

ORIGINAL STUDY

**RESEARCH ON THE DIMENSIONAL CHANGES DETERMINED BY
DISJUNCTION IN THE MEDIAN AREA**

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ABSTRACT

To evaluate and compare the changes occurred in the anterior area, at the molar and premolar level, after the disjunction has been made by breaking of the palatine suture. The trial group of the study was divided into 5 age groups, as follows: 6-8 years: 3 patients, 1 girl and 2 boys; 9-11 years: 12 patients, 7 girls and 5 boys; 12-14 years: 6 patients, 4 girls and 2 boys; 15-17 years: 6 patients, 3 girls and 3 boys; 18-20 years: 5 patients, 2 girls and 3 boys. After establishing the diagnosis on the trial mould of the patients measurements of the permanent upper jaw incisors were carried out. The values of the incisor sum thus determined were introduced in Pont's table, obtaining the corresponding values of the inter-premolar distance and inter-molar distance. The achieved values were compared to the ones resulted from direct measurement, at the level of classical benchmarks. The patients received subsequently a breaker type device fitted with a disjunction screw with the capacity of 11 mm. After the completion of the disjunction, measurements were repeated. The values obtained after the disjunction were compared to the ones before the disjunction. The study quantified the changes determined by disjunction in the upper jaw, transversally, on a sample of 30 patients, 17 girls and 13 boys. The analysis of the data obtained after the disjunction brings several interesting elements: percentage-wise, the value of I.P. in I.M. increases after disjunction, compared to the value before the beginning of the treatment, the percentage of I.P. in I.M. displays an almost linear variation pattern. The greatest widening was obtained in the anterior area (the most affected by the lack of space), confirming thus the hypotheses concerning the ways of breaking of the palatine suture, as well as the ones on the movement of jaw fragments during the disjunction.

KEYWORDS: *jaw transversal size, disjunction, Pont's indexes.*

1. Introduction

The production of dento-maxillary anomalies depends on the subjects' individual embryonic development and legacy characters as well as disturbances in the post-embryonic growth from

birth until the end of the development phase of adulthood [1]. Masticatory apparatus and its structure is a very complex formation. This is explained by the morphology varied and mutual reports of various elements of the masticatory apparatus. Therefore, after gathering all the evidence from clinical and laboratory examinations, they must be processed both

analytic and synthetic , to specify the diagnosis. We must take into account: the number of teeth, size, shape and position, width and length of the dental arches , like occlusion , reports of opposing teeth , alveolar ridge shape and the relationship between them and many other features[2-5].

Talking about orthodontic treatment we mean treatment of dento-maxillary anomalies often in a narrow meaning of the word, like treatment with braces . Application of orthodontic appliances is only part of a complex therapy[2]. It is hard to achieve success through orthodontic treatment based only on appliances , apart from prophylactic , intercepted , sometimes surgery and psychotherapy measures [4].

The transversal occlusion anomalies are characterised by the modification of the relations between the lateral parts of the jaws in relation to the median plane. Jaw compressions and constrictions ensue, greatly influencing the functions of the masticatory system.

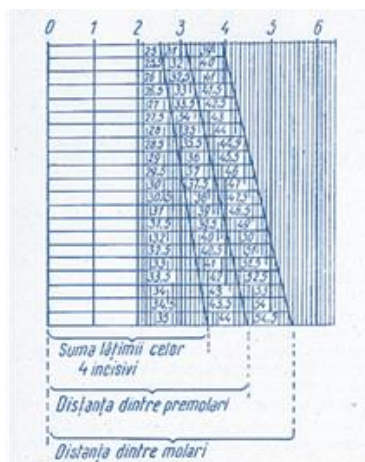


Figure 1. Pont's table (after Kalvelis)

The opposite aspect, when the lateral parts of the jaws are moved away from the median plane, displays no functional problems. This is why, in some manuals, transversal anomalies are represented only by jaw compressions [3]. The quantification of the transversal size of the jaw is achieved by means of

Pont's indexes [4]. In order to avoid determining each time the normal width of the jaw, we can use a table which contains the already calculated normal widths of jaws, starting from varied sums of the width of incisors (figure 1).

2. Material and Methods

The criteria for being included in the trial:

- age: between 6 and 20;
- existence of the jaw compression orthodontic pathology;
- lack of any previous orthodontic treatment;
- signing the agreement for being included in the trial.

The trial group was divided into 5 age groups, as follows (figure 2):

- 6-8 years: 3 patients, 1 girl and 2 boys
- 9-11 years: 12 patients, 7 girls and 5 boys
- 12-14 years: 6 patients, 4 girls and 2 boys
- 15-17 years: 6 patients, 3 girls and 3 boys
- 18-20 years: 5 patients, 2 girls and 3 boys

After establishing the diagnosis, the patients had dental impressions done and the trial mould was obtained, on which measurements of the permanent upper jaw incisors were carried out.

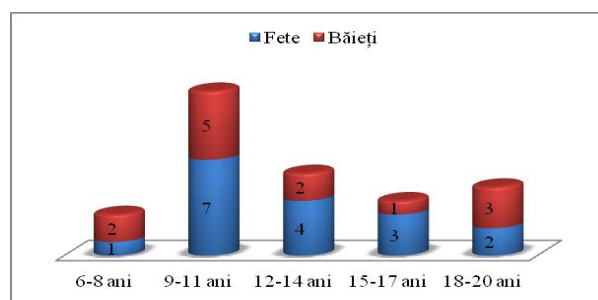


Figure 2. Distribution of the trial group according to age and sex

The values of the incisor sum thus determined were introduced in Pont's table, obtaining the corresponding values of the inter-premolar distance and inter-molar distance. The achieved values were compared to the ones resulted from direct

measurement, at the level of classical benchmarks (figure 3).

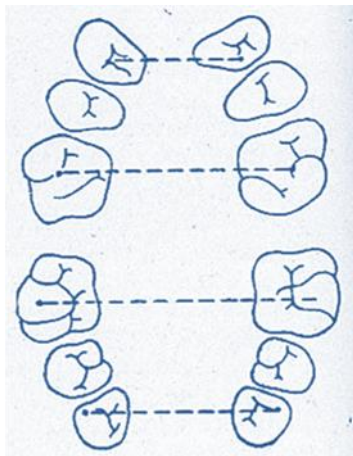


Figure 3. Benchmarks for the measurement of inter-premolar and molar distances (according to Kalvel)

The patients received subsequently a breaker type device fitted with a disjunction screw with the capacity of 11 mm. In 3 cases, when the size of the jaw was very small, a 9 mm disjunction screw was used. After the completion of the disjunction (marked by the correction of the occlusion relation transversally) the patients had dental impressions done again. Measurements were repeated on the study mould for determining the inter-premolar and molar diameters, using the same benchmarks as before the disjunction.

The values obtained after the disjunction were compared to the ones before the disjunction.

3.Results and Discussions

To our knowledge, this is the first report measuring and quantifying the changes determined by disjunction in the upper jaw, transversally, on a sample of 30 patients, 17 girls and 13 boys (figure 4).

In 2 patients, the S.I. could not be determined because at the time of carrying out the impressions, they only had the baby upper incisors on the arcade. In 3 patients the S.I. values were at the limit of

macrodontia (36 mm). The distribution of the S.I. values is given in figure 5.

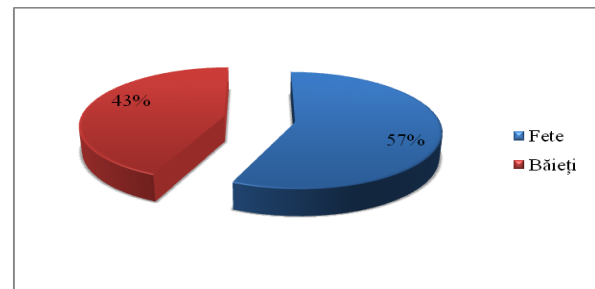


Figure 4. Distribution on sexes of the analysed group

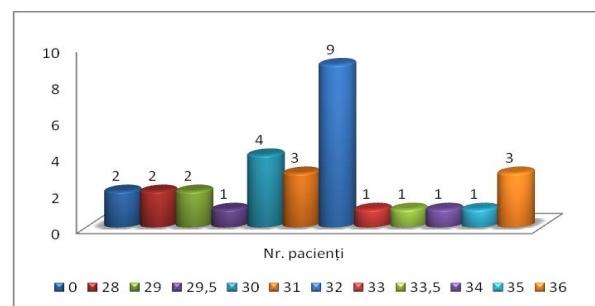


Figure 5. The distribution of S.I. values in the trial group

Introducing S.I. values in Pont's table, a series of ideal values were obtained, both for the premolar diameter (I.P.), and for the molar diameter (I.M.). To be able to quantify the changes caused by the jaw compression anomaly, the IP percentage in IM was calculated in relation to the incisor sum (figure 6).

As one can easily notice, the chart of the percentage variation follows the variation curve of I.M., while I.P. has equal sensitive values for the entire S.I. range determined through measurements. Our results are in concordance with the literature [1,6,7].

In terms of real values, the results of the direct measurements on the patients' trial moulds before the disjunction treatment have another variation pattern. These findings support the suggestions of Cocarla El. and Chateau M. [4,5] .

The first aspect resulting from the analysis of the above data is represented by a wider range of percentage values, between 65.22% minimum and

84.44% maximum (figure 7).

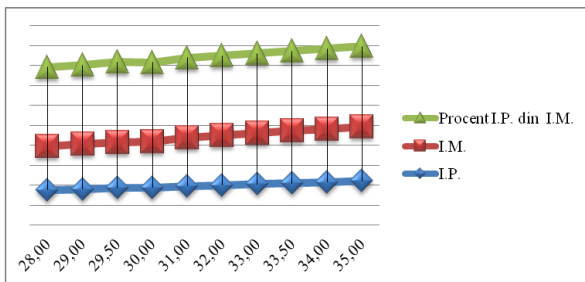


Figure 6. The percentage variation between the ideal values of I.P. in relation to I.M. according to S.I.

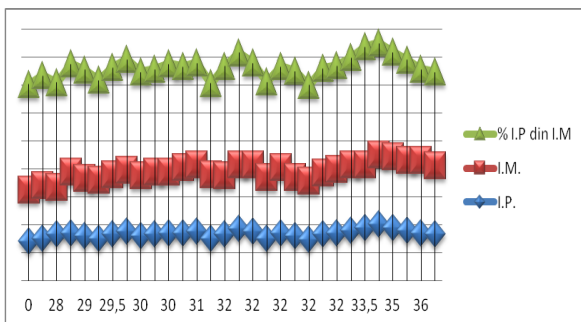


Figure 7. The percentage variation between the real values of I.P. in relation to I.M. according to S.I., before the disjunction

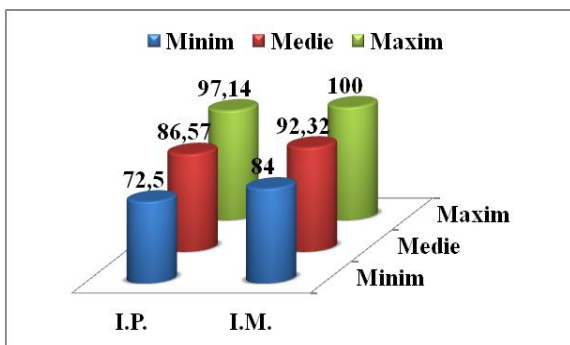


Figure 8. Differences between the real and calculated values for I.P. and I.M. in the trial group before the disjunction

The discrepancy between the variation of I.P. on the one hand and I.M. and the percentage of I.P. in I.M. is more conspicuous for the real values than for the calculated ones, which draws the attention to the main localization of the jaw narrowing process, which seems to be mostly anterior and, to a certain extent, independent of the size of the teeth. We obtained values between 72.5% and 97.14%, with an average of 86.57% (for I.P.) and 84% and 100%, with an average

of 92.32% (for I.M.), (figure 8).

It can be easily noticed that the greatest lack of space is recorded in the anterior area, at premolar level, confirming thus one of the guiding hypothesis resulting from the analysis of the data up to this stage of the trial. This result contrasts with the results of Hernandez – Alfaro F. et al who found that , due to a retrospective study , the constriction of the maxilla is more often present in the molar area [7-10]. The analysis of the data obtained after the disjunction brings several interesting elements to our study, namely:

- percentage-wise, the value of I.P. in I.M. increases after disjunction, compared to the value before the beginning of the treatment;
- the percentage of I.P. in I.M. displays an almost linear variation pattern (figure 9).

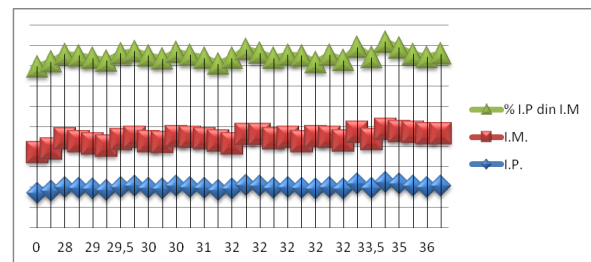


Figure 9. Percentage variation between the real values of I.P. in relation to I.M., after the disjunction

- given that the I.M. parameter undergoes slightly significant quantitative changes, we can consider that the percentage changes were done mostly on the account of I.P. which underwent the most significant quantitative changes (figure 10). These findings support the suggestions of Kilic E., Iodice G. and Seyed M. that once established similar values [9-18] .

The differences between the values measured before and after the disjunction at molar level are represented by a range of values comprised between 1 and 5 mm (in absolute value, figure 11), with an average of 3.26 [19].

Comparing the changes recorded after disjunction at premolar and molar level, we find that the most significant phenomena occurred in the

anterior area (figure 11).

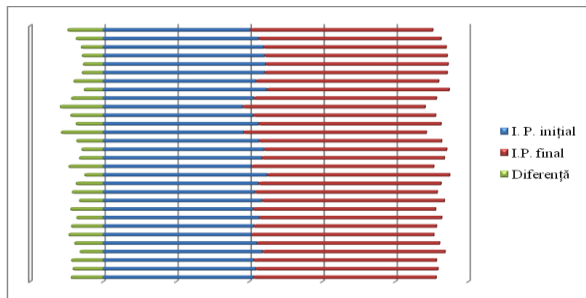


Figure 10. I.P. changes obtained after the disjunction

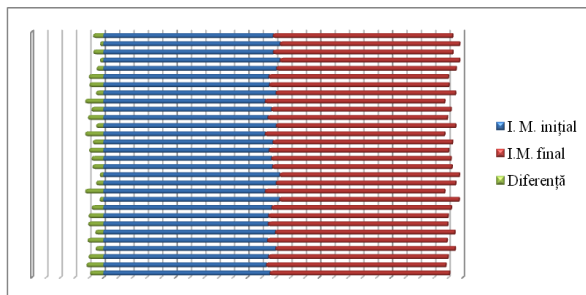


Figure 11. I.M. changes consecutive to the disjunction

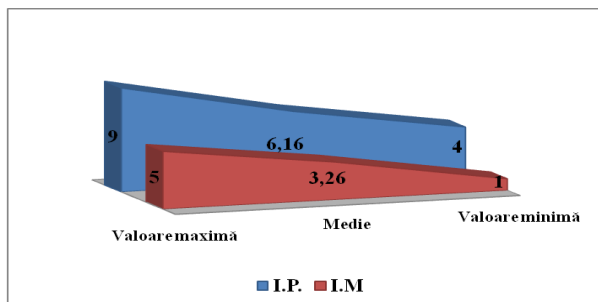


Figure 12. Comparison between the changes which occur at premolar and molar level consecutive to the disjunction process

Thus, at premolar level, the recorded differences were between 4 and 9 mm (absolute value), with an average of 6.16, values significantly greater than the ones quantifying changes in the molar area (figure 12).

4. Conclusions

Most of the patients have a sum of the incisors of 32 mm, resulted from a maximum mesiodistal width of the permanent upper central incisor of 9 mm

and a maximum mesiodistal width of the permanent upper lateral incisor of 7 mm[6,7,8,9].

In ideal conditions, the value of the premolar index is around 80% of the calculated value of the molar index.

For the measured values, percentage-wise, the value of the premolar index is around 74.5% of the molar index, reflecting, in most cases, a jaw narrowing predominant in the anterior area[8,9]

After disjunction, the percentage value of the premolar index is 82.25%, meaning that a significant widening of the jaw bone was achieved, consecutive to this therapeutic operation.

Another aspect which was taken into consideration was the narrowing degree at premolar and molar level in relation to the ideal values. Thus, the measured values were compared to the ideal ones and the difference between them was expressed in percentages.

The greatest widening was obtained in the anterior area (the most affected by the lack of space), confirming thus the hypotheses concerning the ways of breaking of the palatine suture, as well as the ones on the movement of jaw fragments during the disjunction.

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