

Bidimensional Technique: A Topical Review

Review Article

Vipul K S^{1*}, Yadav K², T.P. Chaturvedi³

¹Service Senior Resident, Department of Orthodontics and Dentofacial Orthopaedics, FODS, IMS, BHU, Varanasi, India.

²Senior Resident, Department of Periodontology, FODS, KGMU, India.

³Professor and Head, Department of Orthodontics and Dentofacial Orthopaedics, FODS, IMS, BHU, Varanasi, India.

Abstract

In orthodontics, torquing, particularly in the maxillary incisors is required to overcome play between wire and bracket, for an ideal interincisal angle, adequate incisor contact, and sagittal adjustment of the dentition in order to achieve an ideal occlusion. Various torquing auxiliaries and twisting of rectangular wire have been tried. Most of these approaches require increased chair side time in wire bending and patient discomfort with unguaranteed effects. To control incisor torque, trend of bidimensional technique is increasing in labial/lingual orthodontics. The purpose of this article is to provide an overview of the bidimensional technique.

Keywords: Torque; Ideal Occlusion; Bidimensional Technique.

*Corresponding Author:

Vipul Kr Sharma,
Service Senior Resident, Department of Orthodontics and Dentofacial Orthopaedics, FODS, IMS, BHU, Varanasi (Uttar Pradesh), Room No. 154, Sushrut Hostel, IMS, Varanasi (Uttar Pradesh), 221002, India.
Tel: 09839460640
E-mail: dr.vipul2010@gmail.com

Received: April 24, 2015

Accepted: May 29, 2015

Published: June 23, 2015

Citation: Vipul K S, Yadav K, T.P. Chaturvedi (2015) Bidimensional Technique: A Topical Review. *Int J Dentistry Oral Sci.* 2(6), 94-96. doi: <http://dx.doi.org/10.19070/2377-8075-1500020>

Copyright: Vipul K S[®] 2015. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Introduction

In orthodontics, torquing, particularly in the maxillary incisors is required to overcome play between wire and bracket, for an ideal interincisal angle, adequate incisor contact, and sagittal adjustment of the dentition in order to achieve an ideal occlusion [1]. To investigate torque expression in both conventional and self-ligating brackets, using the finite element method, optical image correlation technique, or some special apparatuses, various studies have been done [2, 3]. In addition, various torquing auxiliaries and twisting of rectangular wire have been tried [4]. Most of these approaches require increased chair side time in wire bending and patient discomfort with unguaranteed effects. Chances of bracket debonding are increased in torqued wires [5]. So, to provide stronger torque control, Schudy and Schudy [6] described

the Bimetric System, a fixed orthodontic appliance incorporating two bracket slot sizes. They also argued for what, they called the precision-fit principle, meaning that in the finishing stages, the wires should fully engage the bracket slots, thus, eliminating or significantly reducing play. After that, a "Bidimensional Edgewise Technique" [7] was proposed some years later, followed by "bidimensional technique" [8]. Rinchuse further modified bidimensional technique and developed a dual-slot system [9]. Thus, the purpose of this article is to provide an overview of the bidimensional technique.

Various Bidimensional Systems

Bimetric system

It is first bidimensional approach in which, 0.016-inch brackets are used on the anterior teeth (canine to canine), while 0.022-inch brackets on the posterior teeth. A 0.016"x0.022" stainless steel archwire is engaged with a 90 degree twist made distal to the canines, so as to "full-sizedly" fill the anterior section as "edgewise," while the buccal sections are filled as "ribbon" with 0.022"x0.016" arch wire. It was a standard edgewise appliance system with zero base [6].

Bidimensional edgewise technique

In this technique, non-preadjusted 0.022x0.028-inch brackets are used for all the teeth, and a 0.016"x0.022" archwire is used with a 90 degree twist immediately distal to the lateral incisors, so as to form a 0.022x0.016-inch ribbon segment that fills the anterior brackets and two 0.016x0.022-inch edgewise segments that fit into the buccal brackets with a clearance of 0.006 inch. This is actually a "bidimensional-wire" technique. This is in contrast to currently used bidimensional technique [7].

Bidimensional Technique

In fact, it is a “bidimensional-slot” technique. In this system, pre-adjusted edgewise brackets with 0.018-inch slot on incisors and 0.022-inch slot on canines, premolars and molars are used. All the brackets have vertical slots that allows for an array of auxiliaries, such as uprighting springs. Smaller brackets (0.018x0.025-inch) on incisors provide three dimensional control on incisors and “tight fit” as well as larger brackets (0.022x0.028-inch) on posterior teeth provide “loose fit” which facilitates sliding mechanism. When a 0.018x0.022-inch SS archwire is engaged, it “full-sizedly” fits into the anterior brackets, but leaves a clearance of 0.004 inch within the buccal brackets. Since the wire is undersize in the posterior brackets, it is relatively simple to insert, and the posterior teeth do not require the close 3rd-order monitoring, that would be necessary if the wire filled the bracket slots. If, torque is needed in the canine region, then a 90-degree bend is made mesial to the canine bracket, and another 90-degree bend is made distal to the canine bracket; thus the strip of wire in the canine bracket is now 0.022x0.018-inch and full engagement is achieved. Gianelly used 0.016x0.022-inch SS wire for canine retraction [8]. Nowadays, only the bidimensional-slot technique is used and the bidimensional wire technique is rarely used. Although, the bidimensional technique provides greater torque control on incisors, only few clinical cases are reported [10-12].

Dual-slot System

Over the years after the bidimensional technique, certain modifications were done to enhance efficiency of this technique. It is known as dual-slot system [9]. In this technique 0.018-inch slot is used on anteriors and 0.022-inch slot used on posteriors. This allows use of more stiffer wire (0.018-inch wire into 0.022-inch slot) preventing notching, deformation and increases the efficiency of retraction and greater torque control on anteriors with 0.018-inch slot, since, 0.022”x0.028” wire is too stiff in 0.022-inch slot [13]. Only one retraction wire is used i.e., 0.018x0.025 stainless steel. 4 mil clearance is maintained in posteriors which will allow better posterior torque control. This much amount of play allow to settle posterior teeth in soft tissue balance and equilibrium because static facial torque prescribed in buccal segments ultimately altered by soft tissue [14]. On the contrary to Gianelly’s bidimensional technique [8], the dual-slot system employs en masse retraction of anterior teeth resulting in reduced treatment time of approximately 8 months as compared with two step-retraction [15]. The other difference is the use of round wire during initial stages of alignment and leveling to avoid adverse effect of rectangular wire on the roots [13].

Another modification of the bidimensional system has been developed i.e., hybrid and dual slot techniques using active and passive self ligating brackets but yet to be proved clinically [16, 17].

Effectiveness of Bidimensional system

Although, this system seems to be biomechanically appropriate, very few studies were done to prove its effectiveness. In one study, the amount of root resorption was found to be similar when compared with straight wire technique [18]. Greater torque control is observed with this technique [17, 19-21]. Recently, the bidimensional technique was shown to be equally effective in lingual

orthodontics [22, 23]. However, according to a recent survey, only 5% practitioners are using this technique [24].

Advantages

The advantages of the bidimensional technique are:

- Greater torque control in incisors due to full slot engagement.
- Very convenient technique, since, it does not require loop formation and arch form is well maintained at the end of treatment.
- This method conserves anchorage because of reduced friction in posterior teeth.
- En masse retraction of anterior teeth reduces treatment time.
- Increased play in posterior teeth makes protraction easy.

Conclusion

Although, the authors of the bidimensional technique claim many advantages, yet, it is still considered a less popular treatment modality. Furthermore, its use is also lacking in surgical cases. Further clinical studies such as randomised clinical trials are needed to prove its effectiveness.

References

- [1]. Archambault A, Lacoursiere R, Badawi H, Major PW, Carey J, et al. (2010) Torque expression in stainless steel orthodontic brackets. A systematic review. *Angle Orthod* 80(1): 201–210.
- [2]. Morina E, Eliades T, Pandis N, Jager A, Bourauel C (2008) Torque expression of self-ligating brackets compared with conventional metallic, ceramic, and plastic brackets. *Eur J Orthod* 30(3): 233–238.
- [3]. Huang Y, Keilig L, Rahimi A, Reimann S, Eliades T, et al. (2009) Numeric modeling of torque capabilities of self-ligating and conventional brackets. *Am J Orthod Dentofacial Orthop* 136(5): 638–643.
- [4]. Panchez H, Loffler A, Obijou C (2001) Efficiency of root torquing auxiliaries. *Clin Orthod Res* 4(1): 28–34.
- [5]. Sondhi A (2000) The truth about bond failures. *Orthodontic Cyber Journal* 1-3. <http://multimedia.3m.com/mws/media/968990/the-truth-about-bond-failures.pdf>
- [6]. Schudy FF, Schudy GF (1975) The Bimetric system. *Am J Orthod* 67(1): 57-91.
- [7]. Gianelly AA, Bednar JR, Dietz VS (1985) A bidimensional edgewise technique. *J Clin Orthod* 19(6): 418–421.
- [8]. Gianelly AA (2000) Bidimensional Technique: Theory and Practice, GAC Int Inc. Central Islip, NY.
- [9]. Rinchuse DJ, Rinchuse DJ (2011) Modification of the Bidimensional System, *Orthod. (Chic.)* 12(1):10-21.
- [10]. Greco M, Giancotti A (2007) Sliding mechanics in extraction cases with a bidimensional approach. *Prog Orthod* 8(1): 144–155.
- [11]. Giancotti A, Greco M, Mampieri G, Arcuri C (2004) The use of titanium miniscrews for molar protraction in extraction treatment. *Prog Orthod* 5(2): 236–247.
- [12]. Keim RG, Gottlieb EL, Nelson AH, Vogels DS (2008) 3rd 2008 JCO study of orthodontic diagnosis and treatment procedures, part 1: Results and trends. *J Clin Orthod* 42(11): 625-640.
- [13]. Proffit WR, Fields Jr HW, Sarver DM (2007) Contemporary Orthodontics. (4th edn), St Louis, Mosby. 376, 553.
- [14]. Proffit WR, Fields Jr HW, Sarver DM (2007) Contemporary Orthodontics. (4th edn), St Louis, Mosb. 6:145-147.
- [15]. Xu TM, Zhang H, Oh HS, Boyd RL, Korn EL, et al. (2010) Randomised clinical trial comparing control of maxillary anchorage with 2 retraction techniques. *Am J Orthod Dentofacial Orthop* 138(5): 1-9.
- [16]. Rinchuse DJ, Miles P (2007) Self-ligating brackets: Present and Future. *Am J Orthod Dentofacial Orthop* 132(2): 216-222.
- [17]. Giancotti A, Mozzicato P, Greco M (2012) En Masse Retraction of the Anterior Teeth Using a Modified Bidimensional Technique. *J Clin Orthod* 46(5): 267-273.
- [18]. Zawawi KH, Malki GA (2014) Radiographic comparison of apical root resorption after orthodontic treatment between bidimensional and Roth

- straight-wire techniques. *J Orthod Sci* 3(4): 106–110.
- [19]. Li Y, Tang N, Jhu Z, Phang X, Yang L, et al. (2012) Bidimensional techniques for stronger anterior torque control in extraction cases: A combined clinical and typodont study. *Angle Orthod* 82(4): 715–722.
- [20]. Aljhani AS, Zawawi KH (2012) Nonextraction Treatment of Severe Crowding with the Aid of Corticotomy-Assisted Orthodontics. *Case Rep Dent* 1-8.
- [21]. Greco M, Giacotti A (2007) Sliding Mechanics in extraction cases. *Prog Orthod* 8(1): 144-155.
- [22]. Soldanova M, Leseticky O, Komarkova L, Dostalova T, Smutny V et al. (2011) Effectiveness of treatment of adult patients with the straight wire technique and the lingual two-dimensional appliance. *Eur J Orthod* 1-7.
- [23]. Macchi A, Norcini A, Cacciafesta V, Dolci F (2004) The Use of Bidimensional Brackets in Lingual Orthodontics: New Horizons in the Treatment of Adult Patients. *Orthodontics* 1: 1–11.
- [24]. Keim RG, Gottlieb EL, Vogels DS, Vogels PB (2014) 2014 JCO Study of Orthodontic Diagnosis and Treatment Procedures Part 1: Results and Trends. *J Clin Orthod* 48(12): 607-630.