

## Extraction vs. non-extraction decision based on facial profile

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### ABSTRACT

**Introduction:** Facial appearance plays an important role when planning orthodontic treatment. The major issue involved in the extraction vs. non-extraction decision is its effect on the soft-tissue profile. The objective of this cross-sectional study was to determine the ratio between extraction and non-extraction treatment protocols. More over whether such decisions were based on soft tissue profile or severe arch length discrepancy in border line case at Department of Orthodontics, University Dental Clinical Centre "St. Pantelejmon" - Skopje, Macedonia.

**Material and Methods:** One hundred and fifteen patients were randomly selected from the diagnostic database fulfilling the inclusion criteria. These records included history, lateral cephalogram and casts for each patient.

**Results:** 39.1% of the total sample was treated with extraction protocol where as 60.9% was treated non-extraction. Out of total extraction cases, 69.8% extraction decisions were carried out on the basis of profile and 30.2% on arch length discrepancy as a predominant factor. Profile based distribution of the sample were; 55.5% convex, 43.5% straight and 1% with concave profiles.

**Conclusion:** Most of the patients having convex and straight profile and more than half of the extraction decisions were based on profile. Arch length discrepancy was the second most important decision influencing extraction protocol decision. A borderline case with pre-treatment lip protrusion may be better served with extraction. Hence in accordance to the 'soft tissue paradigm' such a decision during the treatment planning should be paramount in making treatment decisions. Profile based treatment planning leads to better treatment results.

**Keywords:** extraction; non-extraction; facial profile; facial angle

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### I. Introduction

For years, orthodontists have studied the soft tissue profile in patients treated orthodontically, seeking facial harmony, and the correct dental positioning.[1] In the past, the esthetic facial profile was described very subjectively, and the concept of beauty would refer to the gure of the Greek God Apollo of Belvedere. But, the standards of beauty have changed possibly due to the mixing of races, global media, customs, religion and age; with stronger traits than the straight lines from the Greeks. Facial appearance plays an important role when judging the self-attractiveness and also the development of self-esteem.[2]The perception of appearance, especially of the face, affects mental health and social behavior with significant implications in the educational and professional areas, as well as in the emotional life.[3]

The literature on the extraction dilemma in orthodontics is abundant and most studies show little soft tissue post-treatment alterations in patients with and without extractions.[4-5] Although cephalometric studies exhibit differences mainly in dento-skeletal components among patients treated with and without extraction, an important point would be to check the effect of these therapies in facial esthetics under the point of view of orthodontists, dentists and lay people, since the studies in this area are scarce.

The major issue involved in the extraction vs. non-extraction decision is its effect on the soft-tissue profile. Non-extractionists claim that extractions "dish in" the face, while extractionists contend that without extractions in certain cases, the profile will be too full and periodontal health will be compromised.[6-9] In one study, however, neither general dentists nor orthodontists were able to distinguish between facial profiles of

extraction and nonextraction subjects, the difference being no more predictable than a coin toss.[10] Other studies of follow-up photos of matched extraction/nonextraction patients have reported similar findings.[11-13]

Authors generally agree that extraction treatment does not “dish in” the face, and in fact can produce more pleasing esthetic results than non-extraction treatment in patients with fuller profiles. Recent three-dimensional soft-tissue analyses following extraction treatment demonstrate that the greatest changes are seen in patients with the most protrusion, and that lip retraction is directly related to retraction of the upper and lower incisors.

A confounding factor could be that the profile tends to straighten with time irrespective of treatment modality, simply because the mandible grows more than the maxilla.[14] Even throughout adulthood, the face has a tendency to flatten.[15] Sarver and Ackerman call this the fourth dimension time and caution orthodontists to consider soft-tissue growth, maturation, and aging in their treatment planning.[19] Facial appearance is always a prime consideration when planning orthodontic treatment.[17] Facial soft tissues are affected by a variety of variables including skeletal relationships, dental positions, soft tissue thickness and function. However, the exact nature of these relationships is still debatable. Literature reveals that the extraction of four premolars generally tends to flatten the profile by 2-3 mm when compared with non-extraction treatment. However, many authors believe that undesirable facial aesthetics at the end of orthodontic treatment cannot be attributed to the extraction of premolars only and with proper case selection and patient management being the clinician’s responsibility, undesirable end points can be avoided.[18-20] The decision of extraction versus non-extraction and its impact on facial profile has always been controversial. The major factors for determining the need for premolar extraction in orthodontic practice are arch length discrepancy, mandibular incisor protrusion, curve of spee and lip protrusion.

With the development of modern appliances, skeletal anchorage and easier techniques for molar distalization, non-extraction therapy generally takes precedence. Profit indicates that the decline in extraction frequencies over the years occurred due to several factors including concerns regarding facial aesthetics, stability and temporomandibular joint dysfunction as well as changes in treatment techniques.[21]

The purpose of present study was to determine the ratio between extraction and non-extraction treatment protocols. More over whether such decisions were based on soft tissue profile or severe arch length discrepancy in border line case.

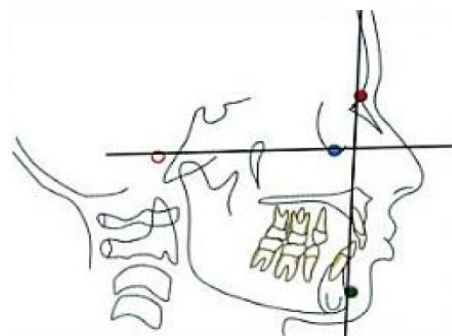
## II. Material And Method

One hundred and fifteen randomly selected patients reporting to Department of Orthodontics, University Dental Clinical Centre "St. Pantelejmon" - Skopje, were included in this study. Two groups were made on the basis of arch length discrepancy. Group one included patients with crowding greater than 6 mm and group two considered the border line cases with crowding less than 6 mm. Arch length discrepancy was determined by measuring arch length from mesiobuccal cusp of first permanent molar to that of the contra lateral side (Carey’s analysis). Sum of mesio-distal width of teeth anterior to the first permanent molars were added up to calculate the space required. The difference between the two gave arch length discrepancy.

Radiographic records included lateral cephalogram taken in natural head position with unstrained lips and teeth in centric occlusion. Profile was accepted as convex, concave and straight by measuring facial angle (N-Pg/FH) on lateral cephalogram (Fig. 1). The mean reading for this angle is  $87.8^\circ$  ( $SD \pm 3.6^\circ$ ) with a range of  $82^\circ$  to  $95^\circ$ . [22]

Profile was divided into three groups on basis of facial angle.

- Convex profile: Facial angle less than  $87.8^\circ \pm 3.6^\circ$
- Straight profile: Facial angle  $87.8^\circ \pm 3.6^\circ$
- Concave profile: Facial angle more than  $87.8^\circ \pm 3.6^\circ$



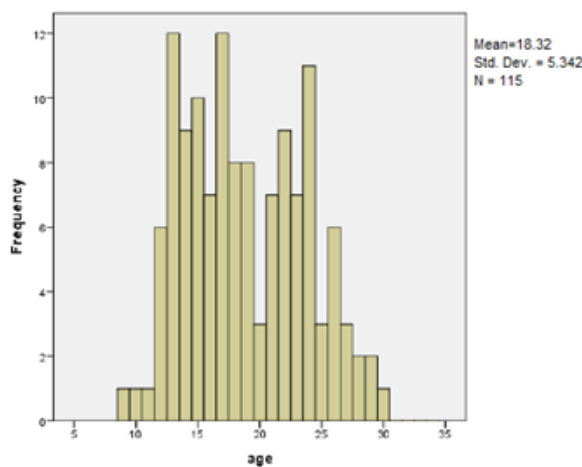
**Figure 1:** Facial Angle 1

Patients with history of previous orthodontic treatment, any systemic diseases and teeth extracted due to trauma or pathology were excluded from the study. Data was analyzed on Statistical Package for Social Sciences (SPSS 10). Descriptive statistics were used. Frequencies and percentages were calculated for extraction, non-extraction, age, skeletal pattern and profile.

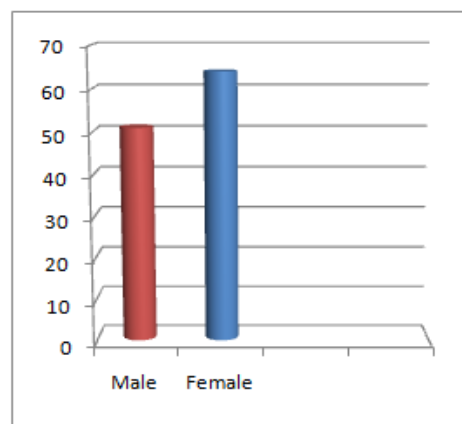
### III. Results

Patients in study groups had mean age of 18 years with minimum reporting age of 9 years and maximum age of 30 years (Table I). Out of the total sample, 64 were females and 51 were males (Table II). 58,4% of the sample belonged to skeletal class I group, 33% to the skeletal class II and 8.6% to skeletal class III (Table III). 55.5% patients had convex profile, 43.5% had straight profile and 1% had concave profiles (Table IV). Out of total sample, 39.1% were planned with extraction protocol and 60.9% non-extraction treatment protocol (Table V). Out of total extraction cases, 69.8% cases had crowding less than 6 mm while 30.2% had more than 6 mm (Table VI).

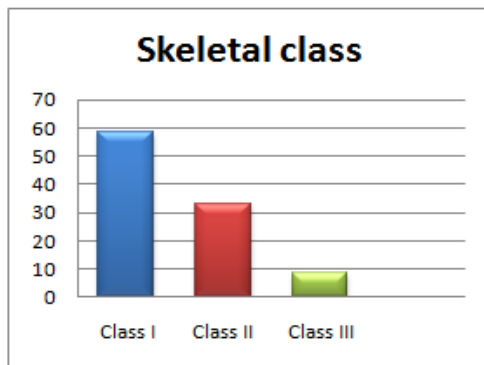
**Table I. Age distribution**



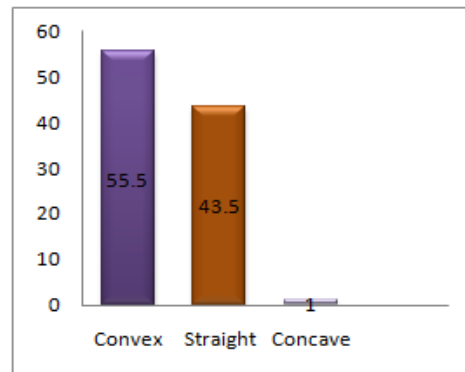
**Table II. Sex distribution**



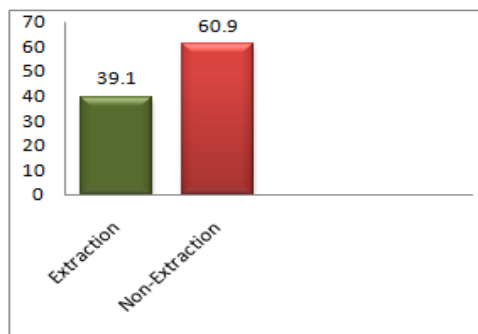
**Table III. Distribution of skeletal pattern**



**Table IV. Profile distribution**



**Table V. Extraction versus non-extraction**



**Table VI. Degree of crowding in extraction cases**

	Frequency	Percent
< 6mm Crowding	31	69,8
>6mm Crowding	14	30,2

#### **IV. Discussion**

The search for a balanced facial profile is a constant challenge for orthodontists, who continue to debate the extraction issue to improve dento-skeletal relations. However, the literature is still short on the effects of extraction decision based on facial profile. Therefore, knowledge about the possibilities of changes in facial profile resulting from this treatment protocol is necessary for professionals in Orthodontics.

In orthodontics, extractions have been traditionally highly debated and their percentage has displayed considerable variation throughout the years depending on treatment trends and other various factors.

Evaluation of patient's facial profile gives valuable information for planning extraction versus non-extraction orthodontic treatment therapy and this forms the essence of the soft tissue paradigm. According to our results, the frequency of extraction was 39.5% and this is a little bit different from finding of Peck and Peck's 42%. [23] Also, this result differs from the frequency reported by Profit [24] in which frequency of extraction was 30% in 1953, peaking at 76% in 1968 and declined again to 28% in 1993. The slight increase in frequency in our study when compared to the ratio found by Profit in 1993 may be due to the difference in selection criteria as they included only first premolar extraction while this study included all kinds of extractions of all teeth in all three skeletal classes where as in their study only class II camouflage cases were included in the sample.

This study has aimed to investigate the effects of facial profile on extraction versus non-extraction treatment decision which will help orthodontic practitioners to identify current trends in treatment planning and its basis.

According to this study non-extraction (60.5%) takes precedence over extraction (39.5%). This supports the study [24] that shows a general trend of increase in non-extraction (70%) orthodontic therapy after 1993. This change might be due to a changing aesthetic guideline in facial aesthetics with fuller lips and broader smile being easily considered to be managed with a non-extraction treatment methodology.

This study has limitation of a small size sample and needs to be carried out in multiple centers with a much larger sample.

#### **V. Conclusions**

There was high percentage of patients having convex and straight profile and more than half of the extraction decisions were based on profile. Arch length discrepancy was the second most important decision influencing extraction protocol decision.

Any decision regarding the need for extraction of teeth during orthodontic therapy is not only dependent on the presence or absence of space in the dental arches. The decision of extractions as a treatment protocol depended at a higher rate on soft tissue profile rather than arch length discrepancy.

A borderline case with pre-treatment lip protrusion may be better served with extraction. Similarly, a more retrusive profile may be improved without removing teeth. In the aging face, lips become relatively more retruded, creating a natural difference in proper lip positions between different age groups.

Prediction of soft tissue response to orthodontic tooth movement is complex and will require further studies. Profile of the patients according to soft tissue paradigm plays an important part in orthodontic treatment planning and should therefore not be neglected while making treatment decisions. Profile based treatment planning leads to better treatment results.

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