

# Comparison of academic and nonacademic surgeons in treatment planning for CIII borderline case

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**Objectives** In borderline class III malocclusions, the patients can be successfully treated by the orthodontic or surgical modalities, however; there is no consensus about the method with the best results regarding functional and esthetic parameters. The present study aimed to assess the treatment plans provided by academic and non-academic surgeons regarding borderline class III patients.

**Methods** In this cross-sectional descriptive study, diagnostic records of 20 borderline class III patients were assessed by 8 academic and 8 non-academic surgeons. The treatment plans suggested by the surgeons for patients were compared with the standard treatment plan based on case presentation. The data were analyzed by paired t-test, Wilcoxon test, Kappa coefficient, independent t-test and Chi-square test.

**Results** No significant differences were found between academic and non-academic orthodontists when suggesting orthodontic treatment ( $p=0.54$ ), orthognathic surgery ( $p=0.1$ ), single or double jaw orthognathic surgery ( $p=0.68$ ) and the treatment plans in total ( $p=0.78$ ) when compared with the standard treatment plan. The mean rate of agreement between the standard treatment plan and the academic and non-academic surgeons' treatment plan for borderline class III patients was  $75.0\% \pm 17.41\%$  and  $80.0\% \pm 17.73\%$  for the orthodontic treatment plan,  $80.0\% \pm 7.56\%$  and  $80.0\% \pm 17.73\%$  for the surgical treatment plan,  $70.55\% \pm 9.4\%$  and  $68.61\% \pm 9.08\%$  for single or double jaw orthognathic surgery treatment plan, and  $79.83\% \pm 7.76\%$  and  $80.63\% \pm 9.79\%$  for the treatment plans in total, respectively.

**Conclusion** Academic and non-academic surgeons both showed higher agreements with the standard treatment plan when suggesting orthodontic and orthognathic surgery treatment plans for borderline class III patients.

**Keywords** Treatment Protocol; Angle Class III; Surgeons

## Introduction

Class III malocclusion has a multifactorial etiology that can be a result of interactions of innate, genetic, hereditary and environmental factors.<sup>1</sup> Patients with borderline class III malocclusion can be treated for ideal occlusion and proper facial esthetics by either orthodontic treatment alone or single and double jaw orthognathic surgery; although it is not clear which treatment plan has better functional and esthetical results for patients.<sup>2-4</sup> Treatment plan selection depends on clinical findings and cephalometric analysis. The final treatment plan is often based on the clinician's experience and patient preferences.<sup>5-7</sup> Selection of orthognathic surgery depends on several factors such as the severity of dentofacial malocclusion, the amount of discrepancy, and the amount of soft tissue changes.<sup>8</sup> Differences between single or double jaw orthognathic surgery include higher risk of surgery, higher cost, longer recovery time, and higher postoperative patient discomfort in the latter.<sup>8, 9</sup> In these patients, the orthodontist, the surgeon, and other members of the medical team should work together and decide on the treatment plan. Due to the different experience and working atmosphere, academic and non-academic maxillofacial surgeons are likely to have

disagreements in treatment planning for borderline class III patients. Few studies have been conducted in this regard and therefore, further studies are required on the agreement rate between academic and non-academic surgeons with regard to treatment planning for borderline class III patients.<sup>4,9</sup>

Mirhashemi and Parhiz<sup>4</sup> studied the disagreement between orthodontists and surgeons, and showed that most patients believed that surgery had no significant effect on their appearance. None of the variables such as age, gender, facial form (long, short, normal), and surgery type (single or double jaw) were effective on patient satisfaction scores. Patients with different treatment plans provided by orthodontists and surgeons were satisfied with the treatment outcome.<sup>4</sup> Tseng et al.<sup>9</sup> identified 6 cephalometric variables (overjet  $\leq -4.73$  mm, Wits appraisal  $\leq -11.18$  mm, L1-MP angle  $\leq 80.8^\circ$ , Mx/Mn ratio  $\leq 65.9\%$ , overbite  $\leq 0.18$  mm, and gonial angle  $\geq 120.8^\circ$ ) as the minimum number of discriminators required to discriminate the surgical and nonsurgical treatment plans in patients with skeletal class III malocclusions.

The present study aimed to compare the treatment plans provided by academic and non-academic surgeons for patients with borderline class III malocclusion.

## Materials and Methods

In this cross-sectional descriptive study, diagnostic records (dental cast, facial photography, panoramic view, lateral and posteroanterior cephalograms) of 20 borderline class III patients (8 males and 12 females) with a mean age of  $18.5 \pm 2.4$  years presenting to the Orthodontic Department of Shahid Beheshti University of Medical Sciences during 2015-2016 were evaluated by 16 surgeons. Eight academic and 8 non-academic surgeons reviewed the records and provided treatment plans for patients. The agreement rate of their treatment plans with the standard treatment plan based on case presentation of orthognathic surgery class which was named "standard treatment plan" was examined. The surgeons were selected through non-randomized sampling method from those who were graduated from Shahid Beheshti oral and maxillofacial surgery residency program more than 5 years ago.

The inclusion criteria of class III patients were Iranian race, females of at least 16 years of age and males of at least 18 years of age, absence of genetic syndromes or systemic diseases, class III molar relationship, minimum Wits appraisal of -4 mm, overjet between -4 mm and 1 mm, minimum ANB of -1.7 degree, normal face height (sum of posterior angles between 390 and 400 degree) and lateral cephalograms analyzed by Dolphin Imaging software.

The possible orthodontic or surgical treatment plans for patients were presented in a multiple-choice questionnaire and the surgeons could select their choice of treatment plan in the answer sheet. The final questionnaire was prepared after validity was reviewed by 6 surgeons and the required changes were applied. Eight academic surgeons in this study were selected from Shahid Beheshti University of Medical Sciences and Islamic Azad University assistant professors with at least 5 years of clinical experience and 8

non-academic surgeons had been graduated at least 5 years earlier from Shahid Beheshti University of Medical Sciences.

All evaluators in the study were informed about the research method and received the necessary information. Each patient's PowerPoint file and the related questionnaire were provided to the surgeons and they were asked to present their treatment plan in sufficient time according to the questionnaire. All questionnaires were collected and reviewed. Finally, the agreement rate of treatment plans suggested by academic and non-academic surgeons were compared with the standard treatment plan.

All participants were treated by the standard methods and the treatment plans proposed by the academic and non-academic surgeons had no role in the treatment nature. The patients' documents remained confidential by the researchers. The frequency and percentage of agreement between the treatment plans suggested by academic and non-academic surgeons and the standard treatment plan were analyzed by paired t-test and Wilcoxon test. The Kappa coefficient was used to analyze the total treatment plan agreement and independent t-test was applied to assess the significance of the agreement rate. The frequency of 100% agreement between the proposed treatment plan and the standard treatment plan in the two groups of surgeons was analyzed by the Chi-square test.

## Results

The agreement frequency and percentage of academic and non-academic surgeons regarding orthodontic treatment and single or double-jaw orthognathic surgery treatment plans in comparison with the standard treatment plan in borderline class III patients are presented in Table 1.

**Table 1-** The agreement frequency and percentage of academic and non-academic surgeons regarding the treatment plans for borderline class III patients in comparison with the standard treatment plan

Group	Orthodontic or surgical treatment plan	Number		Percentage		orthodontic treatment plan	Number		Percentage		surgical treatment plan	Number		Percentage	
Non-Academic	60	1	12.5	50	1	12.5	50	1	12.5	50	1	12.5	50	1	12.5
	75	1	12.5	70	3	37.5	70	3	37.5	70	3	37.5	70	3	37.5
	80	2	25	90	2	25	90	2	25	90	2	25	90	2	25
	85	2	25	100	2	25	100	2	25	100	2	25	100	2	25
	90	2	25	Total	8	100	Total	8	100	Total	8	100	Total	8	100
	Total	8	100												
Academic	70	2	25	60	3	37.5	70	2	25	70	2	25	70	2	25
	75	2	25	70	1	12.5	80	4	50	80	4	50	80	4	50
	85	3	37.5	80	1	12.5	90	2	25	90	2	25	90	2	25
	90	1	12.5	90	3	37.5	Total	8	100	Total	8	100	Total	8	100
	Total	8	100	Total	8	100	Total	8	100	Total	8	100	Total	8	100

According to the results of this study, the mean agreement rate of standard treatment plan with the academic and non-academic surgeons' treatment plan for borderline class III patients was  $75.0\% \pm 17.41\%$  and  $80.0\% \pm 17.73\%$  for

orthodontic treatment plan,  $80.0\% \pm 7.56\%$  and  $80.0\% \pm 17.73\%$  for orthognathic surgery treatment plan,  $70.55\% \pm 9.4\%$  and  $68.61\% \pm 9.08\%$  for single or double-jaw surgical treatment plan, and  $79.83\% \pm 7.76\%$  and

80.63%±9.79% for total treatment plans, respectively (Table 2). With regard to the results of statistical tests, there was no significant difference in the mean agreement rate between academic and non-academic surgeons for

orthodontic treatment ( $p=0.54$ ), orthognathic surgery ( $p=0.1$ ), single or double-jaw surgery ( $p=0.68$ ), and treatment plans in total ( $p=0.78$ ).

**Table 2-** The agreement rate distribution and central index's between academic and non-academic surgeons in choosing treatment plans for borderline patients compared to the standard treatment plan

Treatment Plan	Surgeons	Number	Mean	Standard Deviation	Standard Error	P value
Orthodontics	Academic	8	75.0%	17.16%	5.0	0.54
	Non-Academic	8	80.0%	17.73%	6.27	
Surgery	Academic	8	80.0%	7.56%	2.67	1.0
	Non-Academic	8	80.0%	17.73%	6.27	
Single or Double Jaw Surgery	Academic	8	70.55%	9.4%	3.32	0.68
	Non-Academic	8	68.61%	9.08%	3.21	
Total	Academic	8	79.38%	7.76%	2.75	0.78
	Non-Academic	8	80.63%	9.79%	3.46	

**Table 3-** The agreement frequency and percentage of academic and non-academic surgeons regarding the different treatment plans for borderline class III patients in comparison with the academic treatment plan based on Kappa coefficient.

Group	Kappa Coefficient	Number
Academic	0.40	2
	0.50	2
	0.70	3
	0.80	1
Non-Academic	0.20	1
	0.50	1
	0.60	1
	0.70	3
	0.80	2

According to the results of this study, the mean Kappa coefficient of agreement of standard treatment plan with academic and non-academic surgeons' treatment plan for borderline class III patients when choosing total treatment plan was 59% (SD=15%) and 62% (SD=20%), respectively; according to t-test, there was no significant difference in their agreement rate ( $p=0.68$ ).

The mean agreement rate of standard treatment plan with academic and non-academic surgeons' treatment plan in 20 studied images was 79% (22%) and 81% (21%), respectively. According to the Wilcoxon test and paired t-test, there was no significant difference in this regard

( $p=0.69$  and  $p=0.84$ , respectively).

Of the 160 images analyzed by 8 non-academic surgeons, 129 (80.6%) had an agreement with the standard treatment plan, which was 127 images (79.4%) for academic surgeons. There was no significant difference between the two ratios in academic and non-academic surgeons ( $p=0.78$ ).

The frequency of proposed orthodontic or single or double jaw orthognathic surgery treatment plans suggested by the two groups of academic and non-academic surgeons compared with the standard treatment plan is shown in Table 4.

**Table 4-** Frequency of proposed orthodontic treatment plan, single or double jaw surgery in standard treatment plan and two groups of academic and non-academic surgeons

	Orthodontic treatment	Single Jaw Surgery	Double Jaw Surgery
Academic Treatment Plan	54	22.7	22.7
Academic Surgeons	56	24.5	19.5
Non-Academic Surgeons	52	26	22

## Discussion

Orthodontists and surgeons have a high sensitivity with regard to their judgments about the treatment plans provided for borderline patients due to their special training received, educational background, and scientific knowledge.<sup>10</sup> Today, due to increased patient awareness,

orthodontists and surgeons can increase the treatment success rate through communicating with patients and getting their opinion about facial esthetics. Borderline class III patients with mild to moderate skeletal problems can be treated with orthodontic or surgical procedures. According to Rabie et al. (2008), a treatment method with the highest success rate is the most important part in treatment of this

abnormality.<sup>11</sup>

In a study by Tseng et al, to determine the differences in class III patients regarding surgical or orthodontic treatment alone revealed that the Wits appraisal and overjet indicators are of great importance for discrimination of the two groups of patients, especially the Wits appraisal, because if it is more than -11 according to this study, the patients would surely require surgical treatment. In addition, if the overjet is more than 5 mm, the patient should undergo surgery<sup>9</sup>. In a similar study by Rabieet al, class III patients with an ANB of more than -5 degree should be surgically treated and, if ANB is more than 1 degree, they can be treated with orthodontic treatment without the need for surgery<sup>11</sup>.

A study by Mirhashemi and Parhiz aiming to compare the borderline class III patients' treatment plans provided by the two groups of orthodontists and surgeons revealed no significant difference between treatment plans provided by orthodontists and surgeons<sup>4</sup>. The lack of a significant difference between the two groups of academic and non-academic surgeons in the present study which have similar scientific and experimental background seems logical, and may be due to the fact that the two groups had been graduated from the same university.

According to Benyahia et al. (2011), orthodontists have their own experience, and if they are asked about a borderline case, they may reply differently, which is generally because of their experience of previous treatments. As in the present study, being an academician had no great effect on the final treatment plan, and experience was an important factor in providing the treatment plan<sup>5</sup>.

A study by Benyahia et al. (2011) showed that some of the factors related to the specialists may intentionally or unintentionally affect their evaluation regarding the type of treatment plan to enhance facial esthetics and profile attractiveness<sup>5</sup>. Howells and Shaw (1985) showed that social class plays a key role in evaluation of individuals in

terms of dental and skeletal esthetics. One of the limitations of this study was the impossibility of examining the effects of variables such as patients' social class on the treatment plans and their choice of methods to enhance facial esthetics because, according to the aforementioned issues, these factors have a major impact on the final treatment plan<sup>12</sup>.

Eslami et al. analyzed the pretreatment lateral cephalograms of 65 moderate skeletal class III patients. The camouflage treatment group (36 patients) consisted of flaring of the maxillary incisors and retraction of the mandibular incisors, and the surgical group (29 patients) was treated by mandibular setback, maxillary advancement, or bimaxillary surgery. They showed that Holdaway H angle and Wits appraisal were able to differentiate between the orthodontic and surgical treatment plans. According to their study, cases with a Holdaway angle greater than 10.3° and Wits appraisal greater than -5.8 mm would be treated by orthodontic treatment successfully, while those with a Holdaway angle of less than 10.3° and Wits appraisal less than -5.8 mm can be treated surgically<sup>13</sup>.

In the present study, the subjects were limited only to the Dental School of Shahid Beheshti University of Medical Sciences; therefore, the study results cannot be generalized to the entire community. In addition, the chief complaint of patients and their psychological conditions were not addressed in this study.

## Conclusion

In comparison between academic and non-academic surgeons, there was no significant difference in agreement rates for treatment plan suggestion for borderline class III malocclusion patients but, we should consider that they had been all graduated from the same dental school.

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