

EXTRACTION AND NON EXTRACTION - AN OVERVIEW

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**ABSTRACT:** Every orthodontists often appear to have *conflicting treatment plans for the same patient*. The reason is not that they see very different problems or have radically different philosophies of treatment, but rather that each doctor has a different line in the gray area between extractions and nonextraction. Two treatment plans that appear very different can both be based on a similar analysis of the patient's problem, but end up with very different treatments due to the black and white nature of the decision making process. It is important to understand that in *borderline cases there are no correct or right answers*. Both treatments performed by competent orthodontists would produce a good result, but neither is perfect. Each option would have pros and cons, and orthodontists and dentists could (and do) spend endless amounts of time debating which option is "right".

**KEYWORDS:** Extraction, Dental component, Cephalometric component, Facial component, Growth status

INTRODUCTION

To extract or not to extract" may not have quite the significance of "to be or not to be", but for 100 years it has been a key question in planning orthodontic treatment. The history of this battle, which continues to reverberate to this day, is a fascinating chapter in the history of orthodontics. Moreover, it is also an intriguing window into the minds of intelligent men when ideology replaces rationality, when psycho logic makeup stifles and directs discourse, and when men espouse positions and concepts that they do not totally follow. Unfortunately, orthodontics is not the only arena of our civil life where this type of behavior takes place— as that is the nature of our being human.

In orthodontics, there are two major reasons to extract:

- (1) To provide space for aligning the remaining teeth in the presence of severe crowding, and
- (2) To allow teeth to be moved (usually, incisors to be retracted) so that protrusion can be reduced or skeletal class II or class III problems can be camouflaged.

The alternative to extraction in treating dental crowding is to expand the arches; the alternative for skeletal problems is to correct the jaw relationship, by modifying growth or by surgery.

In general, extraction of teeth for orthodontic purposes was rare in the early 20<sup>th</sup> century, peaked in the 1960s with extraction occurring in a majority of orthodontic patients, as the "no extractions under any circumstances"

Angle forces had been defeated by "extractions when necessary" Case forces on the strength of argument supported by the overwhelming preponderance of countervailing scientific and clinical evidence. There was a decline in extractions to about the levels of the early 1900s by the 1990s. An increase has been anticipated in the early 2000s.

We will attempt to use an historical as well as clinical evidence-based mode of development to show some of the bases of the arguments, try to correct some misunderstandings of people and events, and present material to corroborate certain positions that we are placing before you.<sup>1</sup>

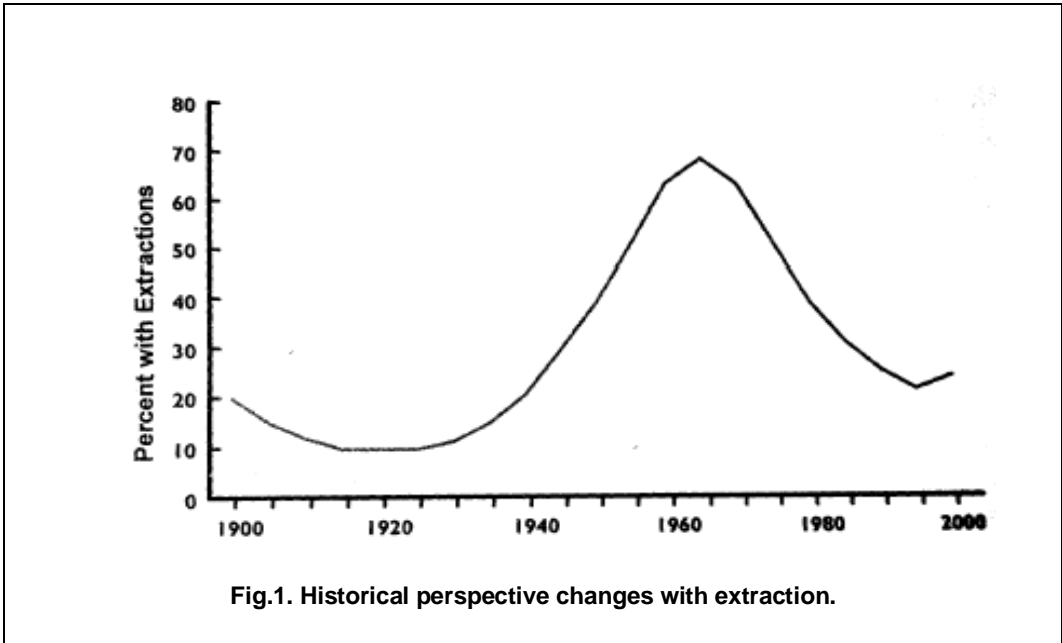
Diagnosis

The variables to be considered on which the extraction and non extraction decision are based on: <sup>2</sup>

- 1. Dental component
- 2. Cephalometric component
- 3. Facial component
- 4. Growth status

1. Dental component

- a. Dental discrepancy: Crowding of 4-8mm can be treated with or without extraction. A discrepancy greater than 8mm indicates a need for extraction, because conservative approaches such as stripping will probably be inadequate.



- b. Curve of spee: A curve of spee of 3-6mm (1.5-3mm per side) is considered mild, whereas a curve greater than 6mm is considered severe. A borderline patient with a deep curve of spee is likely to require extraction.
- c. Bolton discrepancy: A Bolton discrepancy greater than 4mm is considered severe and may indicate extraction to adjust the interarch dental relationships. A discrepancy of as much as 4mm can be resolved by stripping or other conservative approaches.
- d. Peck and peck index: An index between 88 and 95 indicates a good anatomical shape. On the other hand, an index greater than 95 indicates that the mesiodistal width of the tooth is much greater than the buccolingual width. Stripping can improve the shape of these teeth and gain space in the mandibular arch. Borderline patients with narrow lower incisors (index less than 88) are not candidates for stripping and, therefore, are more likely to need extraction.
- e. Irregularity index: an irregularity index of 3.5-6.5mm indicates mild irregularity. An index greater than 6.5mm indicates severe irregularity and a greater need for extraction.

2. Cephalometric component

Relationship of horizontal lines

- . Frankfort mandibular plane angle.
- . SN-mandibular plane angle.

Proportion of posterior facial height to anterior facial height highly divergent plane indicate a skeletal open bite, which in turn, favours extraction. Conversely, parallel horizontal planes indicate a skeletal deep bite, which does not favor extraction.

- a. Incisor mandibular plane angle: According to Tweed, IMPA can vary between 85° and 95°, but its value is highly influenced by the mandibular plane indication and the patients ethnicity. Due to functional and esthetic impairment, an IMPA greater than 96° is an indication for extraction.
- b. Frankfort mandibular incisor angle: Frankfort mandibular incisor angle (FMIA). The norm for the angle formed by the intersection of the Frankfort plane and the long axis of the lower incisor is 60° - 70°. A value less than 60° indicates proclination of the lower incisors, whereas a value greater than 70° suggests that the lower incisors are retroclined.
- c. Distance between lower incisor and the A-Pog line: Values between -2mm and 3mm indicate a good sagittal position of the lower incisors.

3. facial component

- a. Distance between E-line and lower lip: normally, the lower lip (here represented by the labraleinferius) is about 2mm behind this reference line, but because there is considerable variation in terms of age and sex, a standard deviation of 3mm was admitted by Ricketts. As a result, values between -5mm and +1mm are considered normal, while values greater than +1mm indicates lower lip prominence. Since an esthetically pleasing face can be disrupted by lip protrusion, extraction is usually required in such cases.
- b. Distance between B line and lower lip: according to burrstone, the lower lip should be 2.5±1.5mm anterior to the B line, which connects the point where the columella meets the upper lip (subnasale) and soft-tissue pogonion. Extraction is indicated if the lower lip is more than 4mm ahead of this line.

- c. Nasolabial angle: this angle is formed by the intersection of the columella tangent and the upper lip tangent. There is a great deal of controversy regarding its normal value, but most authors choose numbers between 85° and 105°. According to Drobocky and smith, extraction of four bicuspid increases the nasolabial angle by an average of 5.2°. Therefore; extraction should be avoided in patients with obtuse nasolabial angle (greater than 105°).

Upper lip morphology

Holdaway's soft tissue analysis includes linear measurements to assess upper lip morphology and strain. The thickness of upper lip should be measured in two different areas: 3mm below skeletal point A, and from the vermillion border to the labial surface of the maxillary central incisors. In normal patients, these two measurements should be approximately the same (±1mm). If the vermillion border is thinner than the upper lip near point A, the lip are considered strained. If the upper lip is thinner than the vermillion border, the lips are considered flaccid. In borderline patients with strained lips, the incisors can be retracted without altering the soft tissue profile, because the lip needs to reach normal form and thickness before retraction. In such patients, extraction is indicated. On the other hand, the lips would immediately follow tooth movement in borderline patients, with normal lips. According to Arnett and Bergman, orthodontists should avoid extraction in patients with flaccid lips due to the lack of labial support and the potential for esthetic problems.

Dental midline deviations

Dental midline deviations due to skeletal problems should be managed surgically, but patients with a normal relationship of the facial midpoints can be treated orthodontically. Therefore, severe dental midlines deviations support extraction.

Growth status

Growth of the soft and hard tissues has a significant influence on the facial results of orthodontic treatment. For e.g. a gross facial imbalance could be caused by additional growth of nose after the appliance removal. Therefore extractions must be considered cautiously in patients with considerable remaining growth potential. On the other hand because further growth is unlikely to alter facial profile of adult patient the extraction decision is safer in post pubertal patients.

Because orthodontics involves space management clinicians must thoroughly understand the concepts of dimensions of dentition. Diagnosis and treatment are four dimension there is an anterior dimension, posterior dimension, vertical dimension, lateral dimension. If the muscular balance is normal the clinicians should try to respect this dimensions.<sup>3</sup>

1. Anterior dimension

Tweed defined the anterior limit of the dentition for the specility of orthodontics. He developed a diagnostic facial triangle and demonstrated that one could improve facial balance as well as stability, if proclined mandibular anterior teeth were uprighted over basal bone. A patient who might have low mandibular plane angle would not require as much mandibular incisor uprighting as a patient with high mandibular plane angle. Even if the low angle patient the mandibular incisor should not be pushed forward from the original position if the muscular balance is normal. Therefore the patients with normal muscular balance extractions are necessary if the anterior limit of dentition is to be respected, in the presence of significant anterior crowding and or protrusion.

2. Posterior dimension

Posterior area of the mouth and the space available in the posterior area of the mouth is disregarded by the clinicians. Teeth are driven back into this area with little thought given to how much space given to them. Merrifield Richard Son and Laygard have given the speciality some very good guidelines for how much space is actually available. Class III malocclusion resulting from posterior crowding is also documented due considerations has to be given to the 2<sup>nd</sup> molar space while planning for treatment when discussion of the posterior dimension of mouth it is important to note that when non extraction treatment is touted, 32 teeth must be maintained in the mouth. The extraction of the 3<sup>rd</sup> molar is a therapeutic decision. If patient has to have 3<sup>rd</sup> molar extracted it is extraction treatment not non extraction treatment.

3. Vertical dimension

A patient who need extraction but who are not treated without them, are often expanded vertically, point B drops down and back. Poor facial esthetics is the resulted, if maxillary posterior teeth are driven distally to correct class II malocclusion when no space is available; there is a "wedging open effect" in the anterior vertical dimension that creates a longer face. Merrifeld found that every 1mm expansion there is 1.3mm increase in the anterior facial height, except in patient with deep bite who has poor vertical development, it is crucial to preserve the vertical dimension if stability as well as facial balance and harmony are the ultimate goals.

4. Lateral expansion

Lateral expansion is touted in many circles. It works if one believes in permanent retention. Strang one of our speciality pioneers has studied lateral expansion. Strang concluded that it was too be avoided at all costs. The dentition that exhibited the most relapse were that had undergone the most mandibular canine expansion.

CONCLUSION

Despite the popularity of extracting teeth in orthodontic practice, there are no objective standards to be used by orthodontics to decide whether to extract or not to extract teeth.

During the past century, clinical experiences that were thought to be useful in explaining criteria for orthodontic tooth extraction have been stocked, and nowadays they are used in orthodontic practice as a general knowledge. This knowledge, however, the mostly comprised descriptions based on an individual practioner's often fragmentes experiences, and thus are unlikely to systematically provide a rationale basis in choosing either extraction or non extraction of teeth. In fact, this is one of the reasons why there is a considerable degree of discordance in opinions regarding the judgments on tooth extractions delivered by orthodontics.

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