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Wilson Quad Helix Expansion & Uncommon Extraction of Mandibular Incisor: A Case Report

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ABSTRACT

The most important question to the clinician is whether it is warranted to extract a single lower incisor in borderline cases. In the present case report, in order to resolve the minor crowding, a lingually placed lower incisor has been extracted and also the soft tissue profile was maintained. Lower incisor extraction is indicated in the carefully selected cases, especially where space requirement do not call for greater dento-alveolar movement.

Keywords: Quad Helix, Lower incisor, Crowding, Cross Elastics, Asymmetric extraction.

INTRODUCTION

The decision to extract permanent teeth as aid in resolving arch length deficiencies presents a challenge to the orthodontist. Few patients are not ideal either for extraction or non extraction[1]. Hahn in 1942 advocated the removal of a mandibular incisor to close the extraction space and thus reduce the anterior crowding[2]. As pointed out by Kokich and Shapiro (1984), the deliberate extraction of a lower incisor in certain cases allows the orthodontist to improve occlusion and dental aesthetics[2].

Tooth-size and arch-length discrepancy, or arch crowding has traditionally been managed by means of first or second premolar extraction. First or second molar extraction is a less common approach. Incisor extraction is another alternative in the mandibular arch. In 1905, Jackson described a case in which two lower incisors were extracted at different times to relieve mandibular crowding[3]. According to Proffit, mandibular incisor extraction comprised 20% of all the orthodontic extraction cases in 1950s, but was rarely use thereafter.

Case report

A 14 years old female reported with the chief complaint of irregular teeth. The patient's past Medical and Dental history were not contributory. The patient presented with a Orthognathic facial profile, Incompetent lips, Average Mandibular Facial Height (fig. 1)

Intra oral examination revealed Angle's Class I molar relationship with mild crowing, constricted upper arch, overjet of 3mm, overbite of 3mm and lingually inclined lower first molars, and average curve of spee.

Carey's and Arch Perimeter analysis indicates a tooth size-arch length discrepancy of 0.4mm in the maxillary arch and 4mm in the mandibular arch. Bolton's analysis indicated mandibular anterior tooth material excess of 4mm.

The treatment objectives were to Eliminate crowding in Upper and Lower arches, Upper arch expansion, Uprighting the lower molars and maintaining the Overjet and Overbite, and the

acceptable facial profile. Considering the above treatment objectives, it was planned to extract the mandibular right lateral incisor, which would help resolve the lower anterior crowding while maintaining the patient's soft tissue profile.

Treatment objectives

- Expansion of upper arch
- Extraction of lower single incisor
- Correction of lingually inclined lower molars
- Maintaining the Class I molar relationship
- Achieving a competent lip closure

Treatment plan

- Expansion of upper arch with Quad helix.
- Extraction of 42
- Correction of lingually inclined lower molars with cross elastics.

Fig. 1: Pre treatment extra oral photos

Fig. 2: Pre treatment intra oral photos

Fig. 3: Quad Helix

Treatment progress

Initially Quad helix was given during the start of the treatment. Quad helix was activated once a month for a period of 4 months. Expansion took place in the upper arch after 4 months. 0.022-inch slot MBT brackets were bonded, 0.014 NiTi followed by 0.016 NiTi arch wires were given for aligning the upper and lower arches. After the alignment, the extraction of 42 was done, followed by 0.016 x 0.022 NiTi arch wires for 1 month. Later, 0.017 x 0.025 NiTi arch wires were given in Upper and Lower archers.

After placement of these arch wires Quad helix was removed, and Upper arch was consolidated. Lingual buttons were welded to 36 and 46 molar bands and Red cross-elastics were given for correction of lingually inclined molars (36 and 46) along with 0.016 Australian arch wires in Upper and Lower arches for a period of 2 months. After this period of 2 months, the lower molars were uprighted. Later on 0.017 x 0.025 NiTi wires placed in upper and lower arches followed by 0.017 x 0.025 SS wires which was followed by 0.019 x 0.025 SS archwires in upper and lower arches.

Wire sequences

- 0.014 NiTi
- 0.016 NiTi
- 0.016 x 0.022 NiTi
- 0.017 x 0.025 NiTi
- 0.016 Australian wires with cross elastics
- 0.017 x 0.025 NiTi
- 0.017 x 0.025 SS
- 0.019 x 0.025 SS

DISCUSSION

In 1905, Jackson was the first to advocate extraction of lower incisor to relieve crowding. Extraction of mandibular incisor is a logical alternative that may improve the dental occlusion and dental aesthetics, and may allow the stability in the mandibular anterior region. A careful case selection is necessary for an extraction of incisor. This patient reported with moderate overjet and overbite, lingually placed lower incisor, lingually inclined lower molars with acceptable soft tissue profile. Careful diagnosis is necessary to analyze the treatment goal and outcome.

Fig. 4: Mid treatment intra oral photos

Fig. 5: Post treatment intra oral photos with lingual retainers

Fig. 6: Post treatment extra oral photos

Patients who are suitable for single lower incisor extractions usually fit the following pattern[4]

Class I molar relationship; moderately crowded lower incisors; mild or no crowding in the upper arch; acceptable soft-tissue profile; minimal to moderate overbite and overjet; minimal growth potential; missing lateral incisors or peg laterals[4]; under development of premaxillary area, tendency for anterior relationship of mandible to cranial base, short ramus, obtuse gonial angle and long body of mandible[6].

Generally treating patients with extractions in both arches might have compromised the facial balance. Treating non-extraction would have produced gingival recession of the mandibular anterior. The extraction of a mandibular incisor capitalized on the advantages of both treatment approaches while minimizing disadvantages[1].

Factors to be considered regarding choice of extraction are[6]

Amount of tooth size and arch size deficiency; Amount of anterior tooth ratio; Periodontal conditions; and Upper and Lower midline relationships.

Approximately 80% of orthodontic patients need arch expansion in cases of narrow maxilla[7]

According to the literature, maxillary expansion can be done in two procedures. The first, Rapid Maxillary Expansion (RME), can be done by using an appliance that incorporates a screw, for example a Hass or Hyrax. The second is a slow maxillary expansion group which includes removable expansion plates, Porter W arch, and Quad Helix.

The Quad-Helix was developed in 1975 by Robert Murray Ricketts from Porter's "W" arch, adding four loops to the appliance, increasing the wire length on 40 to 50mm. The objective was to reduce the forces and better molar control[8]. Several authors have written that the Quad-Helix appliance can deliver sufficient forces to promote skeletal changes on maxillary bone in younger patients[9-18].

Some of the authors like Zachrisson in 1990 AJO, Hopkins in 1977 AJO, Fusher, Schwartz, Wits, Kokich and Shapiro also have studied the effects of incisor extractions.

CONCLUSION

Significant crowding case's may be reasonably treated by either premolar or incisor extraction, but a single incisor extraction might yield a more stable result. But this is not a recommendation to resolve all cases of mandibular crowding with mandibular incisor extraction. A thorough careful

case selection selection is a important criteria for deciding for the option of mandibular incisor extraction.

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