

Extraction mechanics in lingual orthodontics: Challenges and solutions

Tushar M. Hegde, Viraj Doshi¹

Private Practice, Welcare Dental Clinic, Andheri West, ¹Private Practice, Navneelam Society, Dr. R G Thadani Marg, Worli, Mumbai, Maharashtra, India

Abstract

The 21st century has witnessed a slow but sure incorporation of lingual orthodontic protocols into the orthodontic mainstream. Extraction mechanics with lingual orthodontic appliance poses challenges to even the most experienced clinician. This article is a case series of three cases treated by extraction mechanics in a detailed and sequential manner.

Key words: Extraction mechanics, lingual orthodontics, troubleshoot in lingual orthodontics

INTRODUCTION

Customization has been one of the biggest cited challenges in lingual orthodontics.^[1,2] The appliances that we use today have essentially two options for the clinician. The first one is to use stock brackets, which can have the base, customized but composite using various techniques described for the same.^[3-7] The second option is to use computer-aided design and manufacturing technology for appliance fabrication.^[1,2,8]

While the discussion in lingual orthodontic protocols has centered around slot configuration, slot geometry, method of customization, accuracy of transfer, and bonding procedures, a factor often overlooked is the basic biomechanical consideration that is different with the lingual appliance. The best method of appliance

fabrications can have limited efficacy if this aspect is overlooked.^[9-11]

The case series described in this article demonstrates the effects of efficient mechanics and describes in detail, the solutions for troubleshooting procedures that are critical to success during extraction mechanotherapy with lingual orthodontic appliances.

CASE REPORTS

Case 1

A 25-year-old male patient presented with the chief complaint of dental protrusion. Clinical examination revealed a Class I malocclusion with bimaxillary dental protrusion. The upper arch showed relatively well-aligned teeth, and the lower arch presented with mild crowding in the anterior region.

The dental and facial midlines were coinciding [Figure 1a-g]. The cephalometric readings showed a Skeletal Class II base with a retrognathic mandible and chin. The upper and lower anterior teeth were severely proclined [Figure 2a and b].

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Hegde TM, Doshi V. Extraction mechanics in lingual orthodontics: Challenges and solutions. APOS Trends Orthod 2016;6:99-104.

Access this article online	
Quick Response Code:	Website: www.apospublications.com
	DOI: 10.4103/2321-1407.177963

Address for Correspondence:

Dr. Tushar M. Hegde, Welcare Dental Clinic, 201, Above Tata Star Bazaar, Andheri New Link Road, Andheri West, Mumbai - 400 066, Maharashtra, India.
E-mail: drtusharhegde@rediffmail.com

Treatment plan

The treatment plan was to do a camouflage treatment with extraction of the first bicuspid. The appliance of choice was a 0.018" slot seventh generation lingual appliance (Ormco). The setup was done using HIRO technique. It was a moderate anchorage case.

Treatment progress

Seventh generation lingual brackets (Ormco) were bonded using individual resin trays. Initial leveling and aligning was started with 0.014" NiTi in both arches. After 12 weeks of leveling with 0.014" NiTi and 0.016" SS, upper and lower 0.016" x 0.022" stainless steel archwires were placed to carry out an anterior retraction. After 8 months retraction, upper and lower extraction spaces were closed [Figure 3a and b]. The final detailing of the occlusion was accomplished using 0.017" x 0.025" individual titanium molybdenum alloy (TMA) archwires for torque expression. Total active treatment time was 16 months [Figure 4a-f].

Troubleshooting mechanics needed in this case

After 6 months of retraction, 1 mm of the extraction space was yet to be closed. There was a bunching up of the gingiva that was not allowing the extraction space to close in between the canine and the second premolar. To increase the retraction force, two composite buttons were bonded labially on the canine and the first molar along with the lingually applied retraction force [Figure 5a and b]. The remnant extraction space closed in 6 weeks. For achieving bodily movement of the upper incisors, along with increased built in torque in the laboratory setup, the elastomeric chain was activated every 8 weeks to get the resultant force close to the Cres of the upper incisors.

Case 2

A 25-year-old female patient presented with the chief complaint of dental protrusion. Clinical examination revealed that there was Class I malocclusion with bimaxillary dental protrusion. The upper and the lower arch showed moderate crowding in the anterior region. The dental and facial midlines coincided. Extraoral examination revealed that the patient had a straight profile with a normodivergent facial pattern [Figure 6a-f]. The cephalometric readings showed a Skeletal Class I base with a prominent mandible and chin. The upper and lower anterior were mildly proclined.

Treatment plan

The treatment plan was to maintain the straight profile without any change in the lip position and extract all the second bicuspid. The case was treated using 0.018" slot seventh generation bracket system (Ormco), with the setup done using Bonding with Equal Specific Thickness technique using the Torque angulation device and the

Bracket positioning device. The case was considered a moderate anchorage case.



Figure 1: (a-g) Pretreatment extraoral and intraoral photographs

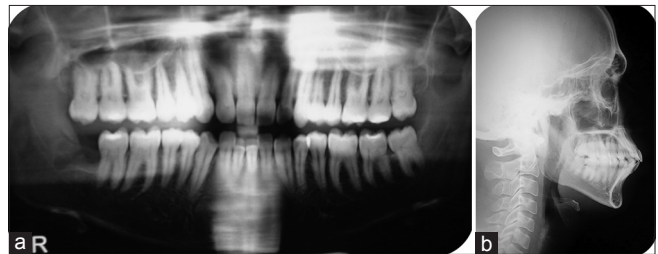


Figure 2: (a and b) Pretreatment radiographs

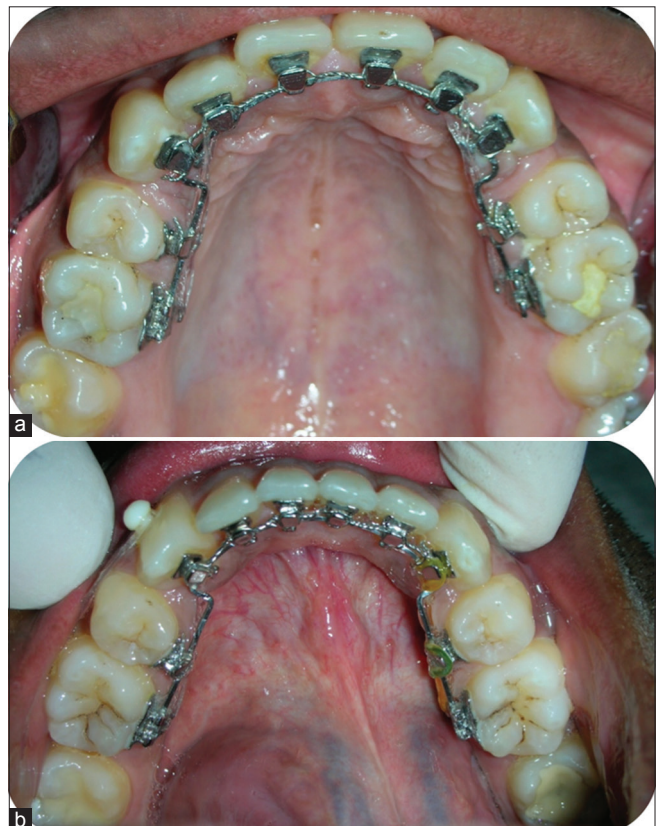


Figure 3: (a and b) Anterior retraction intraoral photographs

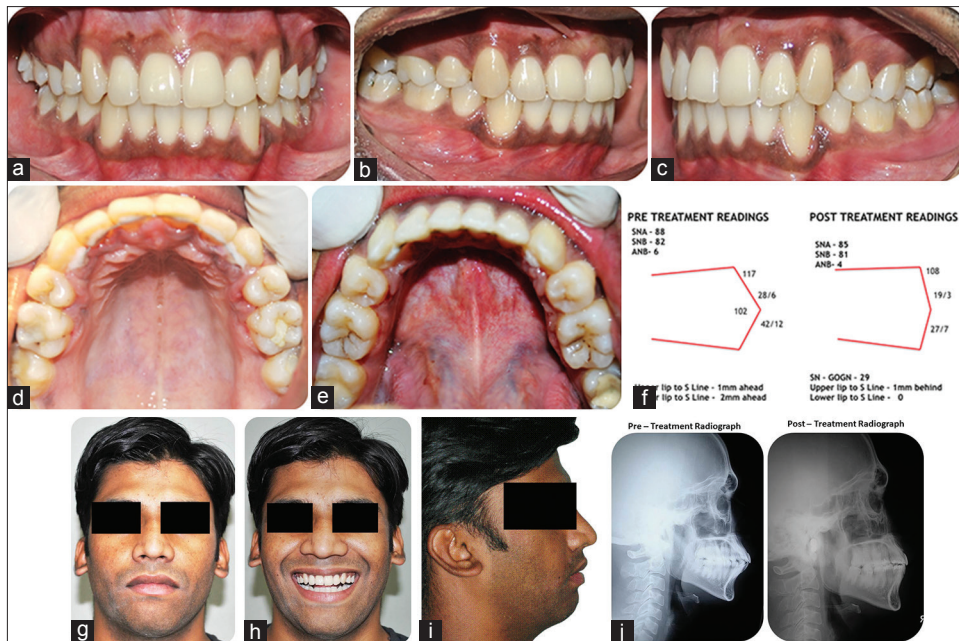


Figure 4: (a-j) Post treatment Extraoral, Intraoral Photographs and Radiograph



Figure 5: (a and b) Troubleshoot mechanics

Treatment progress

Seventh generation lingual brackets (Ormco) were bonded using transparent Memosil-2 trays. Initial leveling and aligning was started with 0.014" NiTi in both arches. After 24 weeks of leveling with 0.014" NiTi and 0.016" SS,



Figure 6: (a-f) Pretreatment extraoral and intraoral photographs

upper and lower 0.016" × 0.022" stainless steel archwires were placed to carry out an anterior retraction [Figure 7]. After 6 months of retraction, upper and lower extraction spaces were closed. The final detailing of the occlusion was accomplished using 0.017" × 0.025" individual TMA archwires for torque expression [Figure 8a-e]. Total active treatment time was 17 months.

Enhanced biomechanical considerations

As the second bicuspids were extracted, to reinforce anchorage, molar tubes were bonded on the upper and the lower first and second molars buccally, and a 0.017" × 0.025" stainless steel archwire was placed to enhance the anchorage consideration. Apart from this, applying elastomeric chain from the lateral incisor bracket to the first molar tube carried out upper anterior *en masse* retraction. There were various advantages; primarily, perimeter on the lingual side

is approximately 40% smaller stretch on elastomeric chain due to which the forces are reduced. Second, the distance from the canine to the molar is more on the buccal side than on the lingual side; hence, retraction from lateral incisor to the molar increases the distance for more effective and efficient retraction [Figure 9a-c].

Case 3

A 39-year-old female patient presented with the chief complaint of dental protrusion. Clinical examination



Figure 7: Anterior retraction intraoral photograph

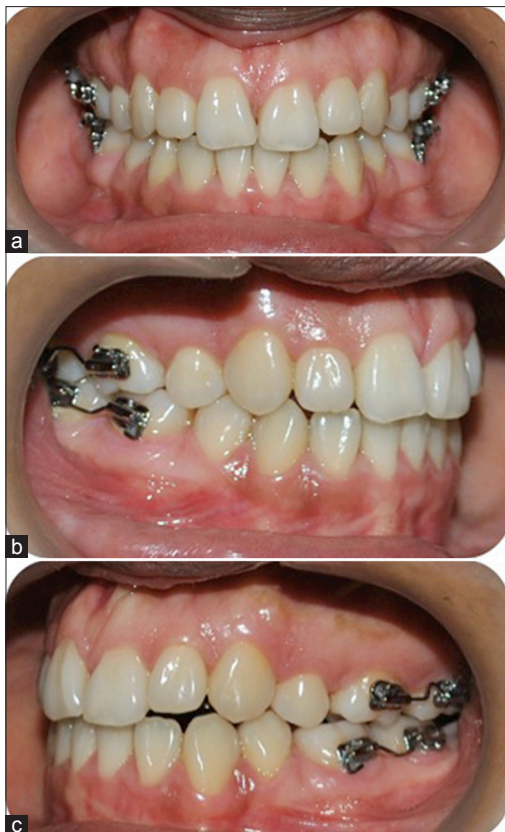


Figure 9: (a-c) Enhanced biomechanical consideration photographs

revealed that there was Class I malocclusion with bimaxillary dental protrusion [Figure 10a-f]. The cephalometric readings showed a Skeletal Class I base. Radiographic evaluations confirmed a generalized gingival recession and poor periodontal condition with bone loss [Figure 11a and b].

Treatment plan

The treatment plan was to maintain the straight profile without any change in the lip position and extract all the first bicusps. The case was treated using a Dentos ORJ anterior 0.018” slot and posterior 0.022” slot bracket in the upper arch. Lower arch was bonded labially with Dentaurem equilibrium mini 0.018” Roth slot brackets with 0.022” slot molar tube.

Treatment progress

Dentos ORJ anterior 0.018” slot and posterior 0.022” slot brackets were bonded in the upper arch using individual resin trays. Initial leveling and aligning was started with 0.014” NiTi in both arches. After 16 weeks of leveling with 0.014” NiTi and 0.016” SS, upper and lower

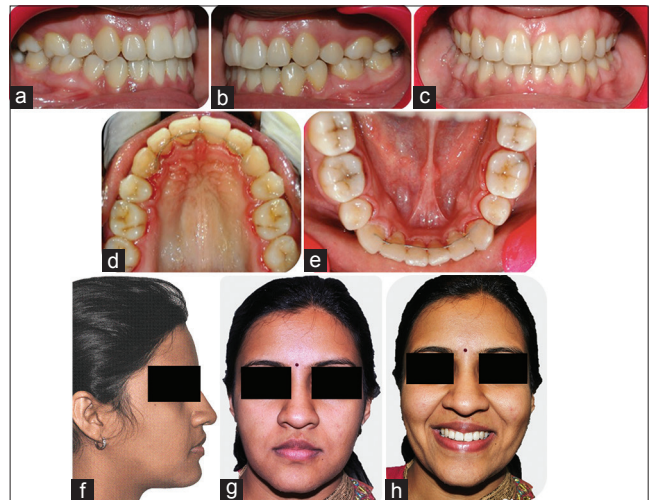


Figure 8: (a-h) Post treatment Extraoral and Intraoral Photographs



Figure 10: (a-f) Pretreatment extraoral and intraoral photographs

0.018" × 0.025" stainless steel archwires were placed to carry out an anterior retraction. After 6 months retraction, upper and lower extraction spaces were closed. The final detailing of the occlusion was accomplished using 0.017" × 0.025" individual TMA archwires for torque expression [Figure 12a-h]. Total active treatment time was 17 months.

Troubleshooting mechanics needed in this case

In the upper arch, consolidation was different and the retraction force was applied from canine to the second premolar [Figure 13]. Anterior consolidation was done with a 0.008" steel ligature wire Spanish tie to allow the patient to maintain proper oral hygiene. The lower arch was bonded labially as there was generalized gingival recession and poor periodontal condition with bone loss. In such cases where periodontal health is compromised, it is advised to use full

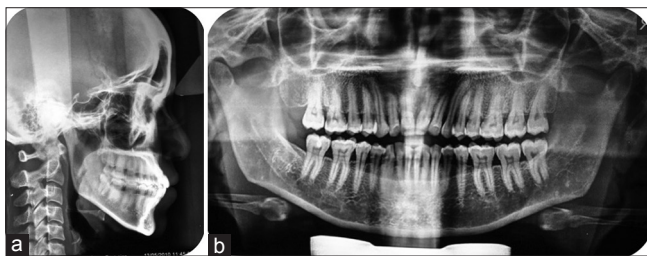


Figure 11: (a and b) Pretreatment radiographs

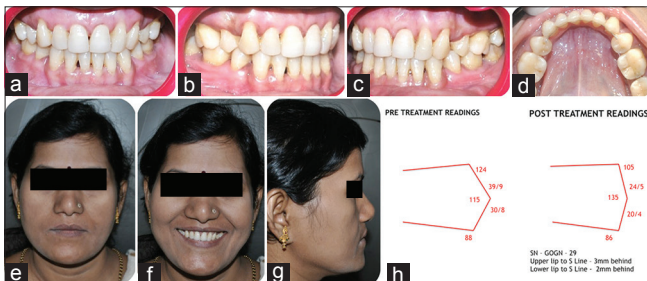


Figure 12: (a-h) Post treatment extra oral and intra oral photographs



Figure 13: Troubleshoot mechanics

size TMA wire as compared to a stainless steel wire during retraction because of the decreased inter bracket distance. Also it be noted is the use of bidimensional bracket system using an 0.018" slot for the anteriors and 0.022" slot for the posteriors which gives us the advantage of using a full size arch wire accounting to better torque control and efficient sliding mechanics during retraction. As there was a periodontal compromise and reduced bone height, the intrusive vector naturally occurring with a lingual appliance had to be controlled by incorporating a reverse curve of Spee in a 0.016" × 0.022" steel wire and a very light Class I elastic force.

CONCLUSION

The aim of this article was to emphasize and drive home the importance of deliberating and planning mechanics in lingual orthodontic maneuvers. The over the counter lingual appliances available in the market today have to a large extent streamlined procedures in lingual orthodontics. The training to use these appliances involves short day or 2 days courses that focus on bonding and ligation only. Mechanics and Plan B's are rarely deliberated or taught. Biomechanics will be integral to orthodontics, irrespective of the appliance. The three cases were treated with different appliance prescriptions and customization protocols but still ended as per acceptable clinical standards and norms. The reason: Not only were the appliance customized but also were the biomechanics!

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Wilson L, Vaid N. Incognito™ lite lingual orthodontic appliance: Enhancing the scope of targeted mechanics with customized computer-aided design/computer-aided manufacturing therapy. *APOS Trends Orthod* 2015;5:122-3.
2. Kothari J. Excellence in lingual orthodontics: Its challenges and solutions – The iLingual three-dimensional low-profile tandem slot. *APOS Trends Orthod* 2015;5:275-88.
3. Alexander CM, Alexander RG, Sinclair PM. Lingual orthodontics: A

- status report. Part 6. Patient and practice management. *J Clin Orthod* 1983;17:240-6.
4. Creekmore T. Lingual orthodontics – Its renaissance. *Am J Orthod Dentofacial Orthop* 1989;96:120-37.
 5. Hiro T, Takemoto K. Resin core indirect bonding system – Improvement of lingual orthodontic treatment. *J Jpn Orthod Soc* 1998;57:83-91.
 6. Fujita K. New orthodontic treatment with lingual bracket mushroom arch wire appliance. *Am J Orthod* 1979;76:657-75.
 7. Fillion D. Lingual orthodontics: Clinical reflections. *Rev Orthop Dento Faciale* 1990;24:475-98.
 8. Wei L, Pang KK, Wong UT, Doshi V. Mini-screws, a viable adjunct along with incognito lingual appliance: A case series. *APOS Trends Orthod* 2015;5:275-8.
 9. Venkatesh S, Rozario J, Ganeshkar SV, Ajmera S. Comparative evaluation of sagittal anchorage loss in lingual and labial appliances during space closure: A pilot study. *APOS Trends Orthod* 2015;1:33-7.
 10. Takemoto K. Anchorage control in lingual orthodontics. In: Romano R, editor. *Lingual Orthodontics*. Hamilton, Canada: BC Decker; 1998. p.75-82.
 11. Geron S, Vardimon A. Anchorage keys in lingual orthodontics: Sliding mechanics. *J Orthod* 2003;4:258-65.