

IDO Tips: Accelerated Orthodontics Made Easy

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Abstract: Introduction: Prolonged treatment duration is one of the main deterrents in orthodontics. Various methods have been introduced to accelerate tooth movement with invasive, non-invasive and minimally invasive techniques. Aim and Objective: The aim of this article is to introduce a new device with minimally invasive technique and negligible post procedural discomfort to the patient. Instrument: IDO tips are commercially available pre-sterilized, pre-calibrated stainless steel tips. Method: Infiltration anaesthesia is administered. The IDO tip is taken out from the pre-sterilized pack and attached to the driver. It perforates into the bone with a clockwise motion. After full insertion, the tip is rotated in anticlockwise direction to drive it out. Post procedure, patients are advised to take a mild NSAID only if required. Discussion: The IDO tip is a device used for micro-osteoperforation. It provides a very efficient way to shorten the treatment time, using regional acceleratory phenomenon (RAP) to advantage. Since the device driver is compatible with the FavAnchor miniscrew system, it reduces the inventory cost. Conclusion: IDO tips are a viable option on occasions when it is desirable to reduce treatment time with accelerated orthodontics.

Keywords: Interdental Osteoperforation, Accelerated Orthodontics

1. Introduction

Typical orthodontic treatment can take 12 to 36 months of active treatment time. This prolonged nature of treatment has an impact on patient's acceptance of this treatment modality, due to various personal and financial reasons. Many patients opt for moderately or highly invasive cosmetic dental procedures on these grounds, which may need periodic maintenance and/or may prove detrimental to long term health of the teeth or supporting structures. Orthodontics, as a profession has tried many ways to reduce the active treatment time. Efficient planning of the treatment, variations in the designs of the brackets and wires, inventions in wire materials, various methods of reducing friction in the appliances are some of the common examples.

A different approach to this problem was developed in 1990s by Orthodontist Thomas Wilcko and his Periodontist brother William Wilcko. Popularised by the name, Wilckodontics, the method involved corticotomy cuts in the bone along with bone grafting to accelerate the tooth movement.^{1,2,3,4} Biologically, this procedure relies on the transient osteopenia created by intentional iatrogenic trauma to the bone. In their cases treated by this approach, the treatment time was reported to reduce from around two years to three to six months.

The major drawback of this modality is that though the treatment time reduced very significantly, the surgical procedure is very invasive in nature. First twenty four hours the patient is advised to have cold and liquid diet, followed by next one week of liquid or semi-solid food. There may be

pain, swelling and general discomfort resulting from post-surgical healing phases.

Piezocision procedure was suggested by Dilbart.⁵ He advocated raising a flap and creating corticotomy cuts with a piezo surgical tip to create well defined cuts in the cortical bone around the teeth which were to be moved.

Park et al and Kim et al suggested corticision procedure.^{6,7} This method uses a scalpel and mallet to make transgingival cortical cuts. This procedure eliminated the need to raise a flap. Still the trauma to the tissues is more than what is readily accepted by the patients.

Many non-invasive procedures were tried to overcome these drawbacks of an invasive surgical procedure. So far non-invasive methods like low-level laser therapy, vibrational therapy etc. have not proven to be effective in accelerating the tooth movement.

Now, the focus has shifted from invasive and non-invasive methods to minimally invasive methods. Research conducted by Consortium for Translational Orthodontic Research (CTOR) suggests that accelerated orthodontics is possible with trans-gingival micro-osteoperforations, which is a minimally invasive technique. This technique uses a sharp screw tip to create transgingival osteoperforations, under infiltration anaesthesia. One of the most successful examples of translational research in the field of orthodontics is micro-osteoperforations (MOPs).^{8,11,17}

Some researchers have suggested using thin carbide burs under slow rpm and with water coolant for the osteoperforations. This method, though effective, carries risk of bone overheating and possible trauma to adjacent

structures as the insertion speed may be high for efficient control.

Another method suggested is to use micro implants for making osteoperforations. The technique is practical and simple but Titanium micro implants are known to get damaged in first insertion itself, resulting in a distorted and blunted tip at the very least, and in worst cases, there may be fracture of the mini screw. The studies of fracture resistance show that after approximately 5 times of insertion, there are higher chances of torsional failures of the screw, leading to breakages. In a single site itself, the recommended insertions and removals are thrice, so the recommendation to use mini implants as a preferred method is questionable at best.

IDO Device is a device specifically made for this purpose. It is pre-calibrated for limited depth insertion and has a sharp screw tip of implant grade stainless steel to safeguard against accidental breakage. A stopper can be used as an alternative for precise and clean osteoperforation. With this line of thought, instruments like Propel have been designed which favours the clinicians, inspite of their higher costs and limited use.

2. Instrument

The authors have designed and developed FavAnchor Skeletal Anchorage System™. As part of this system a micro osteoperforation tip compatible with the driver of FavAnchor™ is commercially manufactured to facilitate accelerated orthodontics (Fig. 2). The tips are available under the commercial name of IDO Tips™, which stands for Inter Dental Osteoperforation Tips.

These tips are made from implant grade stainless steel. The dimension of the tip is 1.2 mm x 4 mm (Fig. 1). The disposable tip is available as a single unit pack which is pre-sterilized with Gamma rays. This tip fits into a specific driver compatible top. Each tip can be used to make up to 20 osteoperforations in a single patient.

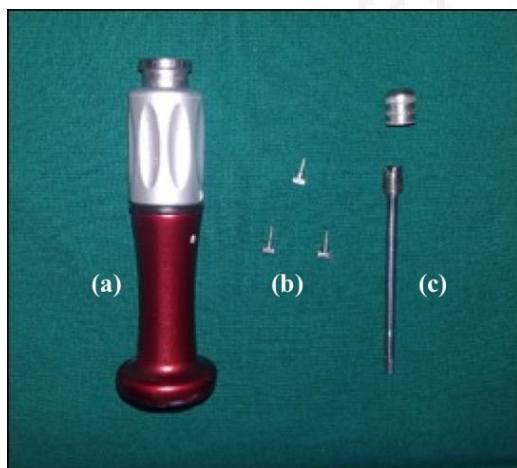


Figure 1: (a) Straight handle driver (Common for FavAnchor SAS™ & IDO) b) Replaceable IDO Tips c) IDO Device

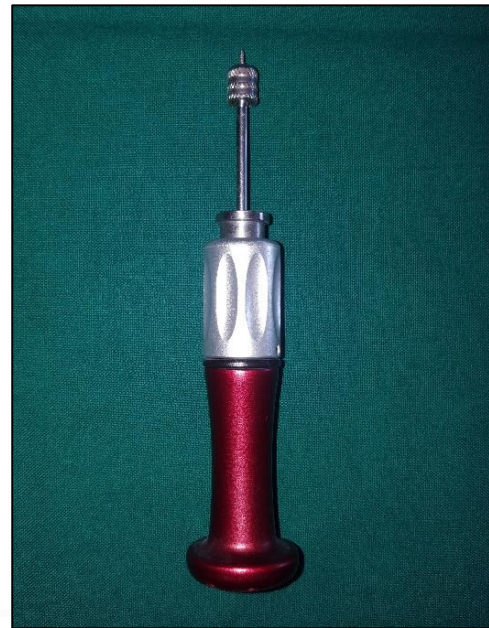


Figure 2: IDO Device ready for use

3. Method

The method of use is very simple. In the area where osteoperforations are planned, infiltration anaesthesia is administered. The IDO tip is taken out from the pre-sterilized pack and attached to the driver. The tip is pressed on the point where perforation is created by driving it in the bone with a clockwise motion till the wide stopper part of the driver touches the gingiva (Fig. 3). After full insertion, the tip is rotated in anticlockwise direction to drive it out (Fig. 4).

It is a good practice to check the IDO tip upon removal for any distortion or damage before re-inserting it to create the next micro osteoperforation. Usually it is recommended to make 3 perforations per site at equal spacing between them. Post procedure, patients are advised to take a mild NSAID only if required. In our experience, it's hardly if ever needed.

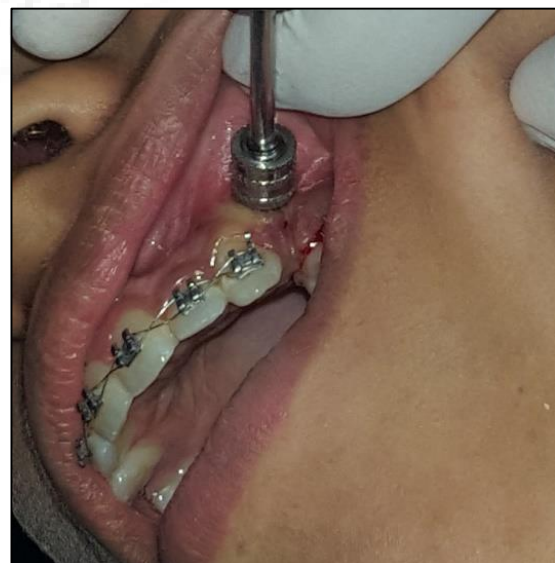


Figure 3: Micro-osteoperforation procedure



Figure 4: Micro-osteoperforations

4. Discussion

Prolonged treatment duration is one of the main deterrents in orthodontic treatment.⁹ Several disadvantages like higher predisposition to caries, gingival recession, and root resorption are posed due to long orthodontic treatment time. Thus, the demand to find the best method to increase tooth movement within shorter duration of time and minimal disadvantages has increased.^{19,20} Recently, various methods have been proposed to enhance the rate of orthodontic tooth movement, like corticotomy, piezocision, low-level laser therapy, electrical current, pulsed electromagnetic fields, dentoalveolar or periodontal distraction, drugs, micro-osteoperforation, etc.^{9,13,18}

The IDO tip is a device used for micro-osteoperforation. It provides a very efficient way to shorten the treatment time, using regional acceleratory phenomenon (RAP) to advantage. The tip is of the optimum size to leave behind a very small soft tissue entry point. At the same time, micro-osteoperforations performed this way are completely effective in accelerating the tooth movement. Since the device driver is compatible with the miniscrew system, it reduces the inventory cost. The Tips are pre-sterilized, thus safe for the patient and convenient for the operator. The screw tip is replaceable, thus the recurring expenses are under control.

5. Conclusion

Accelerated orthodontics still has scope for future research. IDO tips are an innovation in this field with the advantage of minimally invasive technique. The ease of use for the orthodontist and negligible post procedural discomfort to the patient makes IDO tips a viable option on the occasions when it is desirable to reduce treatment time with accelerated orthodontics.

References

[1] Wilcko WM, Wilcko TM, Bouquot JE, Ferguson DJ. Rapid Orthodontics with Alveolar Reshaping: Two Case Reports of Decrowding. *Int J Periodontics Restorative Dent* 2001; 21: 9-19.

[2] Wilcko WM, Ferguson DJ, Bouquot JE, et al. Rapid orthodontic decrowding with alveolar augmentation: Case report. *World J Orthod.* 2003;4:197-505

[3] Wilcko MT, Wilcko WM, Marquez MG, et al. The contributions of periodontics to orthodontic therapy. In: Dibart S (Ed) *Practical advanced periodontal surgery.* Ames, IA: Wiley Blackwell 2007; 23-50.

[4] Wilcko WM, Wilcko MT, Bissada NF. An evidencebased analysis of periodontally accelerated orthodontic and osteogenic techniques: A synthesis of scientific perspectives. *Sem in Orthod* 2008; 14 (4):305-16.

[5] Dibart S., Sebaoun J.D., Surmenian J. Piezocision: A minimally invasive, periodontally accelerated orthodontic tooth movement procedure. *Compend Contin Educ Dent.* 2009; 30 (6):342-350.

[6] Park Y.G., Kang S.G., Kim S.J. Accelerated tooth movement by Corticision as an osseous orthodontic paradigm. *Kinki Tokai Kyosei Shika Gakkai Gakujyutsu Taikai, Sokai.* 2006; 48:6.

[7] Kim SJ, Park YG, Kang SG. Effects of corticision on paradental remodelling in orthodontic tooth movement. *Angle Orthod.* 2009; 79:284-91.

[8] Chou MY, Alikhani M. A successful story of translational orthodontic research: Micro-osteoperforation-from experiments to clinical practice. *APOS Trends Orthod.* 2017; 7:6-11.

[9] Gadakh SB, Gulve N, Patani S, Nehete A, Aphale H, Patil H. Methods of Accelerating orthodontic treatment – A Review. *Journal of Applied Dental and Medical Sciences.* 2016; 2 (1).

[10] Verna C. Regional Acceleratory Phenomenon. *Front Oral Biol.* 2016; 18:28-35.

[11] Alikhani M, Alansari S, Sangsuwon C, Alikhani M, Chou MY, Alyami B et al. micro-osteoperforations: Minimally invasive accelerated tooth movement. *Sem in Orthod.* 2015; 21:162-169.

[12] Alansari S, Sangsuwon C, Vongthongleur T, Kwai R, Teo MC, Lee YB et al. Biological principles behind accelerated tooth movement. *Sem in Orthod.* 2015; 21:151-161.

[13] Cassetta M, Pandolfi S, Giansanti M. Minimally invasive corticotomy in orthodontics: a new technique using a CAD/CAM surgical template. *Int J Oral Maxillofac Surg.* 2015;44 (7):830-3.

[14] Ferguson DJ, Wilcko MT, Wilcko WM, Makki L. Scope of treatment with periodontally accelerated osteogenic orthodontics therapy. *Sem in Orthod.* 2015; 21:176-186.

[15] Hoogeveen EJ, Jansma J, Ren Y. Surgically facilitated orthodontic treatment: A systemic review. *Am J Orthod Dentofacial Orthop.* 2014; 145: 51-64.

[16] Adusumilli S, Yalamanchi L, Yalamanchili PS. Periodontally accelerated osteogenic orthodontics: An interdisciplinary approach for faster orthodontic therapy. *J Pharm Bioall Sci.* 2014; 6: 2-5.

[17] Alikhani M, Raptis M, Zoldan B, Sangsuwon C, Lee YB, Alyami B Et al. Effect of micro-osteoperforations on the rate of tooth movement. *Am J Orthod Dentofacial Orthop.* 2013; 144:639-48.

[18] Long H, Pyakurel U, Wang Y, Liao L, Zhou Y, Lai W. Interventions for accelerating orthodontic tooth movement. *Angle Orthod.* 2013;83: 164-171.

- [19] **Nimeri G, Kau CH, Abou-Kheir NS, Corona R.** Acceleration of tooth movement during orthodontic treatment – a frontier in Orthodontics. *Prog Orthod.* 2013; 14:42.
- [20] **Buschang PH, Campbell PM, Ruso S.** Accelerating Tooth Movement with Corticotomies: Is It Possible and Desirable? *Sem in Orthod.* 2012; 18:286-264.
- [21] **Murphy KG, Wilcko MT, Wilcko WM, Ferguson DJ.** Periodontal Accelerated Osteogenic Orthodontics: A Description of the Surgical Technique. *J Oral Maxillofac Surg.* 2009; 67 (10): 206-16.
- [22] **Owen AH.** Accelerated Invisalign treatment. *J Clin Orthod.* 2001;35: 381–384.

Author Profile



Dr (Prof) Vivek Patni is an alumnus of Government Dental College Mumbai, graduated in 1998 and received post-graduation in orthodontics 2002. He has been a member of faculty in GDC Mumbai. He holds the fellowship in Oral Implantology from MUHS in 2018. Currently he is a professor and post graduate guide in MGM Dental College, Navi Mumbai. He is directing and conducting research projects in orthodontics material sciences, uses of mini implants in orthodontics, accelerated orthodontics and FEM studies in orthodontics.



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