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ELASTIC IN ORTHODONTICS

A Project Submitted to
The College of Dentistry, University of Baghdad, Department of orthodontics

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Certification of the Supervisor

I certify that this project entitled “**ELASTIC IN ORTHODONTIC**" was prepared by the fifth-year student “**Abdulla Abdulsattar**” under my supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirements for the Bachelor Degree in Dentistry.

Supervisor’s name: Lecturer DR. Sara Mohammed

Dedication

To the kindest and most beautiful hearts in my life (my mother and my father) … who gave me all the support and care in my life and they dedicate all their time for me and all the knowledge and passion they gave me to be the person who I am. To my siblings’ friends and everyone who cared about me all this year

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First and foremost, praises and thanks to Allah Almighty for helping me fulfill my dream, for his blessings throughout my work to complete it successfully.

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I would like to show my deep and sincere gratitude to my research supervisor, **Dr. Sara Mohammed** for her advice, encouragement, and guidance in planning and conducting this project.

TABLE OF CONTENT

LIST OF FIGURES

Introduction

Elastomer is a general term that encompasses materials that after substantial deformation, rapidly return to their original dimensions. Elastic it is defined as the ability of a substance to return to its original length or shape after being stretched Elastics and Elastomeric are routinely used as an active component of orthodontic therapy. Elastics have been a valuable adjunct of any orthodontic treatment for many years. **(Asbell, 1990).**

Elastics in dentistry are not a new development. One of the earliest applications of elastics was to extract teeth in patients with bleeding disorders (e.g. hemophilia, purpura), cardiac problems or mental deficiency. Elastics and Elastomeric are routinely used as an active component of orthodontic therapy. Elastics have been a valuable adjunct of any orthodontic treatment for many years. There use combined with good patient cooperation provides the clinician with the ability to correct both Antero-posterior and vertical discrepancies (**Behrents, 2014**).

Orthodontic elastics are widely used in orthodontic practice with the purpose of helping orthodontic treatment, as they are widely used materials in the orthodontic clinic, one must be concerned about the cytotoxicity of elastics, particularly the intraoral type that comes into intimate contact with the mucosa (**Wakelin and White, 1999).**

Amongst the allergic reactions caused by orthodontic elastics, swelling and stomatitis, erythematous oral lesions, respiratory reactions, because latex allergy is prevalent among many patients, so the need for non-latex alternatives is increasing **(Singh *et al*., 2012).**

Aims of the study

To Identify and recognize the different types of elastics that used in orthodontics, their classifications, benefits and side effects.

Chapter one: Review of literature

1.1 History of elastics and Elastomeric

A French Man Strange in 1841 claimed that he used a rubber attached to some hooks on the appliance surrounding the molars for retention. **(Pashley, 1993)**

Early advocates of using natural latex rubber in orthodontics were Baker, Case and Angle. In 1846 E Baker in article on "the use of Indian rubber in regulating teeth" in New York dental recorder (**Graber and Swain, 1975)**

Ricketts in 1970 originated the bioprogressive segmental light square wire technique advising the use of elastics in closing open bites. Roth R in 1972 recommended short class II elastics to help the curve of Spee leveling. In 1996 Langlade developed the clinical applications of elastic forces in different situations such as, crossbite elastics, and proposing biomechanical comparisons in clinical uses (**Langelade, 2000).**

Baker 1987 was the first to combine many of the concepts used by previous dentists into one orthodontic treatment. Baker devised the method known as the "Baker anchorage." Baker anchorage combines the rubber tubing discovered by Tucker, with the wire crib. This technique eliminated the need to completely remove numerous teeth to help correct their alignment (**Asbell, 1990**)

1.2 TYPES OF ELASTICS

1. NATURAL RUBBER
2. SYNTHETIC RUBBER

1.2.1 Natural Rubber

When the early European explorers came to Central and South America, they saw the Indians playing with bouncing balls made of rubber. The South American Indians called the rubber tree cahuchu, i.e., weeping wood. The drops of latex oozing from the bark made them think of big white tears. In 1770, the English chemist Joseph Priestley discovered that the materials could be used as an eraser to rub out pencil marks. from this use we get the name rubber. Chemical analysis shows that about 30–35% of latex consists of pure rubber, while water makes up another 60–65%, the remainder consists of small amounts of other materials such as resins, proteins, sugar, and mineral matter**.** Latex spoils easily and must therefore be processed into crude rubber as soon as possible after it has been tapped. This is done by separating the natural rubber in the latex from water and other materials. About 99% of all natural rubber comes from the latex of Hevea brasiliensis. In laymen terms, we call it the rubber tree. In 1860, another Englishman, Greville Williams, heated some rubber and obtained a colorless liquid that he called isoprene. Natural rubber has many unsaturated carbon atoms. Oxygen atoms from the air gradually attach themselves to these carbon atoms. This breaks down the rubber polymers so that the rubber becomes brittle or soft and loses elasticity. The addition of antioxidants during compounding prevents this action. Scientists have not discovered all the answers to the chemistry of rubber. In many other ways, the chemistry of natural rubber remains a mystery (**Bishara and Anderson, 1970).**

The most important limitation of natural rubber is the enormous sensitivity to the effects of ozone or sunlight, ultraviolet rays which generating free radicals breaks down the unsaturated double bonds at the molecular level this weakens the latex polymer chain (**Baty *et al*., 1994).**

1.2.2 Synthetic Rubber

Synthetic rubber polymers developed from petrochemicals in the 1920s have a weak molecular attraction consisting of primary and secondary bonds. Elastomeric chains were introduced to the dental profession and become an integral part of orthodontic practice. They are used to generate light continuous forces. **(Alexander, 2001)**

They are inexpensive and relatively hygienic, can be easily applied, and require no patient cooperation. There have been numerous advances in the manufacturing process, which have led to a significant importance in their properties; with this there has been a greater application of these elastics in clinics in a variety of uses. Rubber-like materials that are made from chemicals were called synthetic rubbers because they were intended as substitutes for natural rubber. (**Kharbanda, 2019).**

These are polyurethane rubber contains urethane linkage. This is synthesized by extending a polyester or a polyether glycol or polyhydrocarbon diol with a diisocynate **(Alexander, 2001)**

Synthetic rubbers have two classes: -

1-General-purpose Synthetic Rubbers: The most important one is styrene-butadiene rubber (SBR) which is made from petroleum

2-Special-purpose Synthetic Rubbers: buty rubbers, nitrile rubbers, polysulphide rubbers, polyurethane rubbers and many more Special purpose is better than natural and styrene butadiene(SB) because they have the ability to resist harmful elements include heat and cold. Synthetic polymers are very sensitive to the effects of free radical generating systems, notably, ozone and UV light, the exposure to these elements results in decrease in the flexibility and tensile strength of the polymer. Thus, manufacturers have added antioxidants and antiozone agents to overcome this problem (**Wong, 2000)**

1.3 Classification of elastics

Elastics can be classified in many ways. According to the material, them availability, there uses and force (**Wong, 2000).**

1.3.1 According to the material

- Latex elastics
- Synthetic elastics

1.3.2 According to the availability

Different makers have different sizes and force, and the colour coding and the name is also different.

1.3.3 According to the uses

This also can be classified in 2 ways.

1. **The first way:**

A) Intra oral elastics

Intra oral elastics play major role in most forms of fixed appliance therapy. While there are some goals of elastic wear which transcend philosophical difference among treatment technique, there are three basic applications of intra oral elastics.

One is the alignment of maxillary dentition with the mandibular dentition to aid in the achievement of proper occlusion while sagittal correcting any centric relation/centric occlusion discrepancy. Cross bite, and /or midline discrepancy correction (transverse), is a second function. The third application is to help finalize the occlusion at the end of treatment (with emphasis on the vertical dimension). These includes the latex elastics, elastic chains, ligatures **(Alexander, 2001).**

B) Extra oral: Extra oral elastics are used with extra oral mechanic systems. They can hook from the face bow to the cervical strap (cervical head gear), or from the face bow to the high pull strap (high pull head gear). These includes elastic modules, plastic chains and heavy elastics **(Anderson, 1970)**

2.The second way

A-Elastic Chain

It is a chain of connected elastomeric rings, introduced to the orthodontic profession in 1960s as an alternative to latex elastic bands, and are now an integral part of many practices

A number of manufacturers have produced different colors and different spans of filaments "continuous, short and long link" depending on whether or not there is a distance between the rings at its passive state and it is supplied in spools (**Nattrass *et al*., 1998).**

The chain used as tooth-moving mechanism, are effective in closing diastema, correcting rotations or shifting of the midline and achieving general space closure (**Daskalogiannakis, 2000**).

They are inexpensive, easily applied, do not require patient cooperation and relatively hygienic (**Baty *et al*., 1994**).

Although larger spaces within the dental arch can be closed by sliding teeth with rubber bands or elastomeric chains, the same tooth movement can be done much more efficiently with A-NiTi springs that provide a nearly constant force over quite a large range (**Proffit and Fields, 2007**).

Elastomeric power chain is commonly used in orthodontics to facilitate tooth movement and consolidate space. These polyurethane materials are manufactured as a spool of linked elastic chain, which can be cut to the specific number of modules needed and due to the viscoelastic properties of power chain, however, the loss of force over time is inevitable and several studies have been done to illustrate this force decay (**Eliades *et al*., 2005**) **(FIGURE1)**

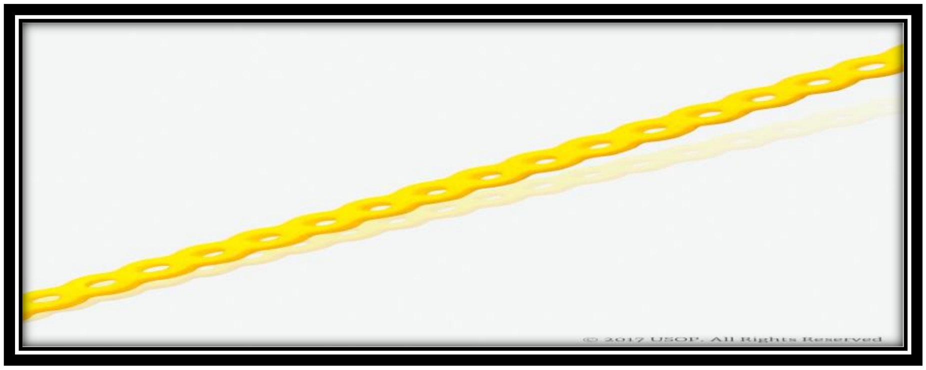

FIGURE 1 ELASTIC CHAIN (Cheng *et al*., 2010)

B-Elastic Separators

They are small-doughnuts shaped-modules or a dumb-bell shaped placed between the teeth to create a space by squeezing the teeth apart over a period of several days not more than one week as they can cause food stagnation (**Alexander, 2001).**

These separators make the band accurately placed, not distorted due to the tight inter proximal contacts which give a false impression of tightly fitting band (**Profit *et al*., 2018).**

They are stretched with the help of special pliers or by pulling apart two pieces of dental floss threaded through it, while it is forced through the contact **(Daskalogianriakis, 2000).**

The elastic separators become the most common devices used today. Brass wire can be used in adult patients with heavy tight contact and/or sharp amalgam fillings with broad contact that prevent the placement of elastomeric separator without distortion or breakage (**McCann, 1991**). **(FIGURE 2)**

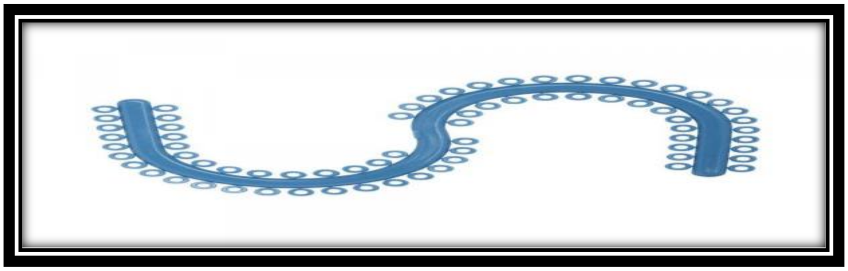

FIGURE 2 ELASTIC SEPARATOR (Mitchell, 2013).

C-Elastic ligatures

One of the most common methods of securing archwires to orthodontic brackets is the application of elastomeric ligatures (modules).

Elastomeric ligatures are synthetic elastics made of polyurethane materials; however, the exact composition is proprietary information (**Young and Sandrik, 1979).**

Elastic ligatures are a small round module that ties archwire into bracket slot, and they are available in a variety of colors (**Alexander, 2001). (FIGURE 3)**

FIGURE 3 elastic ligatures (**ELTAHIR** ***et al.*****, 2009)**

- **Advantages and disadvantages of elastic ligatures**:

Advantages:

1. Esthetically acceptable, especially with the ceramic bracket in which it increases its esthetic appearance **(Lew, 1990).**

2. It is preferable to be used with ceramic bracket and plastic bracket to prevent the distortion and breakage of the tie wings due to brittleness **(Sorenson, 1991).**

3. Easily applied therefore takes less time (**Jeffries and von Fraunhofer, 1991).**

4. Inexpensive and available in different colors, so it is more favourable for young patient **(Storie** ***et al*****., 1994).**

Disadvantages:

1. Discoloration, after three to four weeks of time the elastic ligatures undergo change in their color so it need frequent replacement (**Obaid, 2007).**

2. Less hygienic since the dentition and soft tissue may be adversely affected by microbial accumulation on the tooth surfaces adjacent to brackets ligated with elastomeric ligatures (**Forsberg, 1991).**

3. Arch wire may not be completely seat during torque or rotation correction (**Bednar and Gruendeman, 1993).**

D. Elastic O rings

Which include

1-CL I elastics or horizontal elastics or intramaxillary elastics or intra-arch elastics

These extend within each arch. This is used for the space closure and to a certain extent; it can open the bite also. It is placed from the molar tube to the intramaxillary hook of the same side of the same arch and can be also called as intra arch elastics. The force recommended is 1 ½ to 2 ½ oz for non-extraction cases and 2 to 4 oz. in extraction cases (**Anderson, 1970) (Figure 4).**

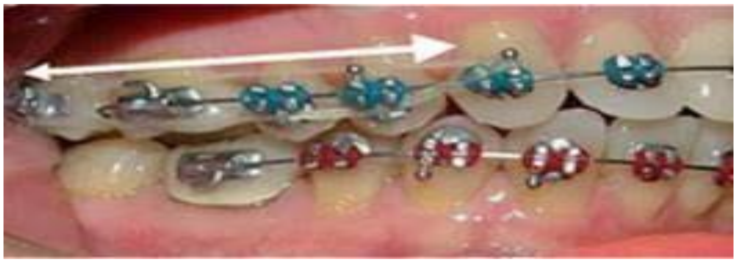

Figure 4: Class I elastic (Brin and Potts, 2017)

2-CL II Elastics / intermaxillary elastics / interarch elastics

This is extended from the lower teeth to upper molar teeth to upper cuspid which is placed from lower molar tube to the upper intermaxillary hook of the same side.They are primarily used to cause Antero-posterior tooth changes that is aid in obtaining CL I cuspid relationship from a CL II relationship. If the lower second molars are banded and include in the treatment mechano therapy, it is best to extend the elastic from the first molar to the cuspid tooth to avoid extrusion of the second molar and the creation of open bite anteriorly. If the lower second molar are banded it is best to extend the elastic from the second bicuspid to the upper cuspid (or even to lateral incisor for longer horizontal vector)

The force recommended is 1 ½ to 2 ½ oz. in non-extraction case and 2 to 4 in extraction cases. (**Dermaut and Breeden, 1981) (Figure 5).**

Figure 5: CL II elastic (Brin and Potts, 2017)

3 -Class III elastics

Class III elastics are exact opposite of the class II's. They extended from upper molar to the lower cuspid. It is attached from the maxillary molar to mandibular lateral incisor or canine**. (Figure 6)** They promote extrusion of upper posterior teeth and upper anteriors, along with lingual tipping of the lower anteriors (**Dermaut LR and Breeden L, 1981)**

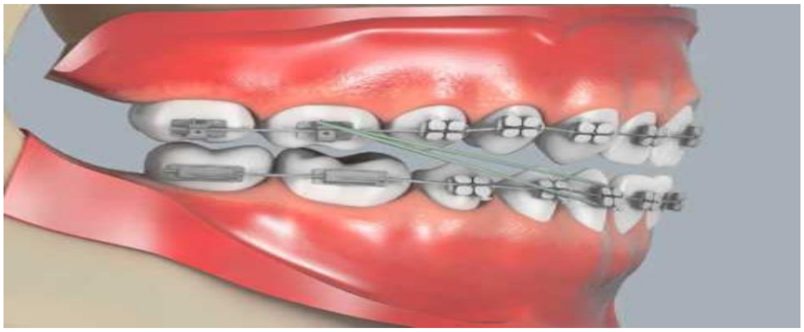

Figure 6: CL III elastic (Brin and Potts, 2017)

4-Anterior elastics

It is used to improve the over bite relationship of incisor teeth. Open bite up to 2mm may be corrected with these elastics. They may extend from the lower lateral incisor to the upper laterals or central incisor teeth or from the lower cuspid to the upper laterals. **(Figure 7),** It produces a reciprocal free tipping of anterior crowns, which closes the spaces. It is recommended only following lingual uprighting and over bite correction. It is placed between the intermaxillary hooks (Force-1 to 2oz.) (**Dermaut and Breeden, 1981)**

Figure 7: Anterior elastic (Mapare *et al*., 2018)

5-Zigzag elastic

This is used for the rotation correction on the bicuspids. It is placed from bicuspid to cuspid and bicuspid to molar. This can cause undesirable molar movements also. This is indicated in extraction cases and where spacing is present. As the indicated in extraction cases and strength elastics are used. Force recommended is 2.5 oz **(Aras and Cinsar *et al*., 2001) (FIGURE 8)**

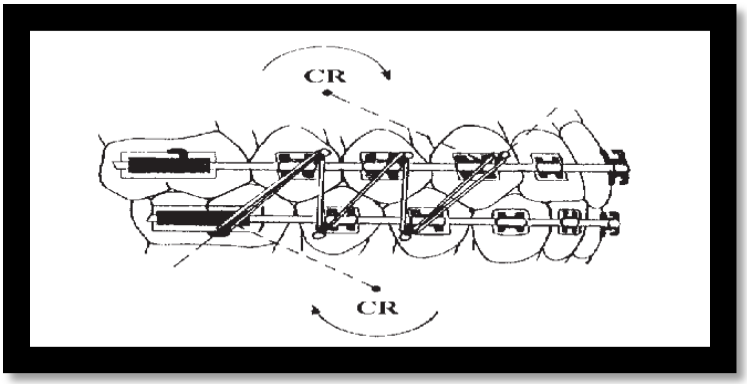

Figure 8: Zigzag elastic (Marpe et al., 2018)

6-Cross Bite Elastics

This is indicated in unilateral and bilateral cross bites, to expand and upright lower molars which have tipped lingually. It is placed between the lingual aspect of the lingually placed molar and the buccal aspect of the opposing tooth. Force recommended is 5-7 ounce. **(Aras and Cinsar et al., 2001) (Figure 9)**

FIGURE 9: Cross Bite Elastics (Littlewood, 2019)

7-Cross Palate Elastics

This is to correct the undesired expansion of the upper molars**;** this is placed between the lingual aspects of the upper molars. Upper molar expansion during the 3rd stage is usually bilateral. (**Figure 10) .** The cross palate elastics is appropriate because the force it exerts in pulling one molar lingually is equal and opposite to the force it exerts in pulling the other lingually. (**Dermaut and Breeden, 1981)**

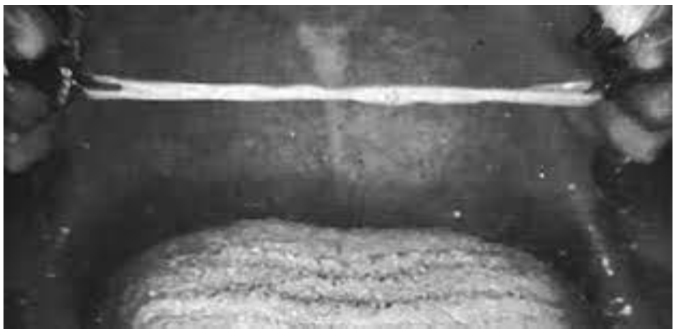

Figure 10: Cross -palate elastic (Mapare *et al*., 2018)

8-Diagonal elastics (midline elastics)

This is used for the midline corrections. It is placed one side upper intermaxillary hook to the other side lower intermaxillary hook. (Figure 12) Force used is 1 ½ to 2 ½ ounces. It is also called as interior intermaxillary cross elastics. (**Dermaut and Breeden, 1981) (FIGURE 11)**

Figure 11: Midline elastic (Phulari, 2011)

9-Open bite elastic

These are used for the correction of open bite. It can be carried out by a vertical elastic, triangular or box elastic. Vertical elastic runs between the upper and lower brackets of each tooth. **(Reyneke and Ferretti, 2016) (Figure 12)**

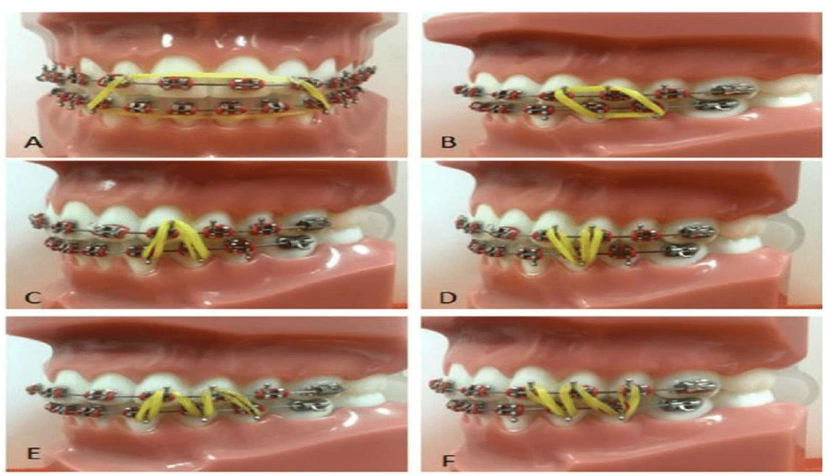

Figure 12: A,B,C,D,E and F :Open bite elastic (Eltahir *et al*., 2017)

10-Box elastics

Box elastics have a box shape configuration and can be used in variety of situations to promote tooth extrusion and improve intercuspation. Most commonly, they include the upper cuspid and lateral incisor to the lower bicuspid and cuspid and lateral incisors to the lower first bicuspid and cuspid (CL II vector) or to the lower cuspid and lateral incisors (CL III vector). All bicuspid teeth of one side can be extruded as well. **(Kwapis and Knox, 1972)**

Elastics attached around the maxillary central and mandibular lateral brackets. Lateral boxes attached to maxillary laterals and cuspids and mandibular cuspids and bicuspids.Buccal boxes used to settle in the posterior occlusion or correct a more posterior openbite. Force used ¼” 6 oz or 3/16" 6 oz **(Kwapis and Knox, 1972) (Figure 13).**

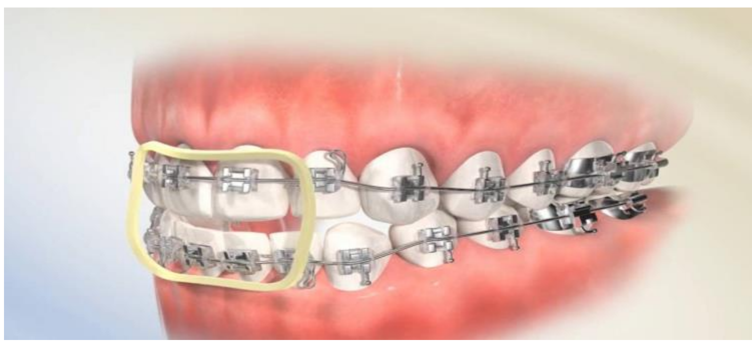

Figure 13: Box elastic (Phulari, 2011)

11-Triangular elastics

Triangular elastics aid in the improvement of CL I cuspid intercuspation and increase the over bite relationship anteriorly by closing open bite in the range of 0.5 to 1.5 mm, they extended from upper cuspid to the lower cuspid and first bicuspid teeth. It is used for similar reasons of box elastics, but including only3 teeth Elastics of 1/ 8" 3 ½ oz is used. **(Anthony and Viazi, 1993) (Figure 14)**

Figure 14: Triangular elastic (Brin and Potts, 2017)

12-Vertical Elastics (spaghetti)

This is useful in whom there is difficulty in closing the bite, whether anteriorly or posteriorly. this type of elastic is contraindicated in malocclusions that were originally characterized by a deep bite. Force used is 3 ½ oz (**Kwapis and Knox, 1972) (Figure 15)**

Figure 15: vertical elastic (Mitchell, 2013)

13-M and W elastics

In an open bite or c1 III tendency some amount curve of spee should have been placed in the lower arch. Therefore, some curve should be placed in the upper arch as well. The arch wire is sectioned distal to laterals or cuspids and up and down elastics ("M" with a tail) are worn. In class I case M or W without a tail is using. The upper and lower arch wire is sectioned in which the teeth to be extruded. In class II vector 'W' with a tail is giving.Force is ¾" 2 ounce **(Anthony and Viazi, 1993)**

14-Lingual elastics

This can be used as a supplement or a counter balancing agent to buccal elastic force, thereby increasing the efficiency of force distribution. It eliminates the tendency to procrastination that arises only alternative as a time consuming arch wire change, especially in III stage**. (Baty *et al*., 1994)**

Lingualy tipped lower molars can be uprighted by the use of class II elastics attached between to lingual hook of the lower molar and intermaxillary hook of upper arch wire on the same side. Lingual elastics can be used as a substitute for buccal elastics like CL I and CL II elastics, provided the arch wire should be tied back to the cuspid bracket (**Anthony and Viazi, 1993) (FIGURE 16)**

FIGURE 16: LINGUAL ELASTIC (Melsen, 1997)

15-Check elastics

When the arch wire tends to tip the molars distally, the molars direct the anterior portion of the wire gingivally providing anchorage in the vertical plane. The vertical anchorage can be reinforced by the single expedient of a pattern of intermaxillary elastic. One end of the elastic is hooked over the cinched distal end of the upper arch wire; both strands are hooked under the cinched distal end of the lower arch and the other end on the elastic hook mesial to the canine. Check elastics can provide a potent mechanism for overbite reduction, causing extrusion of maxillary and mandibular molars and counteracting the tendency of the anchor bends to tip the molars distally plus aiding incisor intrusion. **(Thurow, 1983)**

16-Sling shot elastics (molar distalizing)

Two hook on buccal and lingual side of the molar to be incorporated in the acrylic plate to hold the elastic. The elastic is stretched at the mesial aspect of molar to distalize it**. (Graber and Neuman, 1984) (FIGURE 17)**

FIGURE 17: SLING SHOT ELASTIC (**Maganzini *et al*., 2010)**

17-C1 II and C1 pull elastics

It is used for final setting of teeth. Usually ¾", 2 oz elastic is used. The elastic is used between each pair of teeth and hence on the central incisors on opposite sides of the midline **(Anthony Viazi, 1993)**

1.3.4 According to the force

1. High Pull Ranges from 1/8" (3.2mm) to 3/8" (9.53mm). It gives 71 gm force
2. (2 ½ oz). 2. Medium Pull Ranges from 1/8" (3.2mm) 3/8" (9.53 mm) it gives 128gm or 4 ½ oz force.
3. 3. Heavy pull Ranges from1/8"(3.2mm) 3/8"(9.53 mm) It gives 184gm or 6 1/2oz force. **(Taloumis *et al*., 1997)**

1.4 Other elastics

1)Asymmetrical elastics

They are usually CL II on one side and CL III on other side. They are used to correct dental asymmetries. If a significant dental midline deviation is present (2mm or more), anterior elastic from upper lateral to the lower contralateral lateral incisor should also be used. **(Anthony D and Viazi S, 1993)**

2) Finishing elastics

Finishing elastics are used at the end of the treatment for final posterior settling. In CL II cases elastic begins on the maxillary cuspid and continuous to the mandibular first bicuspid, and in the same "upper and down" fashion it finishes at the ball hook of mandibular first molar band. the elastics are attached to the ball hooks on the brackets or to K-hooks (heavy ligature wires with an extension). They should preferably be worn full time (24 hours / day) for maximum effect, all though 12 hours a day wear may be indicated to their side effects. They should be changed once or a twice a day because the elastic fatigue rapidly (in contrast to elastomeric chains, which lasts 3 to 4 weeks). Force recommended ¾" or 2 oz **(Anthony and Viazi, 1993)**

1.5 Elastic errors

Latex allergy: allergies to the latex proteins are increasing which has implication for dental practitioners because latex is ubiquitous in dental environment.Most documented allergic reactions to latex products have identified the residual rubber protein has the antigen. Reactions to latex carry with them a wide range of risk, and systemic reactionsin the extreme anaphylactic shock. Cutaneous exposure of individual sensitive to latex frequently causes contact dermatitis, whereas either mucosal or potential contact – has with the use of orthodontic elastics- is more likely to induce a rapid systemic reaction such as anaphylactic shock. **(Everett and Hice, 1974) (FIGURE 18)**

FIGURE 18 latex allergy (Lunder, 2000)

1.6 Elastic bands storage and dispensing

Elastics should be stored away from moist, heat and ozone or other free radical generating systems such as sunlight or ultra violet light that produce cracks, to avoid the loss of their properties. **(Kharbanda, 2019)**

Manufacturers dispense elastics bands in sealable opaque pouches to prolong their shelf life. A new pouch of elastics should be dispensed and the ones with reputed manufacturing companies are more reliable in force delivery and force degradation in the oral environment. (**Wong, 2000) (FIGURE 19)**

FIGURE 19 Elastic bands storage and dispensing (Ruiz-Genao, 2003)

1.7 Force delivery and force degradation

During the first day of loading in the mouth most chains lose 50-70% of their initial force, and at three weeks they retain only 30-40% of the original force. **(Andreasen and Bishara,1970)**

It would also greatly depend on the manufacturer, storage conditions and age of the product. The prudent clinician should use a force gauge to determine the desired initial force. **(Baty *et al*., 1994)**

1.8 Staining of Elastics

Elastomeric materials do stain from certain food such as mustard. The attempt to solve this problem by masking with metallic color inclusions reduces the strength and elasticity. It is because of the difference in the resilient properties Gradual staining: With chocolate drink, red wine, tomato ketchup.; rapid staining: With coffee and tea. **(Kochenborger *et al*., 2011)**

1.9 Coil springs VS Elastics

The study on nickel– titanium (NiTi) coil springs and elastics. shows the following:

- Ni Ti coil springs have been shown to produce a constant force over varying length with no decay
- Ni Ti coil springs produced nearly twice rapid of tooth movement as conventional elastic
- No patient cooperation is needed
- Coil spring can stretch as much as 500% without permanent deformation
- The force delivered is 90-100 gm **(Bert and Drosch, 1986)**

1.10 Fluoride release from orthodontic elastics

Plaque accumulation around the fixed orthodontic appliance will cause dental and periodontal decease. Decalcification can be avoided by mechanical removal of plaque or by topical fluoride application or with a mechanical sealant layer Controlled fluoride release device (CFRD) have been in use since 1980's. in such device a co-polymer membrane allows a reservoir of fluoride ions to migrate into oral environment rat (**Eliades *et al*., 2005)**

The delivery of stannous fluoride by means of power chain would presumably reduce count and inhibit demineralization. (An average of 0.025mg of fluoride is necessary for reminerilization). But this protection is only temporary and of a continued exposure needs, the elastic should be replaced at weekly intervals. The force degradation property will be higher with the fluorinated elastic chain.(**Miura et al., 2007)**

Chapter two: Discussion and Comments

The use of elastics in orthodontic treatment is not new, for ages orthodontists used different techniques to benefit from the unique physical properties of elastics. Keeping with the new industrial developments, manufacturers developed synthetic elastics with different configurations and superior properties Elastics are active components of orthodontic appliances. Due to their property of resiliency is used to generate continuous force to be applied on teeth to achieve tooth movement Their use combined with good patient cooperation allows the clinician to correct vertical, horizontal and transverse occlusal discrepancies. (**Behrents, 2014**).

The use of elastics in clinical practice is predicted on force extension values given by the manufacturer for different sizes of elastics. Elastics can be used in various configurations for correction of a particular malocclusion Elastics can be classified in many ways: according to the material, their availability, their uses, and force. **(Singh et al ,2012).**

Natural rubber is the first known elastomeric, used by the ancient Incan and Mayan civilizations. Rubber-like materials that are made from chemicals were called synthetic rubber because they were intended as substitutes for natural rubber The major structural differences between natural rubber and synthetic elastics may account for a different long-term performance of nonlatex elastics (**Marpe, 2018)**

Chapter three: Conclusion and Suggestions

3.1 Conclusion

- To put it in a nutshell, elastics are a prime consideration in orthodontics. Elastics are one of the most versatile materials available to the orthodontist. It is an invaluable tool of the orthodontist armamentarium.
- An orthodontist who does not exploit these materials to the fullest is not doing justice to the patient.
- The use of elastics in orthodontic treatment is not new, for ages orthodontists used different techniques to benefit from the unique physical properties of elastics. Keeping with the new industrial developments, manufacturers developed synthetic elastics with different configurations and superior properties. Elastics are a prime consideration in orthodontics.

3.2 Suggestions

- Further study can be done on force of elastics and its degredation
- Further studies can be done on elastics and its properties

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