degree
	• Maxilla to cranial base (point A to N perpendicular to FH).	• Lateral cephalometry.	• Mm
	• ANB angle.	• Lateral cephalometry.	• Degree
	• FH, palatal and SN planes to mandibular plane angles.	• Lateral cephalometry.	• Degree
	• Ar Go Me	• Lateral cephalometry.	• Degree
	• ANS Me	• Lateral cephalometry	• Mm
	• S Go	• Lateral cephalometry	• mm

	• Nasolabial angle.	• Lateral cephalometry.	• Degree
	• Angle of facial convexity (G-Sn/ Sn-Pg').	• Lateral cephalometry.	• Degree
	• Facial angle (FH/N'Pg').	• Lateral cephalometry.	• Degree
	• Upper lip thickness.	• Lateral cephalometry.	• mm
	• Lower lip thickness.	• Lateral cephalometry.	• mm
	• Mentolabial angle.	• Lateral cephalometry.	• Degree
	• Upper lip/ E-line.	• Lateral cephalometry.	• mm
	• Lower lip/ E-line	• Lateral cephalometry •	• mm
	• Arch form • Curve of spee • Arch length • Arch width	• scanned cast • scanned cast • scanned cast • scanned cast	• mm • mm • mm • mm
			• mm
	• Smile analysis		

		Standardized extraoral photos	
	• Time of elastic wear		• Months /days

- All data will be tabulated and statistically analyzed.

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