

Extraction in Orthodontics – An Overview

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Abstract:- Extraction for orthodontic treatment is not a new idea. John Hunter emphasized the use of extraction in orthodontics in his 1771 book *Natural History of the Teeth*. For many years, the extraction in orthodontics has been a subject of conflict. A significant number of extractions are done as part of a comprehensive treatment plan that involves the use of an appliance. The type of the malocclusion and the patient's age may be important factors in evaluating if extraction is required. To extract or not to extract has always been and will continue to be a source of debate in orthodontics. Teeth extraction as part of orthodontic therapy may be required in any of the following instances: Disparity in arch length and tooth material, Sagittal inter-arch relationship correction, Abnormal size and shape of teeth, Skeletal-jaw malrelations. Extractions in orthodontics include both interceptive extractions carried out during the mixed dentition phase and therapeutic extractions performed as a form of orthodontic treatment to gain space. Therapeutic extraction, Wilkinson extraction, balancing extraction, compensating extraction, serial extraction, phased extraction, enforced extraction, and atypical extraction are some of the extraction treatments employed in orthodontics.

Keywords:- Extraction, Therapeutic Extraction, Orthodontic Extractions, Factors Influencing, Guidelines.

I. INTRODUCTION

The key objective of orthodontic treatment is to reclaim the teeth's normal relationship with the facial structures. Angle emphasised the need of preserving all dental units in order to establish facial equilibrium ^[1,3]. However, soft tissue constraints that minimise the amount of orthodontic correction that may be undertaken, demanding extraction. For many years, disputes about whether to extract or not were typically tied to human opinions rather than scientific standards ^[1]. Extraction for orthodontic therapy is not a new concept. In his book *Natural History of the Teeth*, published in 1771, John Hunter acknowledged the function of extraction in orthodontics. For many years, the extraction in orthodontics has been a source of disagreement and controversy. The major extraction argument, which was founded on two schools of thought, one by Edward Angle and the other by Calvin Case, has become known as "The Extraction Debate of 1911." Angle believed in the notion of a complete complement of teeth, supporting non-extraction, whereas Calvin Case advocated for the prudent extraction of some teeth for long-term stability ^[2,3,4,5]. The majority of

extractions are performed as part of an intensive treatment plan that includes the use of an appliance. The nature of the malocclusion and the patient's age may be crucial variables in determining whether or not extraction is necessary. To extract or not to extract has always been and will always be a point of contention in orthodontics ^[5]. The primary objective of this article is to educate readers about the extraction technique in orthodontic treatment, as well as to give information on the various kinds of extraction and the factors that influence them.

II. DEFINITION

Extraction refers to the painless removal of a tooth from its socket. It is one of the most prevalent strategies of obtaining space in the arch.

III. FACTORS INFLUENCING THE DECISION TO EXTRACT

There are several circumstances which require tooth extraction for orthodontic treatment are: Increased tooth size in relation to the arch size (crowding), supernumeraries, hypodontia (if decided to close the space, may need extraction), carious teeth, increased overjet, open bite cases, impacted teeth, camouflage orthodontic treatment, correction of the buccal segment, malformed teeth, periodontally involved teeth, orthognathic surgery, cleft lip, and palate ^[1]. Different forms of malocclusions necessitate the extraction of particular teeth, and the choice to extract is influenced by the patient's medical history, attitude towards treatment, oral hygiene, caries rate, and tooth quality ^[1]. A detailed diagnostic approach and model analysis are required prior to extraction in order to calculate space needs. Teeth extraction as part of orthodontic therapy may be necessary in various kinds of situations ^[5].

A. Arch length-tooth material discrepancy:

The length of the arch and the size of the tooth material are both determined by genetics. Dentition size and arch length should be in harmonious balance. When tooth material is in excess for a particular arch length, it appears as crowding, impacted teeth, ectopic eruption, or anterior proclination. It is consequently required to reduce the tooth material in accordance to the length of the dental arch. In cases of significant tooth material-arch length disproportion, the principal way of reducing tooth material is extraction of one or more teeth ^[5].

B. Correction of sagittal inter-arch relationship:

Sagittal malrelationships, such as Class II or Class III malocclusion, may necessitate tooth extraction in one or both arches to restore normal sagittal inter-arch relationship. In such circumstances, tooth extraction aids in the restoration of normal incisor and molar relationships [5].

C. Abnormal size and form of teeth:

Individual tooth variance in size, shape, and form can be so uncommon that it may demand their extraction in order to establish proper occlusion. Mesiodens, peg laterals, macrodontia, dilaceration, unsymmetrical crown morphology, and any other supernumerary teeth are examples of such deformities, and their excision is essentially required [5].

D. Skeletal-jaw malrelations:

Orthognathic resective surgery necessitates the extraction of particular teeth in order to establish appropriate jaw alignment [5].

IV. VARIOUS EXTRACTION PROCEDURE IN ORTHODONTIC TREATMENT

The nature of the malocclusion and the patient's age may be key variables in determining whether or not to extract. The majority of extractions are done as part of an extensive treatment plan that includes the use of an appliance. Extractions in orthodontics comprise serial extractions executed as an interceptive process during the mixed dentition phase and therapeutic extractions performed as a form of treatment to gain space [5]. Various forms of orthodontic extraction are: Therapeutic extraction, Wilkinson extraction, Balancing extraction, Compensating extraction, Serial extraction, Phased extraction, Enforced extraction, atypical extraction [5].

A. Therapeutic extraction:

Therapeutic extraction is performed as part of a full-fledged comprehensive orthodontic therapy to gain space. A detailed diagnostic approach and model analysis are required prior to therapeutic extraction in order to calculate the required amount of space [5].

B. Wilkinson extraction:

Wilkinson put forward for the extraction of all four first permanent molars between the ages of 8½ and 9½ years due to their susceptibility to caries [5].

C. Balancing extraction:

The purposeful extraction of another tooth of the exact same purpose or any other tooth on the opposite side (quadrant) of the same arch following the extraction in the opposite quadrant is commonly referred to as balancing extraction [5].

D. Compensating extraction:

Compensating extraction is the removal of teeth that are in the opposing jaws. It is performed in order to maintain the buccal occlusion [5].

E. Serial extraction:

Serial extraction is an interceptive orthodontic method described as the precisely scheduled planned extractions of some deciduous and permanent teeth in mixed dentition situations with dentoalveolar disproportion [5].

F. Enforced extraction:

Extractions performed owing to compulsion induced by extensively weakened teeth, poor periodontal health, broken tooth, impacted tooth, tooth in line of a fracture, and so on are examples of these procedures [5].

G. Phased extraction:

These are extractions of several teeth performed in stages at different periods in distinct quadrants. This is done primarily to modify the molar relationship. Teeth are sometimes taken from only one arch or quadrant. Following this, the teeth in the corresponding quadrant or arch are extracted at a later time [5].

V. GUIDELINES FOR EXTRACTION IN VARIOUS MALOCCLUSION

A. EXTRACTION IN CLASS I MALOCCLUSION:

Treatment of class I with crowding has several different modalities: interproximal reduction (stripping), expansion, derotation, uprighting, distalization, and extraction. In cases of moderate to severe crowding in the labial segment, extraction of all first premolars is typically suggested so as to create sufficient space for crowding reduction. Extraction of all second premolars is usually indicated in grossly carious, largely filled, or periodontally compromised second premolars and first premolars in good condition; moderate crowding in the labial segment and a degree of crowding in the posterior region; anterior open bite, as extraction of second premolar helps in deepening the bite and for centerline correction. Molar extraction is not a recent technique. Chapin was the first to use it in 1939. In cases of poor prognosis, such as the presence of massive restorations, pulpal necrosis, or severe hypoplasia, first permanent molars are eliminated. Extraction of all first molars is recommended in the following circumstances: minimal space required with no change in profile, to rectify anterior crowding or moderate proclination; extensively decayed/periodontally impaired molar with poor prognosis; impacted molar [1].

B. EXTRACTION IN CLASS II DIVISION 1 MALOCCLUSION:

Class II treatment options include growth modification, orthodontic concealment, and surgical correction. In the treatment of increased overjet associated with a class I or moderate class II skeletal configuration with severely crowded upper and lower arches, extraction of all first premolars is typically indicated. In treatment of increased overjet associated with a class I or mild class II skeletal pattern with somewhat crowded arches, extraction of maxillary first premolars and mandibular second premolars is typically the procedure of choice. When treating class II with upper first premolar extraction in the absence of crowding, the anterior section of the upper arch is distalized

to the extent of a premolar width (7 mm) so that cuspids can establish a class I relation while molars correct to class II complete unit. Extraction of maxillary first permanent molars is recommended only when the first molars have extremely deteriorated and there is severe crowding in the upper arch with mild crowding in the lower arch. Extraction of maxillary first permanent molars is recommended only when the first molars are significantly deteriorated and there is severe crowding in the upper arch with mild crowding in the lower arch ^[1].

C. EXTRACTION IN CLASS II DIVISION 2 MALOCCLUSION:

When dealing with class II division 2 issues, it is advisable to avoid extraction. Extractions will be necessary if crowding is noticed. Extraction in the upper buccal segment with distalization is advantageous in situations when the incisor relationship requires adjustment and crowding reduction without altering the overbite. It might also be utilised to treat class II division 2 buccal segment crowding. In situations of severe crowding, upper and lower second premolar extraction is preferable over first premolar extraction to avoid excessive lingual movement of the lower incisors, which leads to bite deepening ^[1].

D. EXTRACTION IN CLASS III MALOCCLUSION:

The extraction pattern for class III malocclusion might be camouflage or orthognathic surgery. Lower first and upper second premolar extraction is the extraction of choice for concealment. This is believed to deal with considerable mandibular crowding or no crowding but edge-to-edge incisor relationship, as well as significant tipping of the mandibular arch. The second method involves extracting one central incisor from either the right or left side. It is the tooth of preference when crowding is minimal or when there is a Bolton discrepancy. Extraction of all first premolars is sometimes performed in situations of severe crowding or in class III cases accompanied with an anterior open bite. Extraction of either first premolar/first permanent molars on the class I side, and extraction of first lower premolar and upper second premolar on the class III side, is recommended to correct the anterior and posterior occlusion and finish in a class I incisor, canine, and molar relationship. Decompensation is essential in cases requiring orthognathic surgery and is performed during the presurgical orthodontic phase ^[1].

VI. CONCLUSION

Extraction of teeth for orthodontic therapy is only a tool, neither good nor bad. When utilised correctly, they increase the treatment's stability and quality; when used incorrectly, they can have disastrous functional as well as aesthetic consequences. The width and length of the face should always be considered when planning orthodontic tooth extraction. Orthodontic treatment success will be determined by a detailed medical and dental history, extraoral/intraoral examination, diagnosis, and treatment planning by means of a systematic approach towards treatment, taking into account oral hygiene, carious activity,

periodontal involvement, prognosis of impacted teeth, supernumeraries, and hypodontia ^[1].

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