The Prediction Failure for Orthodontic Treatment of Class II Malocclusion

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Abstract

Background: It is very important to have keys for the prediction of success or failure of orthodontic treatment in the correction of difficult class II malocclusion so Gramling in 1995 introduced the probability index to answer why some class II cases were treated successfully while the others are not depending on the probability index value for each class II patient .
Objectives: To determine the percent of class II patients that can be treated orthodontically and the ratio of those who need combination of orthodontic treatment and orthognathic surgery.
Materials and method: 750 lateral digital cephalometric radiographs for Cl II adult patients (according to ANB angle , ANB > 4° [1]) were analyzed using AutoCAD 2010 program to measure five cephalometric angles which are **(1)**FMA (Frankfurt mandibular plane angle) **(2)**ANB angle **(3)** occlusal plane Frankfurt plane angle **(4)** FMIA (Frankfurt mandibular incisor angle) **(5)** SNB angle .
RESULTS 21% of class II patients cannot be corrected successfully by orthodontic treatment only but they also need orthognathic surgery, while the others can be treated orthodontically with special considerations .
Conclusions: Most of the class II patients seeking for orthodontic treatment can be treated successfully orthodontically and most of difficult class II cases with high probability index show vertical problems which mean that class II with high angle are difficult to be treated orthodontically without special consideration or orthognathic surgery .
Key words : Cl II malocclusion ,probability index ,failure in Cl II correction.

INTRODUCTION

Since 1970 Charles H. Tweed International foundation started a series of researches to answer the question that why some Class II cases were corrected successfully while other are not so well corrected . The first research was a study of Charles H. Tweed class II treatment in which a random sample of 54 class II malocclusion were selected from the Tweed library and it showed that Dr. Tweed corrected class II malocclusions 40 years ago as effectively as they are corrected today and some class II cases were corrected quite well while the other are not so well [(2)] . The second research was a study of 150 difficult Cl II malocclusion treated by the member orthodontist of Charles H. Tweed international foundation and the study revealed the same finding that a wide variety of class ii malocclusions were corrected ,some better than the others.

The third study was another investigation on the orthodontic treatment of difficult class II malocclusions only the unsuccessfully corrected cases and it appeared that there were some cephalometric keys for prognosis[(3)],and finally a study done by Gramlling in 1993 and edited by Levern Merrifield in 1995 was an effort to discover the predictive element for success or failure for class II correction which was the probability index [(4).]

Objectives:

According to the probability index the current study was done to determine the ratio of Cl II cases that can be treated orthodontically and those whom need a combination of orthodontic treatment and orthognathic surgery.

MATERIALS AND METHODS:

The sample includes 750 lateral cepholometric radiographs of skeletal class II adult patients (ANB>4) [(5)] attending the Orthodontic department of college of Dentistry, University of Baghdad , in addition to under and postgraduate students in the same college and the age of those patients was ranging from 18 to 31 years old . Five angles were measured on each cephalometric radiograph using Auto CAD 2010 software as shown in figure 1 ,and these angles were(1)FMA (Frankfort mandibular plane angle) . (2)ANB (3) occlusal plane Frankfurt plane angle (4) FMIA (Frankfort mandibular incisor angle). (5) SNB. Then by using a special formula described by James & Gramling in 1995 which is based on special statistical formulas to get the probability index value for each patient [(4)] as in table 1.

Figure 1 : cephalometric analysis showing the five angles of the probability index

Table 1:The probability index calculation

angle	*Point value*	*Chephalometric value*	*Probability index*
FMA 20-30	5	35	25
ANB 6 or less	15	8	30
FMIA 60 or more	2	54	12
Occ PL 7 or less	3	10	9
SNB 80 or more	5	75	23
		total	101

To measure the probability index of a given case as described by James and Gramling [4] suppose that the chephalometric value of the five angles as was given in table 1 for example the FMA was 35 so if it ranged between 20-30 so it is within normal limit but 35 is about 5 degrees outside the correctable range so this amount of increase (5) will be multiplied by the point value (which is the mathematic factor that was determined by considering the anatomic importance of each cephalometric angle and the arithmetic value of that angle) to get the probability index value of that angle which is 25 for FMA in the supposed case and so on for the other variables (angles) which are calculated in the same manner then totaled to yield the probability index of 101 for the example case .

Then after getting the probability index value of all lateral cepholometric radiographs they were classified according to table 2 into: impossible, very poor, poor, fair, good and excellent prognosis. Then the percent of each prognosis was obtained by dividing its number to the total number of cases. For example there were 60 radiographs of probability index value more than 100 (impossible prognosis) which mean that 8% of class II cases are impossible to be treated orthodontically successfully without orthognathic surgery.

Table 2: Case prognosis according to the probability index value

Probability index	*prognosis*	*treatment*
More than 100	impossible	adjunctive orthognathic surgery
99-90	Very poor	Border line surgery
89-80	poor	Intrusive force control
79-70	fair	Orthodontic correction (excellent appliance control)
60-69	good	Orthodontic correction (minimum effort)
50 and bellow	excellent	Orthodontic correction (minimum effort)

Then according to the probability index value each Cl II case will be classified as in the following table(2) according to James & Gramling in 1995[4] .

RESULTS

The results showed that 8% of class II patients were with impossible prognosis and cannot be treated successfully without adjunctive orthognathic surgery, 13% of the cases were with very poor prognosis and considered as a border line cases for surgery,14% of class II patients are with poor prognosis can be treated orthodontically with intrusive force control, 27 % of class II patients are with fair prognosis that can be treated successfully orthodontically with excellent appliance control , 18 % of cases are with good prognosis and can be treated successfully orthodontically with minimum effort, and finally 20 % of patients had an excellent prognosis and can be treated successfully orthodontically with minimum effort.

Table 3:The ratio of class II patients according to probability index:

Probability index	*prognosis*	*treatment*	*ratio*
More than 100	impossible	adjunctive orthognathic surgery	8%
99-90	Very poor	Border line surgery	13%
89-80	poor	Intrusive force control	14%
79-70	Fair	Orthodontic correction (excellent appliance control)	27%
60-69	good	Orthodontic correction (minimum effort)	18%
50 and bellow	excellent	Orthodontic correction (minimum effort)	20%

Discussion

38% of the Cl II cases can be treated only by orthodontic treatment with minimal effort and without any precautions ,also 27 % of Cl II patient can be treated orthodontically successfully with excellent appliance control like the use of the Opus closing loop designed by Siatkowski which offers excellent control of forces and moments, so that space can be closed under good control [11]. The loop can be fabricated from 16 x 22 or 18 x 25 steel wire, or from 17 x 25 TMA wire. It is activated by tightening it distally behind the molar tube and can be adjusted to produce maximal, moderate, or minimal incisor retraction, but like all closing mechanisms with a long range of action, must be monitored carefully [12] .

14% of Cl II cases need iIntrusive force control like the use of PG spring which was proven radiographically and clinically to reduce the amount of overbite by upward and backward translation of upper incisors by Gjessing in 1994 [6] and tested by Dincer etal in 2000 [7] , in addition to the molar intrusion by TAD for over erupted posterior teeth to improve both vertical and sagittal skeletal discrepancy [8,9, 10]

Conclusion

Most of difficult class II cases with high probability index show vertical problems as the values of both FMA and occlusal plane angle were increased which increase the need for surgery but a conclusive judgment of the prognosis of a Cl II malocclusion on the bases of FMA alone could not be made [4], again cases with high ANB angle value and others with low ANB angle value showed a very little difference in the successfully treated and unsuccessfully treated Cl II samples which mean that the ANB angle alone is not a reliable predictor of the success or failure of Cl II corrections, also many difficult cases show deficient mandible in both sagital and vertical plane which could be corrected in adult patients by surgery.The importance of the probability index came from that it aid in identifying those class II cases that require either adjunctive orthognathic surgery or alternate treatment methods like the extraction of 1st or 2nd molar in addition to premolars extraction also it can help in predicting accurately the treatment time necessary to correct a given class II malocclusion thereby enable the orthodontist to assign a fairer and more appropriate fee.

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