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Predictability evaluation of virtual surgical planning in linear and angular mandibular movements after orthognathic surgery in malocclusion class II and III patients. A retrospective study

Evaluación de la predictibilidad de la planificación quirúrgica virtual en movimientos mandibulares lineales y angulares después de la cirugía ortognática en pacientes con maloclusión clases II y III. Un estudio retrospectivo

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ABSTRACT: The orthognathic surgery is the procedure to correct dentofacial deformities. Today the Virtual Surgical Planning (VSP) is the best tool to visualize the possible maxillomandibular final position. One of the most asked questions is: since the mandible is a mobile bone, the VSP can be predictable for the final result of the positioning of the mandible? Then a retrospective and observational study was developed to find the VSP predictability in mandibular movements after orthognathic surgery. Were research in class II and III patients using Composite Skull (Computed Tomography CT associated with dental scan). Linear and angular measurements were done comparing VSP to postoperative CT, with at least 6 months after surgery. Eight patients were included in the study. The cephalometric analysis was done using the Proplan software (Materialise Proplan CMF, São Paulo, Brazil). The results of the simulated in VSP and real movements of mandibular points were compared, calculating their linear and angular differences. A total of fourteen measurements were done and evaluated through of the t test, Bland-Altman, Wilcoxon and the Dahlberg error. In addition to being evaluated by clinically acceptable bias (+/- 2 mm). In the total, 4 differences were statistically significant (Chin height, HFP/Me, HFP/LLM, Coronal/Pg, FMA angle). The mean bias in linear measurements ranged from -3.23 mm (Coronal Plane/Pg) to 3.71 mm (PHF/Me). The VSP seems to be a precise and reproducible method as a way of elaborating treatments, reliably transferred to the patient through surgical guides. Although the 4 differences were statistically significant, when clinical measurements compared with them, only 2 measurements (HFP/Me and Coronal/Pg) result in a clinical significantly difference, 25% and 50%, respectively, result that can be explained by the absence of genioplasty guides.

KEY WORDS: Orthognathic surgery, mandibular surgery, malocclusion.

INTRODUCTION

Since the Virtual Surgical Planning (VSP) was introduced in orthognathic surgery, a big question arose about the predictability of the surgical movements. It is special in mandibular movements because the references used to put the dental arch in final position are the guide and the condyles. Another concern is the genioplasty, because we cannot use a reliable surgical guide to place the chin in the final position. So, the bones final position depends from surgical planning precision and surgical technique (Stokbro *et al*., 2014).

The technologic advances were very important when considerer image acquisition and creation of protocols to plan 3D orthognathic surgery. This provides easily access, utility, diagnosis and treatment plan elaboration.

The VSP is created through a Composite Skull. It is an anatomic reconstruction of face and skull Computer Tomographic (CT) and dental scanning. In Composite Skull the maxilla and mandible osteotomies are drawn. So, the surgical movements of maxilla, mandible and chin are done in the three special planes using the computer (Swennen *et al*., 2009). The aim of VSP is choice of treatment plan more favorable to facials proportions with a occlusal correction (Mazzoni *et al*., 2010).

When the planning is 3D, the surgeon visualizes the teeth, the bones and the soft tissues, in a unique virtual model. The cant and yaw deformities are detected, and they can´t be evaluate in the traditional cephalometric analysis and physical exam (Swennen *et al*., 2009; Baker *et al*., 2012). Comparing the virtual planning to conventional planning, we can see these advantages: autonomy to reproduce the surgical movements to gain the best final results; best diagnosis in 3D virtual model, with correction in Z (roll) and Y (yaw) axis; view between the dental arcades relationship and their transport to patient by surgical guides; better position and evaluation from temporomandibular position in mandibular fossa; and, idea of soft tissues changes in post-operative.

When performing the orthognathic surgery, the planning precision is very important to obtain great result (Centenero & Hernández-Alfaro, 2012). The surgeon capacity in reproduce the surgical planning in the operate room is essential (Ellis & Perez, 2011). The differences between virtual planning and the results when less than 2 mm not be considered clinically significant (Stokbro *et al*., 2014; Haas *et al*., 2015).

In 2016, Stokbro evaluated the precision and accuracy of the different positions in orthognathic surgery. Found high degree of linear precision of planning and post-operative results, but with a high standard deviation.

Due the mandible is a mobile bone, with possibility of temporomandibular joint changes in post-operative follow up, it is important evaluate the stability comparing the surgical virtual planning and understand the importance of the positions records before and after surgery.

MATERIAL AND METHOD

To do the orthognathic surgery, the VSP have been used routinely in HFC Healthy Hospital, in Piracicaba, São Paulo Brazil, since 2017. A study, in observational and retrospective format was performed in a group of 8 patients (4 men and 4 women). Six patients were Angle malocclusion class II and 2 class III patients.

Every patients were submitted to a orthognathic surgery planned with the same 3D program Proplan (Materialise Proplan CMF, São Paulo, Brazil), with the same protocol planning, and were treated from 2017 January to 2019 November. To be include in the research, the patients were submitted to bimaxillary orthognathic surgery with orthodontic prepare previously.

Some exclusion criteria to patients were early benefit surgery, monomaxillary orthognathic surgery and with previous trauma on facial bones, tumors, cleft lip or another orthognathic surgery.

This research was appreciated and approved by College São Leopoldo Mandic Ethics Committee, to clinics study. Was done without financial support by any institution or company. It is in conformity with the STROBE declaration of regarding the design of observational studies.

The surgical team that planned and executed every orthognathic surgeries were the same (L.C.P, C.J.O. M.). The facial skeleton was digitally recreated using Digital Imaging and Communications in Medicine (DICOM) from facial and skull preoperative CT. The cuts were 0.6 mm of thickness in axial, coronal and sagittal axis. Teeth scan were made by the same surgeon (L.C.P.). The scan was performed after the installation of hooks and saved in STL format.

The orthognathic surgery was planned through 3D cephalometric measurements and facial analysis using the same planning protocol development by the team. In software, were obtained the composite skull and they were putted in Natural Head Position (NHP) using a sequence of facial photos. Then, the scan images were superimposed with the CT.

The sagittal osteotomies were drawn in mandible. When necessary. The maxilla and mandible were movement to finals positions, with aim to create facial harmony in the 3 dimensions, accord with planning of Xia *et al*., 2015. The results were transferred to patients during the surgery by the surgical guides, printed through Computer Aided Desing/ Computer Aided Manufacturing (CAD/CAM) system, by Moonray printer, with photopolymerizable resin.

The frontal and lateral cephalometries virtual views were extracted from 3D planning and compared to define the predicted movements in maxilla in relationship to cranial bones. The surgical movements were measured to compare the pre and post-operative cephalometries.

The facial and skull CT were analysis at least 6 months after the surgery. Every patients were scanned in post-operative by the same surgeon. The results by simulation and by surgical procedure were compare, with the differences calculated in linear and angular measurements.

Statistical Analysis

In VSP and post-operative CT, linear and angular measurements were did. The same 2 reviewers (L.C.P., C.J.O.M.), to that inaccuracy between evaluators was minimized.

Were made descriptive and exploratory analyzes of measurement linear and angular data. Analyzed the systematic and aleatory errors by t-paired test, Dalberg error and Bland and Altman Methodology.

To interpreted the results of surgical plan precision, a positional difference between surgical plan and the post-operative result less than 2 mm or bigger than – 2 mm, and angular differences less than 4 degrees are considerate clinically insignificant (Tng *et al*., 1994; Xia *et al*., 2009; Shehab *et al*., 2013; Stokbro *et al*., 2014; Zhang *et al*., 2016; Swennen, 2017).

RESULTS

In total 22 patients were recruited to the study after hospital documentation and clinical exam. Only 8 patients participated being 4 men and 4 women, with an average of 24 years ± 7.69 (varying from 17 to 37 years).

The VSP was transfer with success to operated room. Every patients were satisfied with results, including facial profile and occlusion.

To illustrate the measurements did, were reported every measurement in a 25-year woman with Angle class II malocclusion and anterior open bite, submitted to orthognathic surgery (Figs. 1 - 13).

In the Tables I to III and Figures 1 to 13 are presented the results of the cephalometric measurements done in planning and in post-operative. The Dahlberg error represent the aleatory error between the measurements. The Dahlberg relative error (error in relation to the average of measurements) was greater in the measurements from frontal norm and angular measurements.

Table I. Linear measurements in right lateral norm.

Linear Measurement	Abbreviation	Definition
Mandibular Ramus Height	MRH	Distance between Condyle (Co - most superior and posterior point of the mandibular condyle) and Gonium (Go - most inferior and posterior point of the mandible).
Chin Height	CH	Distance between the incisal part of the lower incisor (41) and the bony chin point (Me).
Horizontal Frankfut Plane/Lower Incisor	HFP / LI	Distance between the Frankfurt horizontal plane and the incisal part of tooth 41.
Horizontal Frankfurt Plane/ Lower Right Molar	HFP / LRM	Distance between the Frankfurt horizontal plane and the mesiobuccal cusp of the lower right molar.
Horizontal Frankfurt Plane/Lower Left Molar*	HFP / LLM	Distance between the Frankfurt horizontal plane and the mesiobuccal cusp of the lower left molar.
Horizontal Frankfurt Plane / Pogonion	HFP / Pg	Distance between the Frankfurt horizontal plane and the Pogonion (Pg - most anterior point of the mental symphysis).
Horizontal Frankfurt Plane / Me	HFP / Me	Distance between the horizontal plane of Frankfurt and the Mentum.
Coronal Plane / Point B	Coronal / B	Distance from the Coronal Plane to point B (point located in the largest concavity of the anterior portion of the mandible).
Coronal Plane / Lower Incisor	Coronal / LI	Distance from the Coronal Plane and the incisal part of element 41.
Coronal Plane / Pogonion	Coronal / Pg	Distance from Coronal Plane to Pogonion.
Coronal Plane / Mentum	Coronal / Me	Distance from Coronal Plane to Mentum.

Linear measures, in lateral norm, analyzed. Acronym for abbreviation and definition of each measure. * Measurements taken on the left side.

Table II. Linear Measurements in frontal norm.

Linear measurement	Abbreviation	Definition
Midline / Lower Incisor	M / LI	Midline deviation in mandible
Midline / Pogonion	M / Pg	Midline deviation in chin

Linear measures, in frontal norm, analyzed. Acronym for abbreviation and definition of each measure.

Table III. Angular measurements on right lateral norm.

Angular measurement	Abbreviation	Definition
Frankfurt Mandibular Angle	FMA	Angle formed by the horizontal plane of Frankfurt with the Mandibular plane (Go – Me)

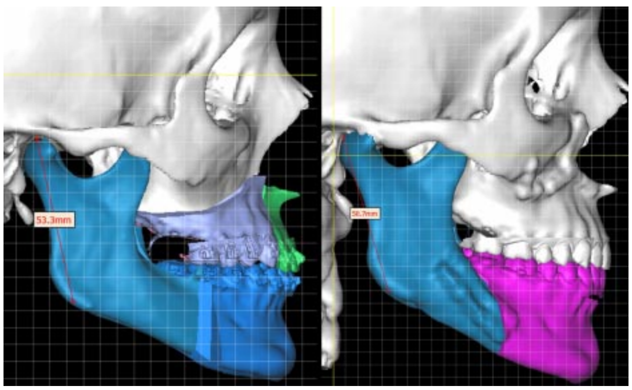

Fig. 1. Illustrations of the Height of the Mandibular Ramus measurements in the preoperative (53.3 mm) and postoperative (50.7 mm).

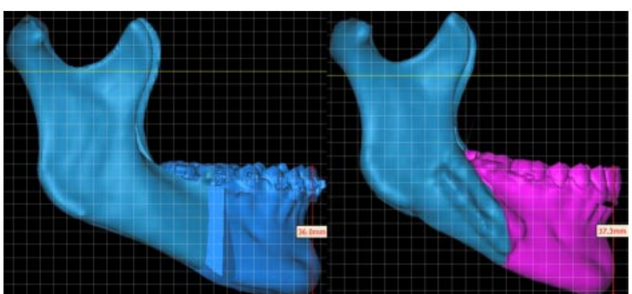

Fig. 2. Illustrations of Mentum Height measurements preoperatively (36.0 mm) and postoperatively (37.3 mm).

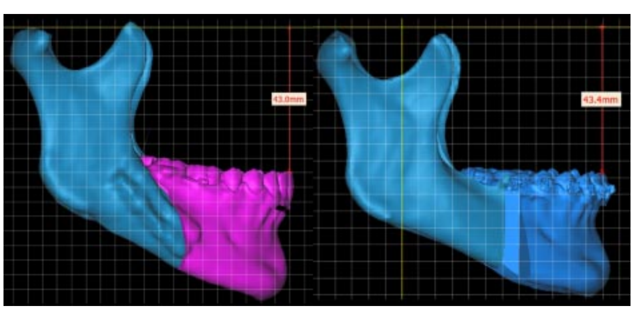

Fig. 3. Illustrations of measurements in the Horizontal Plane from Frankfurt to the Lower Incisor preoperatively (43.0 mm) and postoperatively (43.4 mm).

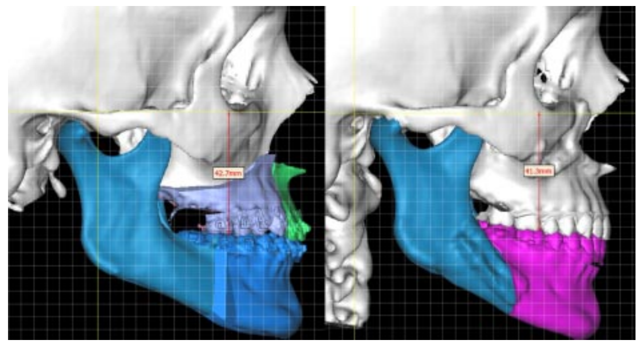

Fig. 4. Illustrations of measurements in the Frankfort Horizontal Plane of the Lower Right Molar preoperatively (42.7 mm) and postoperatively (41.3 mm).

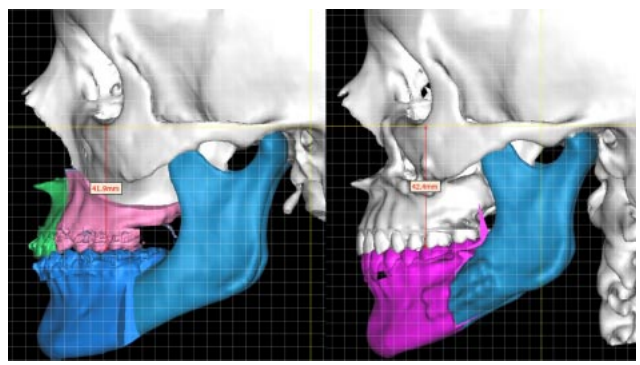

Fig. 5. Illustrations of measurements in the Frankfort Horizontal Plane of the Lower Left Molar preoperatively (41.9 mm) and postoperatively (42.4 mm).

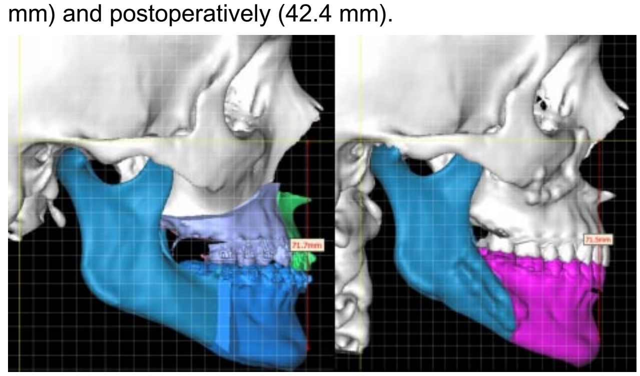

Fig. 6. Illustrations of measurements in the Horizontal Plane from Frankfurt to Pogonion preoperatively (71.7 mm) and postoperatively (71.5 mm).

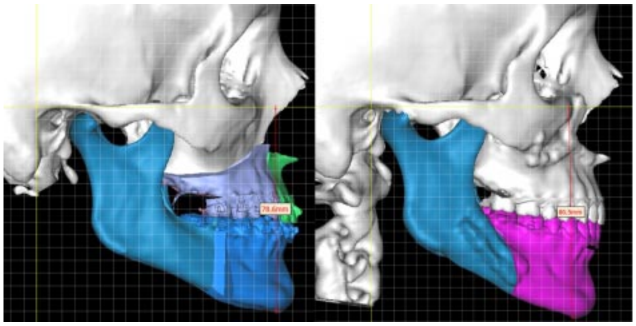

Fig. 7. Illustrations of the preoperative (78.6mm) and postoperative (80.5 mm) measurements of the Horizontal Plane from Frankfurt to the Mentum.

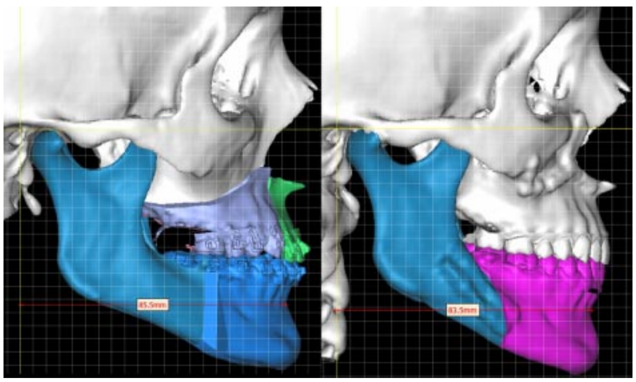

Fig. 8. Illustrations of preoperative (85.5 mm) and postoperative (83.5 mm) Coronal Plane to point B measurements.

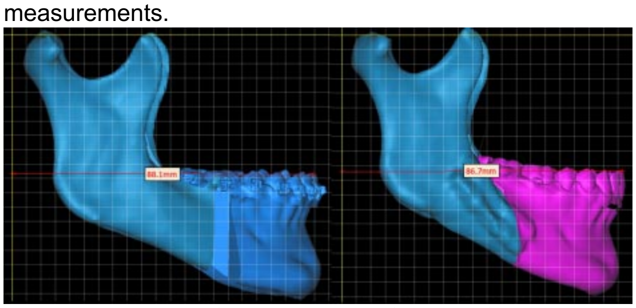

Fig. 9. Illustrations of measurements from the Coronal Plane to the Lower Incisor preoperatively (88.1 mm) and postoperatively (86.7 mm).

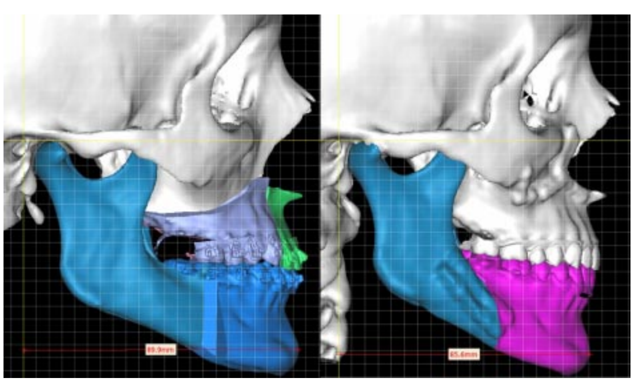

Fig. 10. Illustrations of measurements from the Coronal Plane to the Pogonion preoperatively (89.9 mm) and postoperatively (85.6 mm).

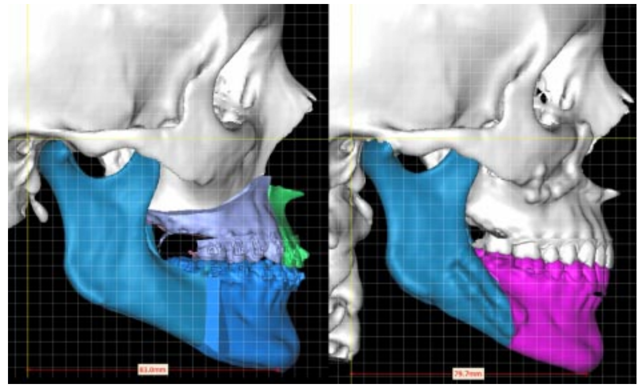

Fig. 11. Illustrations of measurements from the Coronal Plane to the Mentum in the preoperative (83.0 mm) and postoperative (79.7 mm) periods.

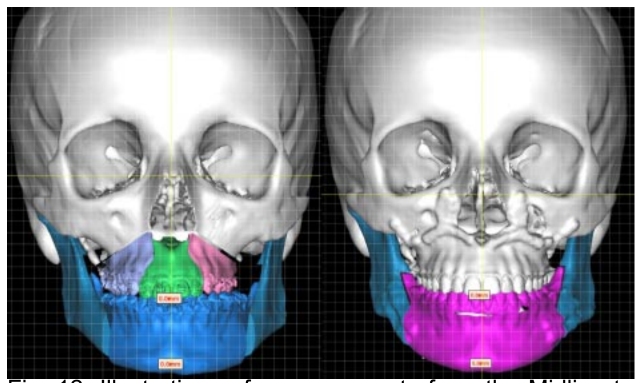

Fig. 12. Illustrations of measurements from the Midline to the Lower Incisor preoperatively (0.0mm) and postoperatively (0.0 mm) and from the Midline to the Pogonion preoperatively (0.0mm) and postoperatively (0.0 mm).

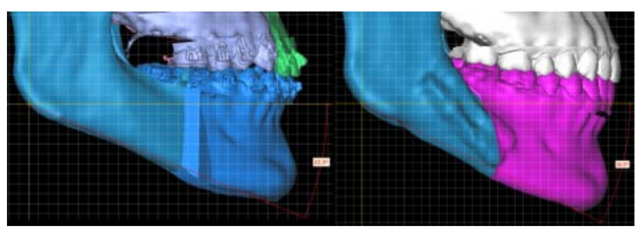

Fig. 13. Illustrations of preoperative (22.3°) and postoperative (26.5°) Frankfurt Mandibular Angle measurements.

In frontal measurements the Dahlberg error varied of 0.71 mm (M/LI) to 0.98 mm (M/Pg) and in the angular measurements varied 3.21° (FMA), been greater in relation to average of measurements (Table IV. To the other variables, the relative error was 3.7% to Coronal Plane to Mentum (Coronal/Me). The systematic errors of each measurement were also analyzed (Bland-Altman method, t test and Wilcoxon). The mean bias in angular measurements was 3.71º to FMA. Although three linear measurements (HFP/

Me, HFP/ULM and Coronal/Pg) and the angular measurement FMA showed statistically significant difference between the planning and the post-operative, the spatial distribution of the biases in the Bland-Altman plots indicated that there is no relationship between the biases and the means of the measurements (Figs. 14 - 27).

In the Table V are presented the frequency and the percentages of patients with bias acceptable clinically in the cephalometric measurements. It is observed that to lateral norm measurements, the percentage of patients with bias clinically acceptable varied from 25% (HFP/Me) to 100% (HFP/LRM). In the measurements of lateral norm, antero posterior, this percentage carried from 50% (Coronal/ Pg and Coronal/Me) to 75% (Coronal/B). In frontal norm was 75% (M/Pg) and 62.5% in angular measurement (FMA).

Table IV. Analysis of the accuracy of cephalometric measurements performed in surgical planning in relation to the postoperative result.

Variable	Measurement				Dahlberg Error	Dahlberg relative Error	[3]Bias (IC 95%)
	Surgical Planning		Post-Operative				
	Mean (standard deviation)	Median (minimum; maximum)	Mean (standard deviation)	Median (minimum; maximum)			
Lateral Norm (mm)							
Mandibular Ramus Height	59.61 (6.53)	59.0 (50.80-70.70)	58.70 (6.61)	58.55 (50.70-71.30)	1.41	2.4%	-0.91 (-4.62; 2.79)
Chin Height	40.28 (3.87)	40.85 (34.80-44.60)	42.01 (4.64)	43.35 (35.60-46.90)	1.48	3.6%	1.74 (-0.68; 4.16)
HFP/LI	47.19 (3.34)	47.30 (43.0-51.80)	48.31 (3.77)	47.60 (42.80-53.80)	1.20	2.5%	1.13 (-1.54; 3.79)
HFP/LRM	45.93 (2.43)	46.25 (42.30-49.20)	46.79 (3.13)	46.50 (41.50-51.10)	0.93	2.0%	0.86 (-1.24; 2.96)
HFP/LLM	45.18 (3.06)	45.25 (41.60-49.70)	46.11 (3.27)	45.60 (42.20-51.70)	1.22	2.7%	0.94 (-2.11; 3.98)
HFP/Pg	81.16 (6.77)	82.15 (71.70-89.30)	83.31 (8.45)	84.60 (70.60-91.70)	2.40	29%	2.15 (-3.34; 7.64)
HFP/Me	86.61 (6.34)	86.90 (78.60-94.70)	90.33 (7.61)	90.00 (80.30-99.80)	2.89	3.3%	3.71 (0.10; 7.33)
Lateral Norm - antero-posterior (mm)							
Coronal Plane/B	91.39 (8.00)	90.05 (82.90-105.30)	88.37 (6.51)	88.50 (8.80-100.30)	3.21	3.6%	-3.01 (-10.12; 4.09)
Coronal Plane/LI	95.11 (6.23)	92.45 (90.20-106.60)	93.09 (4.58)	92.05 (87.30-101.90)	2.27	2.4%	-2.03 (-7.23; 3.18)
Coronal Plane/Pg	94.96 (7.41)	93.75 (87.40-106.40)	91.74 (5.48)	91.00 (85.60-102.20)	3.33	3.6%	-3.23 (-10.42; 3.97)
Coronal Plane/Me	91.36 (8.96)	88.40 (79.00-105.60)	88.49 (6.76)	86.30 (81.60-102.20)	3.34	3.7%	-2.88 (-10.74; 4.99)
Frontal norm (mm)							
Midline/LI	-0.15 (0.30)	0.00 (-0.80-0.00)	-0.28 (1.00)	0.00 (-1.90-0.90)	0.71	331.9%	-0.13 (-2.20; 1.95)
Midline/Pg	-0.30 (0.86)	0.00 (-2.20-0.60)	-1.03 (1.88)	0.00 (-4.50-0.70)	0.98	148.1%	-0.73 (-3.20; 1.75)
Angular measurements (degree)							
FMA	25.11 (2.47)	24.65 (22.30-29.10)	28.83 (2.69)	29.00 (23.70-32.90)	3.21	11.9%	3.71 (-1.76; 9.18)

[1]Student's t test; [2]Wilcoxon test; [3]Bland-Altman method.

Table V. Frequency (%) of patients with clinically acceptable bias in the cephalometric measurements taken in the surgical planning in relation to the postoperative result (< 2 mm in linear measurements and < 4º in angular measurements).

Variable	Mean after surgery	Frequency (%)
Lateral Norm (mm)		
Mandibular Ramus Height	58.70	5 (62.5%)
Chin Height	42.01	5 (62.5%)
HFP/LI	48.31	4 (50.0%)
HFP/LRM	46.79	8 (100.0%)
HFP/LLM	46.11	6 (75.0%)
HFP/Pg	83.31	4 (50.0%)
HFP/Me	90.33	2 (25.0%)
Lateral Norm - antero-posterior (mm)		
Coronal Plane/B	88.37	6 (75.0%)
Coronal Plane/LI	93.09	5 (62.5%)
Coronal Plane/Pg	91.74	4 (50.0%)
Coronal Plane/Me	88.49	4 (50.0%)
Frontal Norm (mm)		
Midline/LI	-0.28	8 (100.0%)
Midline/Pg	-1.03	6 (75.0%)
Angular Norm (degree)		
FMA	28.83	5 (62.5%)

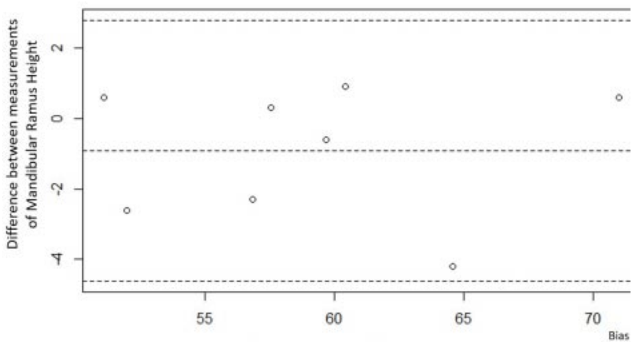

Fig. 14. Scatter plot for the difference and mean of the variable Height of the mandibular ramus between surgical planning and postoperative period. ULA: upper limit of agreement; LlA: lower limit of agreement. Bland-Altman method.

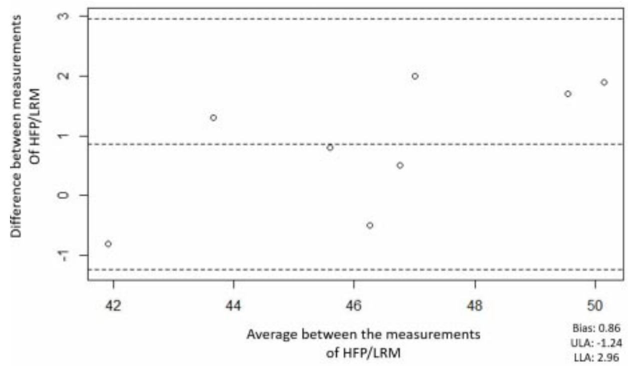

Fig. 17. Scatter plot for the difference and mean of the PHF/MID variable between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

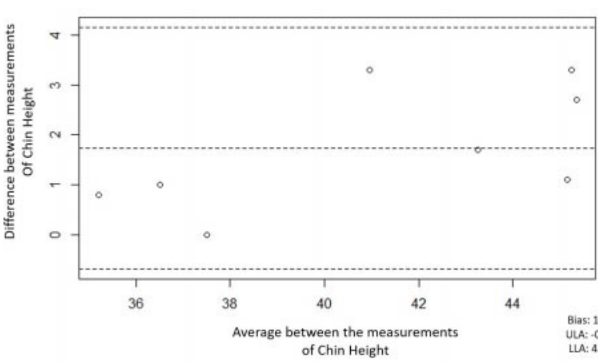

Fig. 15. Scatter plot for the difference and mean of the variable Height of the chin between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

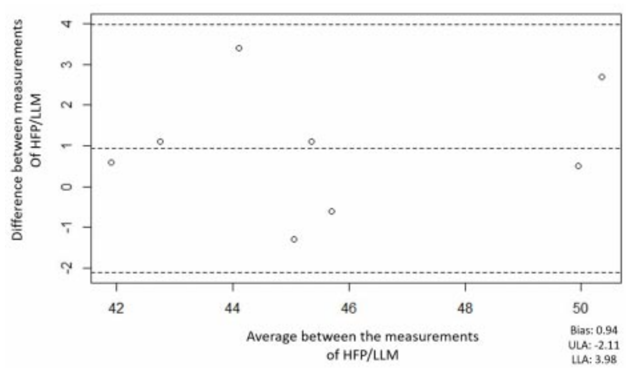

Fig. 18. Scatter plot for the difference and mean of the HFP/LLM variable between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

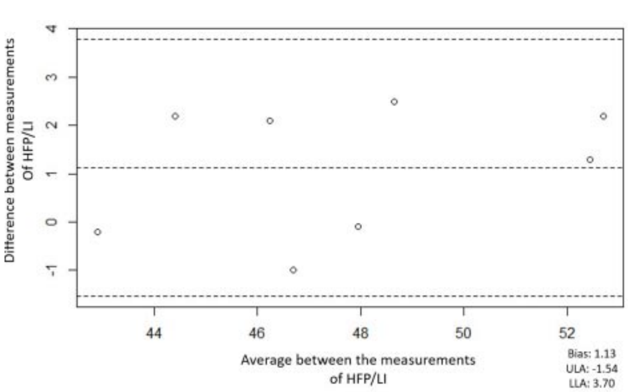

Fig. 16. Scatter plot for the difference and mean of the PHF/II variable between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

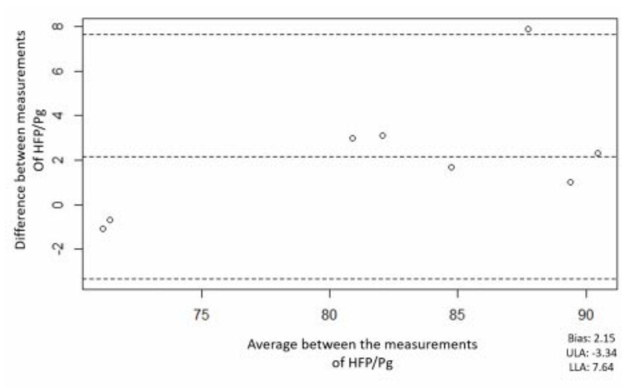

Fig. 19. Scatter plot for the difference and mean of the HFP/Pg variable between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

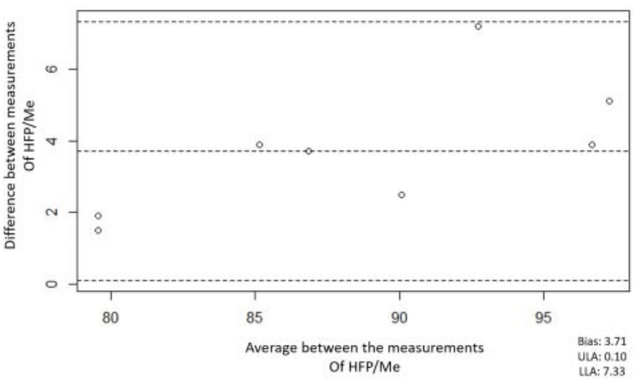

Fig. 20. Scatter plot for the difference and mean of the HFP/Me variable between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

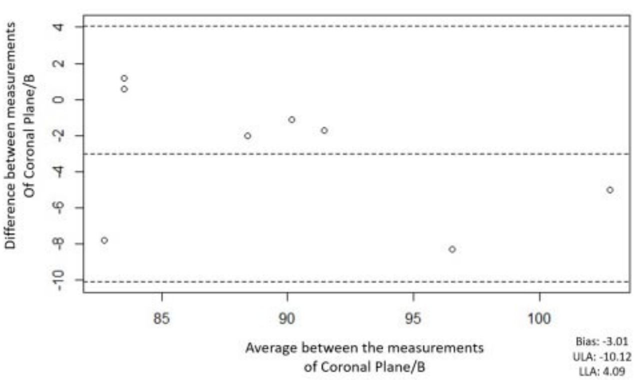

Fig. 21. Scatter plot for the difference and mean of the Coronal Plane/B variable between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

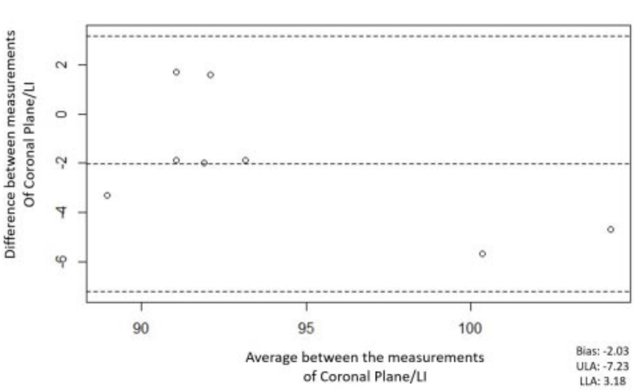

Fig. 22. Scatter plot for the difference and mean of the Coronal Plane/LI variable between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

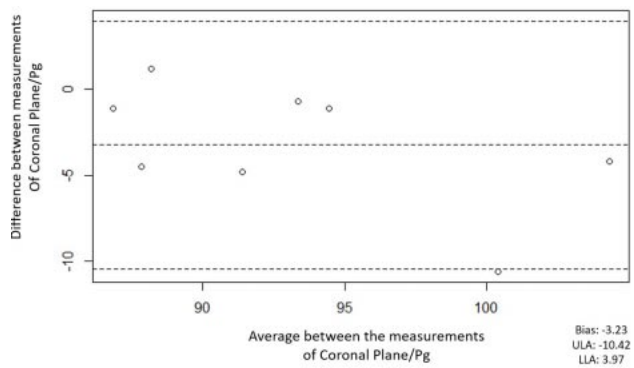

Fig. 23. Scatter plot for the difference and mean of the Coronal Plane/Pg variable between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

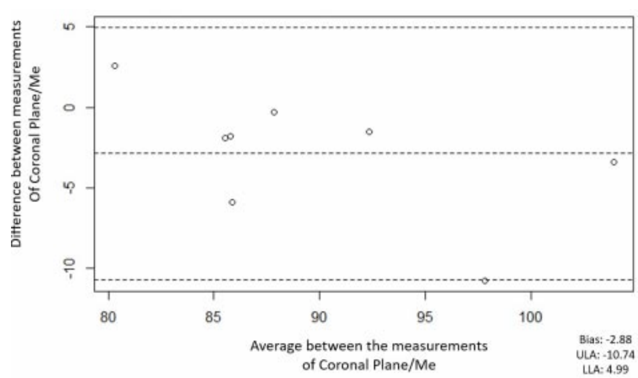

Fig. 24. Scatter plot for the difference and mean of the Coronal Plane/Me variable between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

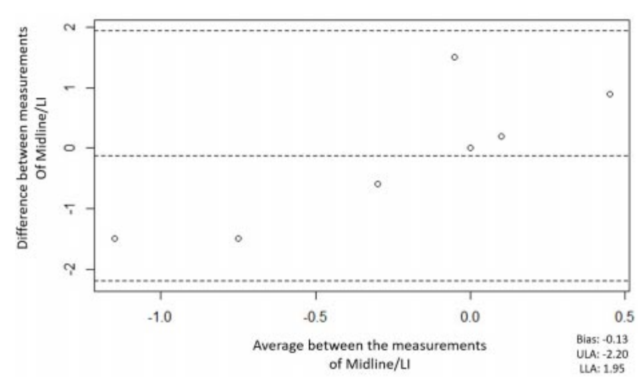

Fig. 25. Scatter plot for the difference and mean of the variable Midline/LI between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

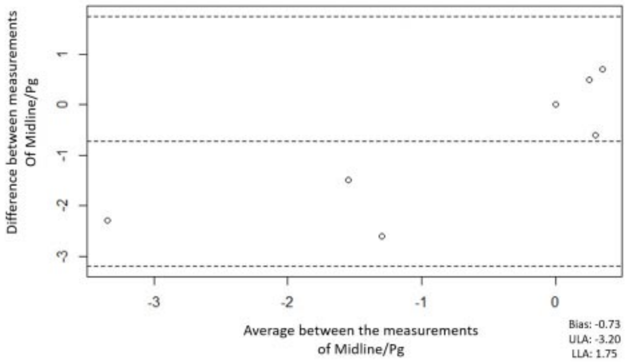

Fig. 26. Scatter plot for the difference and mean of the variable Midline/Pg between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

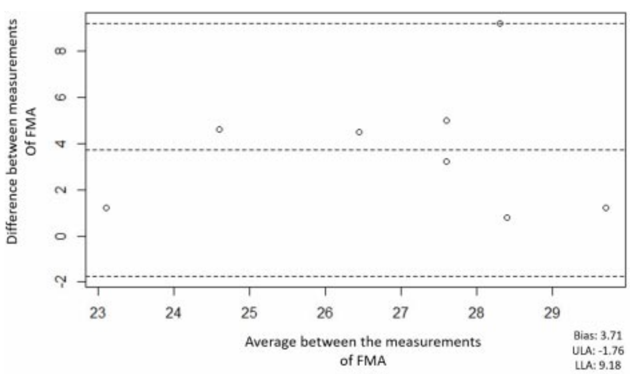

Fig. 27. Scatter plot for the difference and mean of the FMA variable between surgical planning and postoperative period. ULA: upper limit of agreement; LLA: lower limit of agreement. Bland-Altman method.

DISCUSSION

The discrepancy between VSP and the result. In this way Centenero e Hernandez-Alfaro (2012) and Zinser *et al*. (2012) done measurements using cephalometric points which are prone a human mistake. According Makram and Kamel, in 2014, this mistake varied from 0.3 mm to 2.8 mm.

De Riu *et al*. (2018), found differences in chin height. It is observed in our study too. Maybe due the genioplasty positioning be done without specifically surgical guides.

A study that exemplifies this is also the work of Hsu *et al*. (2013). In it, there were means with statistically significant differences when taking into account cephalometric points of the chin (Pg and Me). In that study, 65 patients were treated at 3 different study centers. For genioplasty, one of the centers used computerized guides. There was a statistically significant difference between the groups with and without the use of a genioplasty guide, also corroborating the difference found in our study in the position of the chin in relation to the Frankfurt horizontal plane.

Stokbro *et al*. (2016), also found linear differences in mandibular position, due to the influence of the position of the chin. However, unlike this study, the results were not statistically significant due to the large sample size (30 patients).

In this work, the virtual planning provides good control of the midline deviation, followed by measurements of the Coronal plane (1 statistical difference – Pg) – anteroposterior positioning, as in the Frankfurt horizontal plane (1 statistical difference: Me).

The anteroposterior position of the Pogonion was considered statistically significant. This may be related to imperfect trans-surgical condyle positioning, which affects mandibular positioning during surgery, even with classic planning, as reported by other authors. Condylar seating was performed using two vector forces during surgery. Condylar retro positioning may have caused unintentional changes in the surgical plane, causing under advance of the mandibles. Another explanation would also be the fact that we did not use transfer guides for the genioplasty, and that the chin was adapted earlier or later than planned, as in the work by Hsu *et al*. (2013), previously mentioned.

The number of patients with clinically significant differences (greater than 2 mm) was small. The points that had a large difference (25% and 50%) were Me and Pg, corroborating the work of Hsu *et al*. (2013) and Marlière *et al*. (2019).

CONCLUSION

Virtual Surgical Planning show efficiency and reproducibility to elaborate surgical treatments, by transfer of movements with surgical guides according with this study. Although few differences were statistically significant, when we evaluated the clinical measurements compared together, only 2 measurements (PHF/Me and Coronal – Pg) gave a clinically significant difference – 25% and 50%, respectively, a result explained by the absence of guides in genioplasty.

CAVALIERI-PEREIRA L, MACEDO CJO, CORAL, AJ. Evaluación de la predictibilidad de la planificación quirúrgica virtual en movimientos mandibulares lineales y angulares después de la cirugía ortognática en pacientes con maloclusión clase II y III. Un estudio retrospectivo. *Craniofac Res*. 2023; 2(2):111-120.

RESUMEN: La cirugía ortognática es el procedimiento para corregir las deformidades dentofaciales. En la actualidad la Planificación Quirúrgica Virtual (PQV) es la mejor herramienta para visualizar la posible posición final maxilomandibular. Dado que la mandíbula es un hueso móvil, una de las preguntas más frecuentes es: ¿la PQV puede predecir el resultado final del posicionamiento de la mandíbula? Considerando esta pregunta de investigación se desarrolló un estudio retrospectivo y observacional para encontrar la predictibilidad de la PQV en los movimientos mandibulares después de la cirugía ortognática. Se contemplaron investigaciones en pacientes con maloclusión clase II y III en los cuales se utilizando Composite Skull (Tomografía Computarizada TC asociada a escáner dental). Se realizaron mediciones lineales y angulares comparando VSP con TC postoperatoria, con al menos 6 meses después de la cirugía. Ocho pacientes fueron incluidos en el estudio. El análisis cefalométrico se realizó con el software Proplan (Materialise Proplan CMF, São Paulo, Brasil). Se compararon los resultados de los movimientos simulados en la PQV y reales de puntos mandibulares, calculando sus diferencias lineales y angulares. Se realizaron un total de catorce mediciones y se evaluaron mediante la prueba t, Bland-Altman, Wilcoxon y el error de Dahlberg. Además de ser evaluado por sesgo clínicamente aceptable (+/- 2mm). En total, cuatro diferencias fueron estadísticamente significativas (Altura del mentón, HFP/Me, HFP/LLM, Coronal/Pg, ángulo FMA). El sesgo medio en las mediciones lineales osciló entre -3,23 mm (plano coronal/Pg) y 3,71 mm (PHF/Me). La PQV parece ser un método preciso y reproducible como forma de elaboración de tratamientos, trasladado de manera fiable al paciente a través de guías quirúrgicas. Aunque las cuatro diferencias fueron estadísticamente significativas, cuando se comparan las mediciones clínicas con ellas, sólo dos mediciones (HFP/Me y Coronal/Pg) dan como resultado una diferencia clínica significativa, 25% y 50%, respectivamente, resultado que puede explicarse por la ausencia de guías de genioplastía.

PALABRAS CLAVE: Cirugía ortognática, cirugía mandibular, maloclusión.

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