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Torquing Auxiliaries - A Review

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Abstract

Torque is the third key of the occlusion, described by Andrews as the inclination of the dental crown antero-posteriorly in the anterior teeth and traversal in the posterior teeth. Torque is the force that gives the operator control over them movements of roots of teeth. In this article we will be discussing about the historical perspective of using torque incorporation in different system, the various torquing auxiliaries that were used in various systems from past till present.

Keywords: Torque; Auxillary; Orthodontic; Begg; Tip Edge

Abbreviations

FAC: Facial Axis Crown; SWA: Straight Wire Appliance

Introduction

In orthodontics, the meaning of the torque is different clinically and biomechanically. Clinically, the “torque” is the third key of the occlusion, described by Andrews as the inclination of the dental crown antero-posteriorly in the anterior teeth and traversal in the posterior teeth. The clinical evaluation of torque is made by tracing a line perpendicular to the dental margin and passing through the Facial Axis Crown (FAC) of the tooth (Figure 1) [1]. Biomechanically, the torque is represented by the torsion of a rectangular archwire in the bracket slot. Torque is the force that gives the operator control over the movements of roots of teeth [2]. In this article we will be discussing about the various torquing auxiliaries that were used in various systems from past till present.

Historical Preview

Dr. E.H. Angle (1928) [3] developed the standard edgewise technique in which torque was incorporated into the archwire itself by giving a third order bend (torsional bend). The wire used was a rigid stainless-steel wire.

30 years later, Dr. P.R. Begg (1956) [4] introduced a differential force technique which was popularized as Begg philosophy. In this technique Australian archwire (A. J. Wilcock wire) was used in all the stages. And for torque he used different torquing auxiliaries, instead of relying on the torsion of the wire (third order bend). He used various torquing auxiliaries for torque forces in which force levels differed by the number of coils used, degree of activation and also the dimension of the wire.

Andrews (1972) [1] totally changed the concept of incorporating torque separately by introducing his fully programmed bracket system (Straight Wire Appliance-SWA) in which he incorporated slot sitting features and even inclined the base of bracket to reduce bending of archwire.

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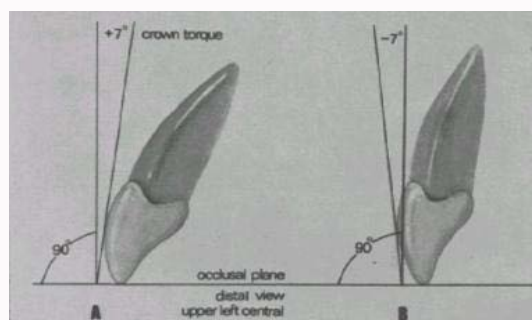
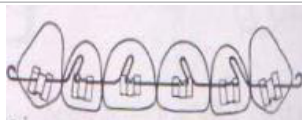
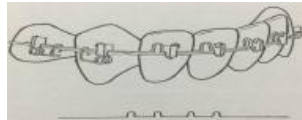
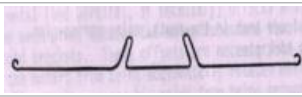
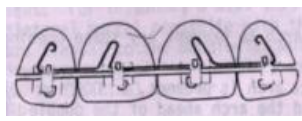

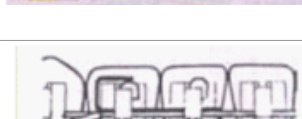

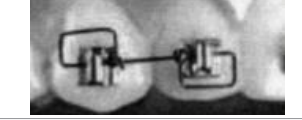

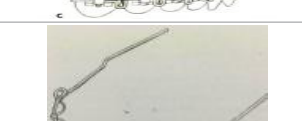
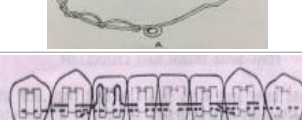
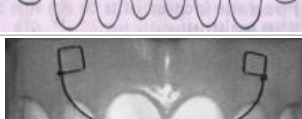
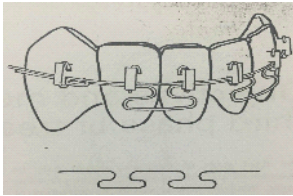



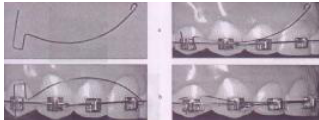
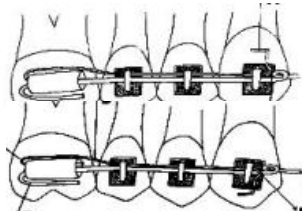
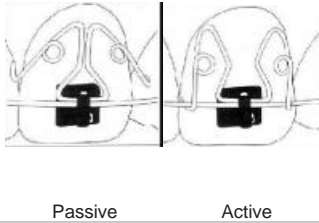


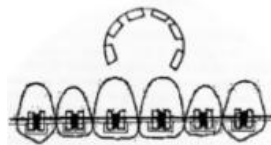



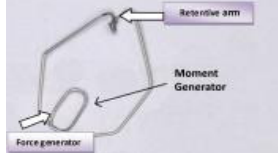


Figure 1: Clinical representation of torque.

Table 1: List of auxiliaries.

SL.NO.	AUXILIARY	SYSTEM/AUTHOR	WIRE USED	IMAGE	PURPOSE
1.	4 spurs [7]	Beggs – stage III / Dr. P. R. Beggs	0.012"/ 0.014"/ 0.016" premium plus pulse straightened wire		Used for torquing the maxillary central and lateral incisors roots palatally.
2.	Brandt type 4 spurs [7]	Beggs – stage III / Dr. P. R. Beggs	0.012"/ 0.014"/ 0.016" premium plus pulse straightened wire		Used for torquing the mandibular central and lateral incisors roots labially.
3.	2 spurs (van der Heydt auxiliary) [7]	Beggs – stage III / Dr. P. R. Beggs	0.012"/ 0.014"/ 0.016" premium plus pulse straightened wire		Used for torquing the mandibular central incisors roots labially.
4.	Short 4 spurs [7]	Beggs – stage III / Dr. P. R. Beggs	0.012"/ 0.014"/ 0.016" premium plus pulse straightened wire		Used for torquing the maxillary central and lateral incisors roots palatally without engaging cuspid bracket.
5.	Reciprocal [7]	Beggs – stage III / Dr. P. R. Beggs	0.012"/ 0.014"/ 0.016" premium plus pulse straightened wire		Used when the central incisors roots are to be torqued palatally and the lateral incisor roots are to be torqued labially.
6.	One to one [7]	Beggs – stage III / Dr. P. R. Beggs	0.012"/ 0.014"/ 0.016" premium plus pulse straightened wire		Indicated when two adjacent teeth require root torque in opposite directions.
7.	SPEC [7]	Beggs – stage III / Dr. P. R. Beggs	0.009" or 0.010" wire		Indicated when two adjacent teeth require root torque in opposite directions.
8.	Udder type [7]	Beggs – stage III / Dr. P. R. Beggs	0.012"/ 0.014"/ 0.016" premium plus pulse straightened wire		Indicated if mandibular anterior teeth are becoming too proclined.
9.	Rat trap (Pre wound) [7]	Beggs – stage III / Dr. P. R. Beggs	Either 0.012" or 0.014" highly resistant round wire		Used for torquing the maxillary anterior roots palatally.
10.	Individual [7]	Beggs – stage III / Dr. P. R. Beggs	0.012"/ 0.014"/ 0.016" premium plus pulse straightened wire		When root of a single tooth is to be torqued.
11.	Jenner [7]	Beggs Stage I or II / Dr. P. R. Beggs	0.012" SS wire		To correct the prominent roots of maxillary or mandibular canines
12.	Buccal root torquing auxiliary [7]	Beggs Stage III / Dr. P. R. Beggs	0.014" SS wire		To provide buccal root torque to molars

13.	Vertical [7]	Beggs Stage III / Dr. P. R. Beggs	0.012"/ 0.014"/ 0.016" premium plus pulse straightened wire		To provide lingual root torque to mandibular anterior teeth.
14.	Kitchton [8]	Beggs / Dr. John Kitchton	0.016" wire with double helix		To provide a palatal root torque to either the 2 maxillary central incisors only (2 teeth auxiliary) or the maxillary central and lateral incisors on both sides (4 teeth auxiliary)
15.	Warren spring [9]	PEA/ Rocky Mountain Orthodontics	0.010" – 0.011" heat treated Green Elgiloy wire		Used most commonly to apply lingual root torque, mainly to maxillary central incisors.
16.	Universal Torqueing Spring [10]	PEA / Dr. Jack Perlow	0.020" Australian archwire		It can be used on extraction and non-extraction cases, on upper and lower teeth, on centrals or laterals, for labial or lingual torque.
16.	Single root [11]	Dr. P. C. Kesling/ Tip Edge	0.012" premium plus wire		Used to provide root torque to a single tooth
17.	Reverse [12]	Franciskus Tan	0.014" round special plus wire		It is particularly effective in an extensive labial canine root movement to produce a canine eminence. It also provides a labial root torque in palatally impacted canines.
18.	Individual Tooth Auxiliary [13]	Dr. Anthony J. O'meara	0.014" Special Plus wire		For providing palatal root torque to individual tooth.
18.	Torqueing Flaps [14]	Tip Egde	0.022 x 0.028" rectangular flap used to cover the 0.036" round molar tube		For buccolingual torque control during anterior teeth retraction
19.	Side Winder Spring [15]	Tip Edge	0.014" High tensile SS wire inserted in the vertical slot		For mesiodistal root movement of individual tooth

20.	Mollenhauer's Aligning Auxiliary [16]	PEA/ Dr. B. Mollenhauer	0.009" supreme grade wire		Used to provide palatal root torque in anterior teeth.
21.	Torquing Bar [17]	Tip Edge	0.022 x 0.018" NiTi wire with 30° torque placed just behind the archwire in the deep groove of the bracket		For torquing of maxillary incisors in late Stage III
22.	Goodman torquing Springs [18]	PEA/ Ortho Arch company	0.013" high-tensile stainless steel wire		Designed to shorten treatment time and prevent relapse by applying labial or lingual root torque to upper or lower incisors, cuspids or bicuspids.
23.	Simple individual Tooth Torqueing (SITT) [19]	Dr. Jose Jacob	0.016" special plus or supreme wire		Torqueing of individual teeth
24.	Single tooth torqueing auxiliary [20]	Dr. Benoy Mathews	0.014" NiTi wire		Torqueing of partially blocked out teeth.

Proffit (1986) [5] quoted a force of 75-125 gm being suitable for torquing movements. The lower end of the range was considered suitable for teeth with small root area, whilst higher forces would be appropriate for teeth with larger roots.

Kesling (1986) [6] combined Angle's edgewise bracket system with the differential force concept of Begg for his Tip Edge system (Preadjusted Edgewise). This system could not be fully regarded as pre-adjusted as SWA but the modification of the horizontal edgewise bracket slot into a propeller slot and the use passive rectangular wires helped to control the tooth movement in both directions. In this system, each bracket had the requirement of a torquing auxiliary for achieving the final prescription similar to Begg philosophy.

Further later, next generations of SWA; Roth philosophy and MBT prescription used the inbuilt features at the base of the bracket instead of using any kind of auxiliary.

Materials and Methods

Inclusion criteria: A critical search analysis regarding the various torquing auxiliaries was carried out using different keywords such as "torque", "torquing auxiliary" and "torquing springs" in various search engines using web. The articles considered were either mentioning about how to incorporate torque in the teeth or how to achieve a non-orthodontically treated normal occlusion. In addition, searches were made within the references of the chosen articles.

Exclusion criteria: all the results were totally scrutinized in three stages: foremost, those that were not almost alike the target were excluded, second, the recurrent ones were removed, and in conclusion, the authors who used a similar variety of strategies were omitted from the final list.

Results

A total of 91 articles resembling our objectives were settled to work with. After a healthy scrutinization by our team keeping in mind the inclusion and exclusion criteria, 25 articles were left to contend with. A table constituting of the auxiliary name, system in which it is used/ author who introduced it, wire used, its image and its purpose is listed in Table 1.

Conclusion

Torque is probably one of the most important and potent forces of orthodontic treatment mechanism. With proper understanding and systemic technical approach, it is not difficult to accomplish. The operator's ability to control torque properly will mean the difference between artistically treated cases that has all esthetic beauty desired in a finished denture and an ordinary tooth straightening accomplishment that contains very few of these desirable features. The auxiliaries provide adequate forces which can be easily controlled by the clinician thus providing aesthetic results. After proper knowledge and practice, it depends upon the operator to decide which auxiliary to use. With the continuously evolving techniques and introduction of 3rd generation Straight wire appliance, the torque has now been incorporated into the brackets (either in face or base) and the need of different auxiliary has reduced thereby reducing the extra bulk of wire in the mouth and thus decreasing the chances of plaque accumulation and facilitating good oral hygiene. Still some clinicians sometimes depend on these torquing auxiliaries to provide torque to a single tooth as it has more control on the tooth and provide a light continuous force.

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