Section: Research Paper

VARIOUS TORQUE PRESCRIPTION IN ORTHODONTICS

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Abstract:

Torque is the labiolingual or buccolingual inclination of the tooth. There can be lingual torque or labial/buccal torque for any tooth. In the lingual torque, the crown will tip lingually while in the buccal torque, the crown will tip buccally. Various torque prescriptions are present in orthodontics. In orthodontics, for the inclination of the teeth especially the anteriors, torque is incorporated. The change in the buccolingual inclination of the crowns varies depending on various factors such as the wire torque stiff ness, design of bracket, the wire/slot play, and the mode of ligation used.[1]

In orthodontics, basically two types of torque are seen.

1. **Passive torque**- with the incorporation of any wire if there is no action or force acting on the tooth, that means a passive torque is present in an arch wire, when the torque present in the wire will not follow any torque movement even on the full engagement of the wire. The main objective of the passive torque in the wire is to maintain the already achieved torque in the tooth.

2. **Active torque**- is the torque which has a determined action or force on the tooth when it is engaged. When any arch wire is able to of generate any torque movement of teeth in a segment is considered to be an active torque present in the archwire[1,2]

FACTORS AFFECTING TORQUE IN ORTHODONTICS[3]

1. Shape of the wire: for the torsion attribute just after the levelling most of the rectangular wires are used. These are used mostly as to express the torque in the roots that tip in all three planes of space with the transition of arch wires from the round more resilient wire to the square or rectangular stiffer wire. There is from 10° to 31.5° of rotational freedom between the square or rectangular wire and the 0.022 x 0.028 slot in a range of wires from 0.016 x 0.016 (31.5° freedom) to 0.018 x 0.025 (10.0° freedom)
2. Size of the wire:- With the thicker wire, there is greater ability to torque, i.e. 0.018, 0.022, 0.025 wires in the horizontal plane, without any twist present in the wire itself there will be a much greater ability to "torque. An example is any difference of torquing ability in the 0.017 x 0.017 and the 0.017 x 0.025.
3. Various materials that are used for arch wire: materials with low modulus of elasticity such as nickel titanium (Ni-Ti) Alloys, that results in reduced torque expression when compared to stainless steel. Usually, the torque produced by the steel wires will be 1.5 to 1.8 times the torque of TMA and about 2.5 times the torque of Ni-Ti at 24 degrees.
4. Bracket materials: with the use of ceramic brackets, the clinical concerns are somewhere reduced with high appliance stiffness and fiber reinforcement of plastic-polycarbonate appliances. The mean fracture strength is much lesser in polycrystalline Brackets when compared to monocrystalline ceramic brackets.[4]
5. Bracket height: on the crown of the tooth, the position of brackets establishes the tooth‘s last tip, torque, rotation and height. Poorly positioned brackets will result in imperfectly positioning of teeth and requires a much higher arch wire adaptations.
6. Mode of Ligation: Arch wire is adapted in the bracket slot by steel ligature or elastomeric modules. An additional cause of torque control loss is the loosening of force of elastomeric ligatures. The use of steel ligatures would be successful in sustaining the arch wire in the slot for proper torque control.
7. Loop design: The torsional stiffness of a looped wire can be distinguished by the two factors are the wire cross section and the loop geometry. Increase in the quantity of wire in the mesiodistal section of the loop and also increasing the diameter of the apex

will result in increase of loop's torsional workability.[5]

Various torque prescriptions that have evolved in orthodontics are :

Andrews Prescription[6,7]

Lawrence Andrews started the pre-adjusted appliance. In his study he evaluated the occlusion and identified the six keys of occlusion by re-assessing all the previous orthodontic experiences. The third key is described by the torque and was expressed by a bracket containing the angulation, inclination and in-out of each tooth, interrelate with a straight-wire. The prescription given by Andrews:(Table I)

Upper Arch	**Inclination**	**Lower Arch**	**Inclination**
Central	**+7°**	**Central**	**-6°**
Lateral	**+4°**	**Lateral**	**-6°**
Cuspid	**-7°**	**Cuspid**	**-11°**
1st Bicuspid	**-7°**	**1st Bicuspid**	**-17°**
2nd Bicuspid	**-7°**	**2nd Bicuspid**	**-22°**
1st molar	**-11°**	**1st molar**	**-30°**

TABLE I: Andrews Prescription

Roth Prescription[8]

Roth condemn Andrews furnishing of brackets. According to Roth , a large inventory was difficult to handle, so he proposed a new prescription called as the Straight Wire, in which a unique torque value of the upper canines (11°), proposing to use the same brackets for extractions and non-extraction cases.(TABLE II)

Upper Arch	**Inclination**	**Lower Arch**	**Inclination**
Central	**12°**	**Central**	**0°**
Lateral	**8°**	**Lateral**	**0°**
Cuspid	**0**	**Cuspid**	**-11°**
1st Bicuspid	**-7°**	**1st Bicuspid**	**-17°**
2nd Bicuspid	**-7°**	**2nd Bicuspid**	**-22°**
1st molar	-14°	**1st molar**	-30°

TABLE II: Roth prescription

THE BUTTERFLY SYSTEM[9,10]

The butterfly system was introduced by Dr. Jay Bowman and Dr. Aldo Carano. In order to correct the undesired effects produced, in this butterfly system progressive posterior torque was incorporated. To improve the final buccolingual occlusion, the lower posterior torque is reduced while the upper is increased by flattening the curve of Wilson, reducing inconsistency in posterior overjet, and lowering the bulging of palatal cusps.(TABLE III)

Upper Arch	Inclination	Lower Arch	Inclination
Central	**14°**	**Central**	**-5°**
Lateral	**8°**	**Lateral**	**-5°**
Cuspid	**0**	**Cuspid**	**-3**
1st Bicuspid	**-7°**	**1st Bicuspid**	**-7°**
2nd Bicuspid	**-8°**	**2nd Bicuspid**	**-9°**

TABLE III: The butterfly system

MBT prescription[11,12]

MBT technique is the third-generation of Straight wire devices. McLaughling, Bennet and Trevisi altered the prescriptions of Roth and Andrews: this alteration is due to the establishment of sliding mechanics, so that light forces could be used to close the extraction spaces.(TABLE IV)

Upper Arch	Inclination	Lower Arch	Inclination
Central	**+17°**	**Central**	**-6°**
Lateral	**+10°**	**Lateral**	**-6°**
Cuspid	**7°/-7°**	**Cuspid**	**6°/-6°**
1st Bicuspid	**-7°**	**1st Bicuspid**	**-12°**
2nd Bicuspid	**-7°**	**2nd Bicuspid**	**-17°**
1st molar	-14°	**1st molar**	-20°

TABLE IV: MBT prescription

ALEXANDER'S THE VARI-SIMPLEX DISCIPLINE[13]

An appliance called as the Vari-Simplex Discipline was introduce in the year 1977 by alexander in which he introduced a system of brackets placed on teeth, employed by orthodontists all over the world and he defines Vari-Simplex Discipline, in which there is specific bracket system utilized in case treatment. Specific bracket designs are been made for individualized teeth. In this

prescription, mainly for non-extraction cases, allows controlled and efficient mandibular arch levelling. (TABLE V)

Upper Arch	**Inclination**	**Lower Arch**	**Inclination**
Central	**14°**	**Central**	**-5°**
Lateral	**7°**	**Lateral**	**-5°**
Cuspid	**-3**	**Cuspid**	**-7°**
1st Bicuspid	**-7°**	**1st Bicuspid**	**-11°**
2nd Bicuspid	**-7°**	**2nd Bicuspid**	**-17°**
1st molar	**-10°**	**1st molar**	**-22°**

TABLE V: ALEXANDER'S prescription

Self Ligating Brackets-DAMON System[14]

The Damon philosophy assert for the lowest frictional resistance of any ligation system with the idea of passive self-ligation technique. The concept of decreasing the friction allows the force to transfer from the arch wires to the teeth and its supporting structures directly and without any force dissolution by the ligature system.(TABLE VI)

Upper Arch	**Inclination**	**Lower Arch**	**Inclination**
Central	**12°**	**Central**	**-1°**
Lateral	**8°**	**Lateral**	**-1°**
Cuspid	**0**	**Cuspid**	**0°**
1st Bicuspid	**-7°**	**1st Bicuspid**	**-12°**
2nd Bicuspid	**-7°**	**2nd Bicuspid**	**-17°**
1st molar	**-18°**	**1st molar**	**-28°**

TABLE VI: Self Ligating Brackets-DAMON System

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