Mandibular Incisor Extraction – A Viable and Efficient Treatment

Bhavna Singh, Rajiv Ahluwalia

Abstract
Mandibular incisor extraction is a treatment approach that has often been criticized for resulting in compromised anterior occlusion. This paper reports the management of a 12-year-old patient with Class I buccal occlusion, nearly edge to edge anterior occlusion, highly placed upper canines and rotated mandibular right lateral incisor with the extraction of a mandibular central incisor.

Key Words: Mandibular incisor; extraction

Introduction
The development of orthodontics has brought the realization that in order to achieve a normal occlusion tooth extraction. In view of this fact, sometimes lower incisor extraction may be considered an alternative treatment for malocclusions that do not fit the conventional forms of extraction to ensure greater stability in the long term. This paper reports the management of a 12-year-old patient with Class I buccal occlusion, nearly edge to edge anterior occlusion, highly placed upper canines and rotated mandibular right lateral incisor with the extraction of a mandibular central incisor.

Case Report
A 12 year old male patient presented with the chief complaint of irregular arrangement and large size of his front teeth. There was no significant dental or medical history. He had a pleasing, straight profile, normal naso-labial and mento-labial sulci and competent lips. Intraoral examination showed a Class I buccal occlusion, nearly edge to edge anterior occlusion, highly placed upper canines and rotated mandibular right lateral incisor (Figure 1a,b,c, 2a,b). Cephalometric evaluation revealed a Class I skeletal base, normal growth pattern and normal inclination of upper / lower dento-alveolar segments. Discrepancy analysis showed a space requirement of 3.5 mm in upper arch and 4.5 mm in lower arch. Bolton's analysis revealed a 3.5 mm mandibular anterior tooth material excess. The patient was diagnosed as Angle’s Class I type 1 malocclusion. Treatment objectives includes a) correction of crowding, b) improvement of smile, c) establishing Class I canine relation, d) establishing adequate overjet and overbite and maintaining class I buccal occlusion.

The alternative treatments include a) non-extraction: which could result in proclination of maxillary / mandibular anteriors. A 3.5 mm mandibular anterior tooth material excess would make it difficult to establish adequate overjet/overbite and result in an edge to edge incisor relation, b) interproximal reduction, i.e., reduction of tooth material from mandibular anteriors would help establish adequate incisor overjet. However, significant amount of interproximal reduction will be needed which would jeopardize the mesio-distal width of incisors and render them increasingly prone to caries at such a young age, c) Premolar extraction: this approach is not justified as the patient has a pleasing soft tissue profile and the space requirement does not warrant premolar extraction. Extraction treatment would result in flattening of profile and dished in face, d) mandibular incisor extraction: this approach is most appropriate for the patient, as both the space requirement in mandibular arch (4.5 mm) as well as the Bolton’s discrepancy supports the same. The resultant reversal of Bolton’s discrepancy (as the width of tooth to be removed will be more than the existing Bolton mandibular excess) can be corrected by some interproximal reduction in upper arch, which would also address the patients other chief complaint of large tooth size.

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Figure 1a,b,c. Pre-treatment intraoral photographs, Figure 2a,b. Pre-treatment occlusal photographs, Figure 3. Piggy back wire used for alignment of blocked out canine, Figure 4a,b,c. Post-treatment intraoral photographs Figure 5a,b. Post-treatment occlusal photographs
Treatment Done: MBT 0.022 slot pre-adjusted appliance was bonded and mandibular right lateral incisor was extracted. Removable posterior bite plate was given to disocclude the anterior and allow correction of cross bite of maxillary right lateral incisor. Alignment was started using 0.016 NiTi in both arches, followed by 0.016 × 0.022 NiTi and 0.017 × 0.025 stainless steel and 0.019 × 0.025 stainless steel arch wires. During alignment stage, existing space in maxillary canine region was maintained using a sleeve. On 0.019 × 0.025 stainless steel, an open coil spring was placed bilaterally, between maxillary lateral incisor and 1st premolar to gain required space for canines. Following this a 0.012 NiTi was attached in piggy back fashion on the 0.019 × 0.025 stainless steel to bring the canines into the arch (Figure 3). In the mandibular arch, the space obtained by incisor extraction was closed during alignment of the remaining incisors. After alignment of both arches the over jet was slightly increased. At this stage, as planned before treatment, mild proximal reduction of maxillary incisors was done to correct the height-width ratio of the central incisors as well as reduce the over jet, for establishment of satisfactory anterior occlusion. After 1 month of passive stabilization on 0.019 × 0.025 stainless steel, the buccal segment wire was sectioned and removed for settling. The case was deboned after 13 months of active treatment and lingual retainers were bonded. Thirteen months of active treatment resulted in correction of tooth-size discrepancies in both arches and improved smile aesthetics (Figure 4a,b, c, 5a,b). Class I canine relationship and good posterior intercuspaton were established. The over jet and overbite were improved. The centre of the lower left central incisor became the new mandibular dental midline. The dentition and the periodontal tissues remained healthy during treatment.

Discussion
Treatment by extraction of one single mandibular incisor is not popular in the orthodontic profession despite the apparent advantages of the extraction in the region of crowding. It has been often stigmatized as an expedient that may adversely affect the occlusion, soft tissue and aesthetics.3,7 However, when properly used, incisor extraction is only one aspect of the total correction of the malocclusion. Failure to observe this will fulfill the negative predictions. This middle of the road approach is indicated in carefully selected cases, especially where facial esthetics and space requirement do not call for greater tooth movements. Prior to choosing the most favourable treatment option it is important to analyze patient needs, treatment requirements, goals and stability, the final occlusion to be achieved and the esthetic conditions that constitute a case. Literature suggests that this method affords improved post treatment stability compared to premolar extraction.2,8,9 Careful diagnosis established with the aid of a diagnostic setup, professional skills and clinical experience are instrumental in achieving successful orthodontic results with this treatment.

Indications / Case Selection Criteria10-14

1. Angle Class I malocclusion with moderate to severe anterior tooth size discrepancy greater than 4.5 mm due to,14
   a. Agenesis, deficient mesiodistal diameter of upper incisors or peg shaped lateral incisors or, conversely,
   b. Excessive mesiodistal diameter of the mandibular incisors.
2. Deep bite:- as further bite deepening is seen with closure of incisor extraction space.
3. An existing Bolton discrepancy between the upper/lower anterior segments greater than 4.5 to 5mm.11
4. Class I relationship with adequate posterior intercuspaton, acceptable facial aesthetics and absence of skeletal discrepancy.
5. Permanent dentition with minimal remaining growth potential.
6. A harmonious soft-tissue profile.
7. Patients with mild to moderate Class III malocclusion with relatively small crowding and anterior cross bite or incisors with edge-to-edge relationship, showing a tendency towards anterior open bite.11
8. Class II Division 1 skeletal and dental malocclusions with maxillary protrusion and crowding or protrusion of the lower incisors. Typically, lower incisor extraction in such cases should be accompanied by the extraction of maxillary premolars while keeping the Class II molar relationship but establishing normal canine occlusion.13
9. Malocclusions with a malformed or severely compromised periodontal status of mandibular incisor, whose maintenance would not provide any benefit whatsoever in view of the stability of the dentition as a whole in such situations removal of the compromised tooth give better long term benefits.1,10
10. Minimal-to-moderate overbite.

Contraindications
1. Increased Over jet:- is a contraindication as mandibular incisor extraction would most often lead to further increase of over jet.
2. Deep bite:- as further bite deepening is seen with closure of incisor extraction space.
3. No existing anterior Bolton discrepancy / anterior mandibular excess:- incisor extraction would create a mandibular deficient and thus difficult to obtain an ideal anterior occlusion.
4. Less than 3mm space requirement: better managed by interproximal reduction rather than removal of incisor.
5. Incisors with triangular form:- will lead to creation of triangular dark spaces on space closure.
6. Adult patient with mandibular anterior crowding: increased mandibular incisor display on smiling with age. Thus, better to manage by proximal reduction and maintain mandibular midline. Incisor extraction would lead to deviated midline which will be unesthetic.

7. High insertion of the lower labial frenum: may cause gingival recession in the remaining incisor to be moved to the frenum area.15

Precautions

1. Space closure should be done on rectangular wire to avoid undue tipping of incisors and creation of black triangles.16

2. Which incisor to extract: Type of malocclusion and periodontal tissue health may influence the choice of the tooth to be extracted. Extraction of a lateral incisor is generally preferred because it is less visible from the front, but the incisor that is closest to the crowding, farthest outside the natural arch, severely rotated or ankylosed is usually the best candidate for extraction. Extraction of the worst positioned incisor is a means to prevent relapse by limiting the unnecessary movement of many teeth.17

3. A Diagnostic setup is strongly recommended before considering this treatment approach. Kokich, Shapiro and Tuverson summarized the importance of the setup as one of the most valuable orthodontic records to determine if a lower incisor requires extraction. It is the most accurate method to predict potential interocclusal relations to be accomplished through orthodontic treatment, and it would be reckless to start treatment without first reviewing the overjet and overbite that would result from such procedure. It should be emphasized that if overjet is excessive or buccal occlusion is unacceptable in the setup, stripping the upper arch can be considered, within acceptable limits. If the occlusal outcome remains dissatisfaction, then probably the extraction of an incisor should not be the treatment of choice.2, 15, 17

Mandibular incisor extraction is a treatment approach that has often been criticized for resulting in compromised anterior occlusion. However, what lies beneath such unacceptable results is faulty case selection. Erratic extraction of mandibular incisor without due consideration to the specific guidelines often does produce less than acceptable orthodontic results. What remains the most important aspect for planning this approach is a thorough and clear consideration of individual case needs. Correct diagnosis and accurate case selection as outlined above, results in aesthetically pleasing and acceptable results for both the patient and orthodontist. The case described here, typically exemplifies one such situation where incisor extraction was the most appropriate treatment approach.

Conclusion

In conclusion, lower incisor extraction can be regarded as a valuable option in the pursuit of excellence in orthodontic results in terms of function, aesthetics and stability for appropriately selected cases, based on specific indications and individual treatment needs, coupled with sound treatment mechanics.

Authors Affiliations

1. Bhavna Singh MDS, Senior Lecturer, Department of Orthodontics, Faculty of Dental Sciences, C.S.M.M.U., Lucknow, 2. Rajiv Ahluwalia MDS, Professor and Head of Department, Department of Orthodontics, Santosh Dental College and Hospital, Santosh University, Ghaziabad, U.P, India.

References


**Address for Correspondence**

Dr. Bhavna Singh, MDS,  
Senior Lecturer,  
Dept. of Orthodontics,  
Faculty of Dental Sciences,  
C.S.M.M.U., Lucknow, UP, India.  
Email:sweet.bhavnasingh@gmail.com

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