

# DENTOALVEOLAR PROFILE CHANGES AFTER MALOCCLUSIONS TREATMENT WITH AND WITHOUT EXTRACTION

(PERUBAHAN PROFIL DENTOALVEOLAR SETELAH PERAWATAN MALOKLUS  
DENGAN DAN TANPA PENCABUTAN GIGI)

I Gusti Aju Wahyu Ardani

Department of Orthodontic  
Faculty of Dentistry, University of Airlangga  
Jl. Mayjen. Prof. DR. Moestopo No. 47 Surabaya - 60132  
E-mail: ardani.ortho@gmail.com

## Abstract

Treatment protocol in orthodontic treatment is based on the dentoalveolar and facial profile patients. The objectives of this study were (1) to compare dentoalveolar profile changes in skeletal malocclusion types after four orthodontic treatment types, nonextraction, two upper first premolars, two lower first premolars extraction, and four first premolars extraction; (2) to compare dentoalveolar profile changes after orthodontic treatment within skeletal malocclusion types; (3) to compare dentoalveolar profile changes within orthodontic treatment types. The study was conducted in Dental Hospital, Faculty of Dentistry-Airlangga University. Forty eight patients (females, between 17-32 years) who fulfilled the inclusion criteria were selected. Data was analyzed using ANOVA test. The results showed that dentoalveolar profile was significant difference between without extraction and four first premolars extraction ( $p < 0.05$ ), except for variables NB-L1 and IMPA. The dentoalveolar facial profile changes were significant difference within malocclusion types after orthodontic treatment ( $p < 0.05$ ). In Conclusion, the extraction in orthodontic treatment type had a great variation of dentoalveolar profile changes after orthodontic treatment depends on malocclusion types.

**Keywords:** dentoalveolar profile, orthodontic treatment

## Abstrak

Protokol perawatan ortodonsi didasarkan pada profil dentoalveolar dan profil wajah pasien. Tujuan penelitian ini adalah (1) membandingkan perubahan profil dentoalveolar pada tipe maloklusi skeletal setelah dilakukan empat macam perawatan ortodonti; (2) membandingkan perubahan profil dentoalveolar di antara tipe maloklusi skeletal setelah dilakukan perawatan ortodonti; (3) membandingkan perubahan profil dentoalveolar di antara macam perawatan ortodonti. Penelitian dilaksanakan di Rumah Sakit dan Mulut Pendidikan (RSGMP) Fakultas Kedokteran Gigi-Universitas Airlangga. Delapan puluh empat pasien (wanita, usia antara 17-32 tahun) yang memenuhi kriteria inklusi dipilih sebagai sampel. Data dianalisa dengan menggunakan uji ANOVA. Hasil penelitian menunjukkan bahwa profil dentoalveolar berbeda bermakna antara tanpa pencabutan dan pencabutan empat premolar pertama ( $p < 0.05$ ), kecuali variabel NB-L1 dan IMPA. Perubahan profil dentoalveolar berbeda bermakna di antara tipe maloklusi setelah perawatan ortodonti ( $p < 0.05$ ). Kesimpulannya, pencabutan gigi dalam perawatan ortodonti memberikan hasil yang sangat bervariasi terhadap perubahan profil dentoalveolar setelah perawatan dan hal ini tergantung pada tipe maloklusinya.

**Kata Kunci:** profil dentoalveolar, perawatan ortodonti

## INTRODUCTION

The indication for extraction in an orthodontic practice has historically been controversial. Many studies have been published on ANB angle for assessing sagittal jaw relationship, as important part for many analysis and is the most commonly used

measurement.<sup>1</sup>

Ideally, the ability of specific abnormalities should lead the elimination of malocclusion by normalization of the defective structures. In many situations, diagnosis is not matched by comparable differential treatment objectives and procedures. This particularly evident in the correction of severe maloc-

clusion of skeletal origin.

Premolars are probably the most commonly extraction teeth for orthodontic purposes, located conveniently between the anterior and posterior segments. Variation in extraction sequences including upper and lower first premolars have been recommended by different authors for various reasons.<sup>2</sup>

Ideally, the ability specific abnormalities should lead to elimination of malocclusion by normalization of the defective structures. In many situations, diagnosis is not matched by comparable differential treatment objectives and procedures. This is particularly evident in the correction of severe malocclusion of skeletal origin.

A majority of patients who came to RSGMP Dental Faculty Airlangga University are Javanese (Deutromalay). The Javanese has a craniofacial difference with Caucasians. Winoto took a simple cephalometric analysis in which SNA and SNB had been found to be 83.55 and 84.75 degrees, respectively. Providing an ANB angle of 2.78-2.89 degrees. Data of dentoalveolar profile for Javanese ethnic assists in the diagnosis, management and outcome assesment of orthodontic care.

This study aimed to compare dentoalveolar profile changes after fixed orthodontic treatment in skeletal malocclusion: (1) to compare dentoalveolar profile changes in skeletal malocclusion types after four orthodontic treatment types: nonextraction, two upper first premolars extraction, two lower first premolars extraction, and four first premolars extraction; (2) to compare dentoalveolar profile changes after orthodontic treatment within skeletal malocclusion types; (3) to compare dentoalveolar profile changes within orthodontic treatment types.

## MATERIALS AND METHODS

The experimental design was analytic observational retrospective study of cephalometric data from 48 subjects (mean age  $25.08 \pm 1.3$  years), data from 2006 to 2009 at Orthodontic Clinic, Dental Faculty of Airlangga University. The samples were selected by simple random sampling, with certain criteria. The inclusion criteria have no orthodontic treatment before, complete dentition except third molar, and all subjects were Javanese, there were no TMJ disorders and mandibular *displacement*.

All 48 subjects were treated with fixed orthodontic treatment, which had different orthodontic treatment types: without extraction 16 subjects (33.33 %), two upper first premolars extraction 5 subjects (10.42 %), two upper lower premolars extraction 5 subjects (10.42 %), and four first premolars extraction 22 subjects (45.82 %).

Figure 1 was based on the classic definition previously described in the literature.<sup>3</sup>

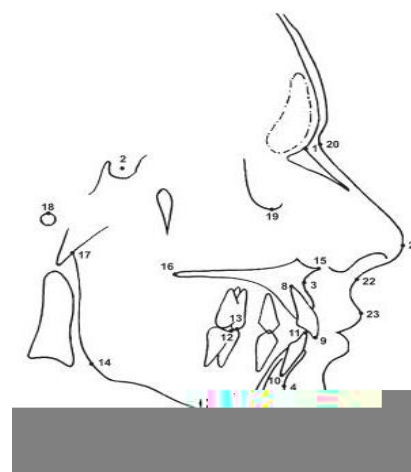


Figure 1. Ceph

location by twice identifications with the range time 3 weeks. Allowable between twice intrainvestigations were predetermined in 0.5 mm and 0.5°.

Cephalometric measurement used digital V-Ceph 3,0 with accuracy of two digits. Paired t-test was used to compare dentoalveolar profile pre- and post- treatment in different orthodontic treatment types. To evaluate the dentoalveolar change within skeletal malocclusion types and orthodontic treatment types in this study used ANOVA multivariate test.

## RESULTS

The ANB angle represented the sagittal relationship between upper and lower jaws among the normal (2.78-2.89) or Class I, ANB more than 2.89 as class II, and ANB less than 2.79 as class III skeletal malocclusion (Table 1). Class II skeletal malocclusion was the highest prevalence than others. The ANB angle was used to classify the skeletal malocclusion in anteroposterior relationship.

Class I skeletal malocclusion was found in 4 patients, which presented 8.3 % of total samples. Class II skeletal malocclusion was diagnosed in 28 patients which presented 58 % of total samples, class III skeletal malocclusion group consisted of 16 individuals which represented 33% with total samples were 48 subjects (Table 1).

Dentoalveolar characteristics class I skeletal malocclusion were found before orthodontic treatment protrusion upper and lower incisor with 34.51° and 34.69°. The inclination lower incisor was protrusion to the mandibular plane with 97.46°. Interincisal angle 108.45° was in normal range (Table 1).

Dentoalveolar characteristics class II skeletal malocclusion were found before orthodontic treatment upper incisor in normal range with 23.48° but lower incisor protrusion with 34.02°. The inclination lower

incisor was protrusion to the mandibular plane with 98.27°. Interincisal angle 116.48° was in normal range (Table 1).

Dentoalveolar characteristics class III skeletal malocclusion were found before orthodontic treatment upper incisor protrusion with 33.92° but lower incisor retrusion with 29.06°. The inclination lower incisor was retrusion to the mandibular plane with 93.55°. Interincisal angle 118.55° was in normal range (Table 1).

Dentoalveolar characteristics were found before orthodontic treatment without extraction group, protrusion upper and lower incisor with 25.34° dan 31, 32°. The inclination lower incisor was protrusion to the mandibular plane with 96.84°. Interincisal angle 119.77° was in normal range (Table 2).

Table 2 showed the comparison of pre- and post-treatment dentoalveolar measurements for patients without extraction group. Only one variable NA-U1 showed statistical difference ( $p < 0.05$ ). Other variables NB-L1, <U1 L1 and L1-MP were no significant differences after orthodontic treatment. ( $p > 0.05$ ).

Dentoalveolar characteristics were found before orthodontic treatment two upper extraction, protrusion upper and lower incisor with 23.88° dan 34.12°. The inclination lower incisor was protrusion to the mandibular plane with 96.68°. Interincisal angle 115.77° was in normal range (Table 3).

Dentoalveolar characteristics were found before orthodontic treatment two lower first premolars extraction, protrusion upper and lower incisor with 35.98° dan 26.56°. The inclination lower incisor was retrusion to the mandibular plane with 84.47°. Interincisal angle 119.59° was in normal range (Table 4).

Table 4 showed the comparison of pre- and post-treatment dentoalveolar measurements for patients with two lower first premolars groups. There was no variable showed statistical difference ( $p < 0.05$ ).

Table 1. The mean values in class I, II, and III skeletal malocclusion dentoalveolar characteristic patients at RSGMP-Dental Faculty Airlangga University from year 2006-2009

Variable	Class I	Class II	Class III	Normal Range (degree)
	Mean	Mean	Mean	
SNA (°)	80.78	83.20	81.36	83.55-84.75
SNB (°)	78.01	77.07	82.31	80.67-81.99
ANB (°)	2.77	6.13	-0.94	2.78-2.89
NA-U1	34.51	23.48	33.93	18
NB-L1	34.69	34.02	29.06	23
<U1 L1	108.45	116.47	118.55	129.6-141.2
L1-MP	97.46	98.27	93.55	85-95
Total	4 (8.3%)	28 (58%)	16 (33%)	-

Dentoalveolar characteristics were found before orthodontic treatment of two lower first premolars extraction, protrusion upper and lower incisor with  $28.80^{\circ}$  and  $34.17^{\circ}$ . The inclination lower incisor was protruded to the mandibular plane with  $99.13^{\circ}$ . Interincisal angle  $113.57^{\circ}$  was within normal range (Table 5).

Table 5 showed the comparison of pre- and post-treatment dentoalveolar measurements for patients four first premolar extraction group. There were all four variables showed statistical difference after orthodontic treatment. ( $p < 0.05$ ).

According to the

Table 6. Pre- and post- treatment mean measurements among the four orthodontic treatment types at RSGMP - Dental Faculty Airlangga University from year 2006-2009

Variable	Without extractions	Two upper first premolars	Two lower first premolars	Four first premolars	p value
	n = 16	n = 5	n = 5	n = 22	
NA-U1	-7.39+13.93 <sup>a</sup>	-8.66+14.42 <sup>a</sup>	-5.42+8.63 <sup>a</sup>	-16.95+7.49 <sup>b</sup>	0.03
NB-L1	0.07+5.56	1.50+2.92	-3.46+10.19	-5.97+7.96	0.07
< U1 L1	6.79+16.96 <sup>a</sup>	6.48+12.69 <sup>a</sup>	7.12+16.41 <sup>a</sup>	20,77+10,28 <sup>b</sup>	0.01
L1-MP	-2.25+5.69	0.35+2.60	-2.24+13.83	-5.31+7.82	0.14

Table 7. Pre- an 14.170>> BDC q( )JTJETBT1ETBT1 0 0 1 122.25 611.75 Tm9MCID 176>> BDC q165.05 648.75 75.225 15 re( )

protocol has also a better occlusal successful rate and a shorter treatment time than a non extraction protocol in complete Class II malocclusion patients. Although treatment results and times have been compared between treatment protocols, the amounts of change in a time period have not been related to each other to evaluate treatment efficiency.<sup>7</sup> If it is true that different treatment methods and extraction patterns lead to different total space conditions within the lower arch, the above evidence might challenge the notion of the so-called nonextraction treatment philosophies often found in the literature. Contemporary clinicians need to consider whether these proposed treatment strategies actually are nonextraction or whether they are simple resources of treatment performed without the extraction of premolars.<sup>1,2</sup>

These results suggested that special consideration was needed for the initial occlusal anteroposterior malocclusion severity when planning treatment in Class II patients concerning dentoalveolar successful rate. Many treatment protocols might be effective but not efficient. When planning non extraction treatment for patients with Class II malocclusions, the initial anteroposterior discrepancy plays a great role in the dentoalveolar successful rate.

The greater the Class II anteroposterior discrepancy, the smaller the successful rate and the treatment efficiency with the non extraction protocols investigated. Therefore, it would be preferable to plan non extraction treatment when the anteroposterior discrepancy is small.<sup>7-9</sup> Treatment can be started without extractions, and, if there is not enough patient compliance, it can be changed to 2 maxillary premolar extraction treatments. However, one should not wait too long to change the treatment plan. If patient does not comply within 3 months, the 2 maxillary premolar extraction protocols should be started.<sup>7,8,10</sup>

Class III malocclusion is far more prevalent in Asian than in the West.<sup>11,12</sup> The incidence of anterior crossbite is 2.3-13 per cent among Japanese, 9.4-19 per cent among Koreans and 12.8 per cent among Chinese and 14.5 per cent in southern Chinese.<sup>4</sup> In contrast, the prevalence of class III malocclusion in the United States is only about 1.0 per cent of the total population, and only 5 per cent of orthodontic patients.<sup>4,13</sup>

In this study, there were 16 patient in class III skeletal malocclusion investigated borderline cases and found that upper and lower incisor protrusion characteristics which the decision had been based on the orthodontic camouflage.

It is commonly believed that successful camouflage treatment for class III malocclusion can be

achieved by proclination of maxillary incisors, retraction of mandibular incisors, and downward and backward rotation of mandible.<sup>13</sup>

In this study, as all of the patients were extraction cases the upper incisors showed mild retroclination and lower incisors mild proclination, with post treatment inclination of upper and lower incisors in normal range. This finding was similar to that reported by Bishara et.al.

In a detailed analysis of the mode of movement of the lower incisors, the crown tips and root apices of the lower incisors were retracted and this retraction was combined with tipping and bodily movement. The bodily movement of the roots was important in preventing over retroclination of the lower incisors. In order to do that, lingual root torque should be applied to the lower incisors during treatment.<sup>12,13</sup>

In conclusions, after orthodontic treatment, the upper and lower incisor inclination dentoalveolar profile were better in the extraction group than non extraction.

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