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Atypical Therapeutic Extraction in Orthodontics (Mandibular Incisor Extraction): A case report

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Abstract

Extraction versus non-extraction debate has been a major controversy in orthodontics and it is still continuing since Angle era. Extraction of premolar teeth is the conventional treatment of choice for the management of class I malocclusion cases but in border line cases, orthodontists find difficulty in making a decision particularly in cases with good facial esthetics. However class I malocclusion with arch length tooth tissue discrepancy can be managed with the extraction of a lower incisor tooth. This would produce a more acceptable aesthetic outcome. Lower incisor extraction becomes a therapeutic alternative to premolar extractions in cases of lower anterior crowding and cases with well occluded posterior teeth.

Keywords: Crowding, Mandibular incisor extraction, Orthodontic treatment, Bolton discrepancy, Class I malocclusion.

Introduction

Extraction in orthodontics is a therapeutic procedure of gaining space. It is done to create space to relieve the crowding, to reduce the anterior teeth proclination, and to reduce the anterior overjet and overbite. It is also undertaken for leveling of the curve of spee, correction of the gross midline shift, and correction of the molar relation and canine relation. The first premolar or second premolar teeth are most commonly extracted for orthodontic treatment. In case of borderline space discrepancy, extraction of premolar can create more space than required amount.[1,2,3]

In such cases of borderline space discrepancy especially in mandibular arch, a better option is to follow an atypical therapeutic extraction *i.e.* extracting one or two mandibular incisors. Conventional extractions of first or second premolars are sometimes not able to fulfill the objectives required in such cases. Therefore, atypical extractions of other teeth is carried out, for instance mandibular incisors may be employed to meet the treatment objectives. Therefore, diagnostic setup is necessary which reveals the post-treatment occlusal possibilities and hence it is the most important step in the diagnosis and treatment planning in orthodontics. Extraction of lower incisors would be a better treatment option in anterior Bolton's discrepancy cases.[4,5]

Diagnostic indications for single lower incisor extractions:

- Dental Class I molar relationship.
- Moderate crowding in lower incisors.
- Mild or no crowding in the upper arch.
- Abnormalities in the number of anterior teeth.
- Ectopic eruption of incisors.
- Lower incisors with loss of gingival tissue.
- Good buccal interdigitation in l maxillary dentition.
- Soft-tissue profile must be acceptable.
- Growth potential must be minimal.
- A tooth-size-arch-length discrepancy of more than 5mm in the anterior region such as missing lateral incisors or peg laterals.[6,7,8]

In any such case, a full diagnostic setup should be made to obtain acceptable occlusal results.[9]

One prerequisite for therapeutic extraction of mandibular incisor is that the lower anterior tooth material should be more in proportion to maxillary anterior tooth material *i.e.* Bolton's tooth ratio.[10]

Advantages of Extraction of Lower Incisor:

- Fewer teeth are sacrificed as extraction of one incisor is undertaken rather than 4 premolars.
- Reduced treatment time with fixed appliances. The tooth movement needed is minimal.
- Lower incisor extraction is a compromise solution for adults who need a relatively fast outcome.
- No negative consequences on soft-tissue profile as anteroposterior position of mandibular incisors remain unchanged.
- Stable result is likely to occur in the anterior region, as arch expansion is not required and there is minimum alteration of intercanine width.[8,9,10,11]

Disadvantages of Extraction of Lower Incisor:

- Acceptable esthetic result but the occlusion is not always a perfect one.
- Lower midline discrepancy is evident.
- Possible increase of the overbite and overjet beyond acceptable limits.
- Re-opening of the space.
- Partially unsatisfactory posterior occlusion.
- Relapse of crowding in the remaining three incisors.
- Loss of the interdental gingival papillae in the lower anterior region
- Formation of a black triangle due to papillary defect between lower incisors.[12,13,14,15]

Consideration on which incisor teeth need to extract

It depends on several considerations, including:

- Periodontal condition of the dentition.
- The presence of gingival recession
- Presence of endodontic treated tooth.
- Also, measurement of the mesiodistal width of each incisor should be done and the needed amount of tooth movement is calculated by the Bolton analysis. The central incisors tend to be smaller than the lateral incisors in mandible.
- Since lateral incisor is less visible from the front view, extraction of a lateral incisor is generally preferred but the best candidate for extraction is that incisor which is farthest outside the natural arch and closest to the area of crowding.
- Class, Class III malocclusions and mild open-bite cases are preferred for single incisor extractions.
- Mandibular incisor extraction may also be undertaken in congenitally missing maxillary lateral incisors cases and in cases with significant amount of mandibular anterior crowding.
- Mandibular incisor extraction is contraindicated in a Class II patient, as it would result in a significant increase in overjet.[5,9,11,15]

Case Report

This case report illustrates class I malocclusion case treated with lower incisor extraction. A 14-year-old girl, reported with a chief complaint of forwardly placed upper anterior teeth and crowding in lower anterior teeth. She had a mild convex pleasing facial profile with competent lips (Fig. 1a). Intraoral examination revealed a mild crowding in maxillary anterior region and a moderate crowding in the mandibular anterior region and Angle's Class I molar relation and canine relation bilaterally. (Fig. 1b, 1c, 1d, 1e, 1f). It was decided to treat her with extraction of one lower incisor *i.e.* mandibular left central incisor.

Fig. 1a: Pretreatment Extra-oral photo

Fig. 1b: Pretreatment Intra-oral photo (Front view)

Fig. 1c: Pretreatment Intra-oral photo (Right side view)

Fig. 1d: Pretreatment Intra-oral photo (Left side view)

Fig. 1e: Pretreatment Intra-oral photo (Maxillary occlusal view)

Fig. 1f: Pretreatment Intra-oral photo (Mandibular occlusal view)

Treatment Objectives: The objective was to relieve upper and lower crowding in anterior region without much disturbance of her facial profile. Extraction of mandibular left central incisor was planned to facilitate proper aligning of lateral incisor and canine. This would help in gaining space to relieve lower anterior crowding. Prior to start of orthodontic treatment, periodontal maintenance was carried out in form of scaling and then, extraction of incisor was done.

Treatment Plan: Lower incisor extraction was planned because of minimal space requirement. Blocked out lower incisor extraction will help in correction in lower arch. Upper space requirement was minimal.

Treatment Progress: The patient was referred for the extraction of lower central incisor (31). The orthodontic treatment was started using MBT 0.022 slot brackets. Initial leveling and aligning was done with round nickel-titanium archwires.0.014 inch NiTi preformed arch wire was used as initial wire to exert very light forces (Fig. 2a, 2b, 2c). After leveling and aligning, 0.019"×0.025" stainless steel was placed in the upper and lower arch for torque expression and closure of spaces, space closure was started with very light forces using tie backs. Settling of occlusion was done with 0.016" stainless steel wire.

Fig. 2a: Intra-oral photo with bonded attachments (Front view)

Fig. 2b: Intra-oral photo with bonded attachments (Maxillary occlusal view)

Fig. 2c: Intra-oral photo with bonded attachments (Mandibular occlusal view)

Treatment Results

Post-treatment facial photographs showed little change in facial profile. Her treatment resulted in good facial profile with alignment and leveling with no crowding in upper and lower arch (Fig. 3a, 3b, 3c). The Class I molar and canine relationship was maintained, and the mandibular spaces were closed completely. The good overjet and overbite were achieved and good alignment was done in both arches, with the upper midline centered on the middle of the lower incisors (Fig. 4a, 4b, 4c, 4d, 4e).

The total duration of orthodontic treatment undertaken was 16 months. After the removal of appliance, bonded lingual retainers were bonded as part of permanent retention of upper and lower arches.

Fig. 3a: Post-treatment Extra-oral photo (Rest view)

Fig: 3b: Post-treatment Extra-oral photo (Smile view)

Fig. 3c: Post-treatment Extra-oral photo (Profile view)

Fig. 4a: Post-treatment Intra-oral photo (Front view)

Fig. 4b: Post-treatment Intra-oral photo (Right side view)

Fig. 4c: Post-treatment Intra-oral photo (Left side view)

Fig. 4d: Post-treatment Intra-oral photo (Maxillary occlusal view)

Fig. 4e: Post-treatment Intra-oral photo (Mandibular occlusal view)

Discussion

Arch length-tooth material discrepancy helps in evaluation of the amount of space required for correction

of crowding, leveling of curve of spee and inclination of lower incisors. Anterior Bolton's discrepancy of more than 83 mm can be a definite case for lower incisor extraction. Extraction decision should be taken to produce harmony between the upper and lower arches without any deficient or excess space left.[4,5]

The above discussed case revealed the clinical effectiveness of one incisor extraction but it is carried out in properly selected cases. Advantages of mandibular incisor extraction treatment are: reduced treatment time, fasten treatment outcome, long term stability in the mandibular anterior area and maintenance of soft-tissue profile.

During the preliminary diagnosis of this patient, an accurate tooth-size analysis was made. The tooth-size analysis revealed a 1.7 mm mandibular anterior tooth size excess. The mandibular central incisors measured 5.4 mm mesiodistally. The extraction of lower left central incisor was planned which was the most proclined tooth in the lower anterior region. This case presented with Boltons anterior mandibular excess and showed space requirement of 5.5 mm. Although proximal stripping can be an alternative for gaining of space but incisor extraction was planned to achieve more acceptable results. Use of simple mechanics with control in torque and monitoring of axial inclinations of mandibular teeth was done to prevent lingual tilting of the mandibular canine crowns and unwanted narrowing of the inter-canine width.[8,9,10]

Extraction of one incisor in cases of moderate to severe crowding may even satisfy the requirement of maintaining the arch form and width without expansion of the inter-canine width. Long term retention is essential to allow for periodontal adaptation which enhances post-retention stability; hence fixed bonded retainers were given in both the arches in this case. However, all cases may not consider this treatment modality, a proper case selection and careful planning is required before going for lower incisor teeth extraction.[15,16]

Conclusion

Mandibular incisor extraction can be an effective treatment option not in all cases but in borderline cases especially in cases with mild crowding in lower arch. In patients with moderate crowding and with less mandibular tooth material excess, interproximal reduction may be a better treatment option. Minimal alteration of mandibular arch form and minimal alteration of intercanine width is a key for success and stable results.

Selection of the best treatment option is often difficult and not all factors can be achieved, but a proper case selection and proper planning on which tooth need to be extract can substantiate extraction of mandibular incisor a therapeutic extraction option in severe lower anterior crowded cases. A systematic treatment approach integrated with simple mechanics and torque control can help in achievement of a stable occlusion that is aesthetic and in sync with functional harmony and all this can be achieved with minimal orthodontic intervention.

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