

Tabla 8: Cuadro comparativo de tamaño de corona clínica con tamaño de corona anatómica real milímetro.

Comparative chart of clinical crown size with real anatomical crown size mm.

Pieza dental	Tamaño de corona clínica (sonda periodontal) (mm)	Tamaño de corona anatómica real (CBCT) (mm)
1.1	7	8.60
1.2	7	9.06
1.3	8	9.60
2.1	7	8.94
2.2	6	8.94
2.3	8	8.65

mm = milímetro, CBCT = cone-beam computed tomography.

valorados previamente con CBCT y dieron la ventaja de no invadir más allá de los límites establecidos.

De acuerdo a los resultados obtenidos con la media y la desviación estándar podemos mencionar que las diferencias entre las medidas entre ambas técnicas es muy poca, por lo cual el uso del tomógrafo digital proporciona una información más objetiva que la técnica tradicional.

La importancia de la técnica se establece en la previa planificación y diagnóstico mediante una radiografía tridimensional (CBCT). Esto permite obtener diagnósticos certeros y confiables, lo que conlleva a tratamientos exitosos. El uso de CBCT en Honduras ha sido un tema innovador, ya que se ha empezado a implementar desde 2018. Esto ha creado un impacto en la odontología, puesto que ha venido a facilitar a los odontólogos el diagnóstico de enfermedades bucales. Por lo cual tomamos la decisión de formar este sistema de medidas que es obligatoriamente complementado con el CBCT, ampliando así el interés de los odontólogos en el país.

CONCLUSIONES

El uso de *cone-beam computed tomography* (CBCT) como parte del plan de tratamiento parece ser una opción eficaz para la planeación objetiva de la cirugía de alargamiento de corona, es una combinación ideal ofreciendo una mayor precisión en la cirugía periodontal, ya que se obtienen datos exactos y precisos del tamaño de la corona anatómica y longitud de UCE-cresta ósea a eliminar durante la cirugía.

Además, ofrece la ventaja adicional de reducir el número de citas, ayuda a realizar un procedimiento atraumático para el paciente, a efectuarlo en una sola cita y evitar hacer, de manera rudimentaria, un procedimiento de sondeo óseo bajo anestesia. Permite eje-

cutar el tratamiento de una manera objetiva y concreta, siendo una alternativa de diagnóstico y elaboración del tratamiento. Se requiere de un mayor número de casos para opinar de manera conclusiva esta opción de tratamiento.

AGRADECIMIENTOS

A los estudiantes de la Facultad de Cirugía Dental de la Universidad Autónoma de Honduras (UNAH), por su valiosa aportación durante el proceso quirúrgico.

Clinical case

Use of cone-beam computed tomography on the diagnosis and treatment of a patient with altered passive eruption

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ABSTRACT

Passive altered eruption (PAE) is a pathological condition that can create concerns in the patient due to the unsightly impact of this mucogingival deformity. Some authors have reported the prevalence, methods of diagnosis and treatment for the PAE; the use of *cone-beam computed tomography* (CBCT) has been a fundamental tool in the treatment plan of this type of pathology providing objective and quality results, being this the main objective of this clinical case. **Material and methods:** Female patient diagnose with PAE, in the upper anterior sector (tooth 1.3 to 2.3), the protocol was performed to obtain measurements of the size of the clinical crown, Cementum-Enamel Junction (CEJ) length, crestal bone and amount of gingival tissue with the traditional clinical technique and with the use of the CBCT, all the measurements were recorded and the results obtained were analyzed to perform the crown lengthening surgery. The results obtained with the measures of the differences between the clinical traditional technique and the CBCT gave an arithmetic mean of 0.6876, which means this is the average value of the differences between the two techniques and a standard deviation of ± 0.4997 which means the degree of dispersion of the variability. With these results, it can be concluded that the difference between the traditional clinical sounding technique and the CBCT is very small, so the digital tomography study offers more objective information.

Keywords: Altered passive eruption, cone beam computed tomography (CBCT), crown lengthening.

INTRODUCTION

The parameters of dental aesthetics today become more demanding and require precision to achieve successful dental treatments. Smile line and facial midline, teeth alignment, dental deformities, dental and gingival dyschromia, gingival recessions, gingival excess, gingival scars, and diastema/papillary loss¹ are factors to take into account in the assessment of harmony of the smile of patients by professionals in dentistry.

Mucogingival deformities are a group of conditions that affect a large number of patients. In the new publication of the classification of mucogingival deformities and conditions around the teeth, they include that gingival excess can be caused by various conditions such as pseudobags, inconsistent gingival margins, gingival excessive visualization, gingival enlargement, altered passive eruption.¹ that we find patients who come to present gingival tissue > 2 mm, although this is not a pathological situation, this condition produces an unsightly effect known as «gingival smile»,² and it is important to know the types of smile that patients present according to the Dr. Anthony Tjan are: high smile (shows the total cervicoincisal length of the maxillary anterior teeth and a continuous gum band), medium smile (shows 75 to 100% of the maxillary anterior teeth and only interproximal gingiva), low smile: shows more than 75% of the maxillary anterior teeth.³

Altered passive eruption occurs when the teeth fully erupt during growth, but the tissues fail to regress to the normal apical level, the only abnormality being coronal displacement of the gingival margin position,⁴ this condition is also known as Delayed Passive Eruption. (EPR).⁵ The prevalence of EPA is reported to be approximately 12%, considering more than 1,000 adult patients with a minimum age of 24 years.^{6,7} Correction of this condition can be achieved by periodontal surgery (crown lengthening).⁸ This procedure is one of the most common surgeries to treat periodontal conditions⁹ and restore the gingival margin biologically and physiologically 1 to 2 mm from the Cement-Enamel Union or at the same level, avoiding the abuse of causing bone resorption, gingival recession, inflammation or hypertrophy.¹⁰ The American Academy of Periodontology reported in a survey that 10% of all periodontal surgeries are performed in order to gain crown length.¹⁰

The cone-beam computed tomography (CBCT) is an X-ray cone-beam computed tomography technology that presents limited radiation emission,⁷ offering high-quality diagnostic imaging to the clinician

and becoming an essential tool and widely¹¹ used for various dental applications such as: implant planning, endodontics, maxillofacial surgery and orthodontics.¹² On the other hand, in the CBCT studies, the position of the bone crest and the position of the UCE hard tissue can be shown in relation, determining the amount of gingival tissue that is covering the enamel and that needs to be removed. Another advantage of this study is the possibility of estimating whether an osteotomy or osteoplasty is necessary since it can make the surgical procedure more precise and predictable. Without the need to anesthetize the patient.¹³

MATERIAL AND METHODS

Clinical case presentation

A 24-year-old female patient attends dental care, stating in her reason for consultation: «I don't feel comfortable with a smile». In the anamnesis carried out, he does not refer to pathological diseases, so he is considered an apparently healthy patient. In the initial clinical evaluation, periodontal probing is performed giving the diagnosis: Altered passive eruption type 1, subgroup B in the upper anterior sector (from 1.3 to 2.3 according to the IDF nomenclature) (*Figure 1*). The indicated treatment plan is lengthening of the aesthetic crown in a single appointment using the CBCT as a radiological support tool in order to achieve precision in the location of the following parameters: anatomical crown size, length of UCE-bone crest and amount of gingival tissue to be removed during the procedure surgical.

Initial treatment (pre-operative)

The clinical crowns of 1.3, 1.2, 1.1, 2.1, 2.2, 2.3 (nomenclature) are measured with a millimeter-sized periodontal probe [UNC-15 Hu-Friedy: 1 mm each line] (*Figure 2*), the measurement is taken from the gingival margin to the incisal edge of each dental organ, several fluid resin points are placed on each tooth at the level of the middle of the clinical crown, in order to be able to accurately measure the convex curvature of the dental crown in 3D tomography [Orthophos XG 3d ready ceph/Sirona] (*Figure 3*). He proceeds to take the tomography and then the lines are drawn to measure the actual size of the anatomical crown.

Surgical procedure

The infiltrative anesthesia technique was used to block the infraorbital nerve of the right and left

hemiarchids from the canine (1.3) to the canine (2.3). 4 cartridges of lidocaine HCl 2% with epinephrine 1:100,000 each containing 1.8 ml were placed.

Then, with a periodontal probe, it was marked with bleeding points on the gum in the vestibular area (according to the CBCT data obtained) of all the teeth to be treated, followed by a gingivectomy with an incision to the internal bevel with a scalpel blade. 15c following the natural scalloping of the gums, followed by an intracrevicular incision and interdental incision; subsequently, an internal bevel gingivoplasty was performed with a Kirkland scalpel to decrease the thickness of the keratinized inserted gingiva and restore the position of the marginal gingiva with respect to the necks of the teeth (*Figure 4 A and B*). A full thickness flap was lifted (*Figure 4C*), the measurements of the anatomical crown were taken and the distance from the bone crest to the CEU, real clinical crown, anatomical crown with periodontal probe was measured (in order to compare the results obtained with CBCT). Finally, the flap was repositioned and sutured with a suspensory suture technique, using a 4-0 polyglycolic acid (VICRYL) suture thread (*Figure 4D*).

Final treatment (postoperative)

The following medications were prescribed for the patient as therapeutic support for analgesia, inflammation and scarring: dextketoprofen 25 mg orally 1 every 8 hours for 3 days, dexamethasone 8 mg intramuscularly 1 ampoule, apply hyaluronic acid 3 times a day. Recommendations are given to the patient: absolute rest and a soft diet for three days.

Postoperative

The patient was reviewed after having performed the surgical procedure, she did not present any complications, the gingival tissues with normal characteristics, without inflammatory processes and in accordance with the healing process (*Figure 5*).

RESULTS

Below is a description of the results obtained:

The clinical crowns in millimeters of each dental piece were measured using the traditional technique with periodontal probe as reflected in *Table 1*.

In the three-dimensional radiographic examination, the crown of the tooth is divided into two parts by drawing two lines: line A (it is measured in mm from

the top of the fluid resin - to the incisal Edge (BI) of the tooth and a line B (it is measured in mm from the UCE to the top of fluid resin), line A + line B is added to give the length of the dental crown (*Figure 6*) (*Table 2*).

To the CBCT results of the length of the dental crown, the measurement of the resin stop is subtracted, in order to result in the actual size of the anatomical crown. The resin cap size of each tooth was achieved by measuring it on the 3D tomography as can be seen in *Table 3*.

A comparative table of the measurements of the clinical crown (periodontal sounding) and the real anatomical crown (CBCT) of each anterior dental piece was made, subtracting both data (sounding - CBCT) in order to obtain the precise amount of gingival tissue at eliminate in crown lengthening surgery (*Table 4*).

The decision was made to perform osteotomy and osteoplasty in order to give the space to the supracrestal tissue or biological space (*Table 5*) (*Figure 7 A and B*) and thus allow an insertion of the connective tissue and junctional epithelium, taking the reference de Gargiulo et al where the biological space consists of 0.97 mm of junctional epithelium and 1.07 mm of connective tissue, totaling 2.04 mm.¹⁴

A comparative table showing the size of the clinical crown with the size of the anatomical crown and the size of the real anatomical crown (CBCT) is shown from the results obtained (*Table 6*).

A comparative table is presented (*Table 7*) showing the difference of the size of the real anatomical crown (measured with the CBCT) with the size of the real anatomical crown (measured with periodontal probe) during surgery. Likewise, we present the comparison of the size of the clinical crown (measured with a periodontal probe) prior to performing the surgery and the size of the actual anatomical crown (measured with CBCT) (*Table 8*).

The results achieved showed with the measures of the differences between the clinical survey and the CBCT an arithmetic mean of 0.6876, which means that it is the average value of the differences of the means of the entire previous sector between both techniques and a standard deviation of ± 0.4997 which means the degree of dispersion of said measurements.

DISCUSSION

The purpose of performing a crown lengthening treatment for the condition of impaired passive eruption (EPA) requires good diagnosis and planning. Conventionally, the aesthetic crown lengthening has been planned with periodontal probing and waving,

making a procedure of longer duration, when using the CBCT presents us with the opportunity to use computed tomography scans, which provides us with more information and shortens the time of the procedure.

Like the study carried out by Dr. Francesco Cairo et al 2016, their data indicated that careful preoperative planning could avoid complications and improve the post-operative for the patient when performing EPA treatment,⁶ with this study the results obtained indicates that treatment planning is required, using tools such as CBCT to achieve precision in crown lengthening surgery, thus avoiding root discoveries and seeing a satisfactory result in the patient.

According to Dr. Claverson O. Silva et al 2015, the treatment of altered passive eruption must aim to achieve the reduction of excess gingival tissue (reestablishment of the gingival margin from 1 to 2 mm above or at the level of the UCE and increase the length of the clinical crown), the balance of the gingival contours, the reestablishment of inserted supracrestal tissue (biological width),¹⁵ as in this study, the parameters of correct removal of gingival tissue, clinical crown size, crest length were considered bone to UCE being previously assessed with CBCT and giving the advantage of not invading beyond the established limits.

According to the results obtained with the mean and standard deviation, we can mention that the difference between the measurements between the two techniques is very little, which is why the use of the digital tomograph provides more objective information than the traditional technique.

The importance of the technique is established in the previous planning and diagnosis by means of a three-dimensional radiography (CBCT). This allows accurate and reliable diagnoses which leads to successful treatments. The use of CBCT in Honduras has been an innovative topic since it has started to be implemented since 2018. This has created an impact in dentistry since it has made it easier for dentists to diagnose oral diseases. For this reason, we made the decision to form this system of measures that is compulsorily complemented by the CBCT, thus expanding the interest of dentists in the country.

CONCLUSIONS

The use of cone beam computed tomography (CBCT) as part of the treatment plan seems to be an effective option for objective planning of crown lengthening surgery, it is an ideal combination offering greater precision periodontal surgery, since

data is obtained Accurate and precise anatomical crown size, length of UCE-bone crest to be removed during surgery,

It offers the additional advantage of reducing the number of appointments helps to perform an atraumatic procedure for the patient, to perform it in a single appointment and to avoid doing a rudimentary procedure of bone rippling under anesthesia. Allowing to execute the treatment in an objective and concrete way, being an alternative of diagnosis and elaboration of the treatment. A greater number of cases is required to give a conclusive opinion on this treatment option.

ACKNOWLEDGMENTS

To the students of the dental surgery faculty of the Autonomous University of Honduras (UNAH), for their valuable contribution during the surgical process.

REFERENCIAS / REFERENCES

1. Cellini NP. Mucogingival conditions in the natural dentition: Narrative review, case definitions, and diagnostic considerations. *Journal of Periodontology and Journal of Clinical Periodontology*. 2018; 45: 190-198.
2. Nart NJ. Prevalence of altered passive eruption in orthodontically treated and untreated patients. *J Periodontol*. 2014; 85 (11): 348-353.
3. Tjan HA. Some esthetic factors in a smile. 1984; 51 (1): 24-258. *The Journal of Prosthetic Dentistry*. 1984; 51 (1): 24-28.
4. Hürzeler OZ&M. Plastic esthetic periodontal and plastic surgery a microsurgical approach. In Bryn Grisham QPCI, editor. *Plastic Esthetic Periodontal and Plastic Surgery a Microsurgical Approach*. Berlin: Quintessence Publishing; 2012. p. 858.
5. Mele M. Esthetic treatment of altered passive eruption. *Periodontology 2000*. 2018; 77 (1): 65-83.
6. Cairo F. Periodontal plastic surgery to improve aesthetics in patients with altered passive eruption/gummy smile: a case series study. *Int J Dent*. 2012; 2012: 837658.
7. Germana Jayme Borges. *Cone-beam* computed tomography as a diagnostic method for determination of gingival thickness and distance between gingival margin and bone crest. *The Scientific World Journal*. 2015; 142108.
8. Jepsen DS. Periodontal manifestations of systemic diseases and developmental and acquired conditions: Consensus report of workgroup 3 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. *J Periodontol*. 2018; 45: 219-229.
9. Paolantoni GG. Comparison of three different crown-lengthening procedures in the maxillary anterior esthetic regions. *Quintessence Int*. 2016; 47: 407-416.
10. Marzadori M. Crown lengthening and restorative procedures in the esthetic zone. *Periodontol 2000*. 2018; 77 (1): 84-92.
11. Lourenço A. Soft tissue cone-beam computed tomography: a novel method for the measurement of gingival tissue and the dimensions of the dentogingival unit. *J Esthet Restor Dent*. 2008; 20 (6): 366-367.
12. Pauwels R. Technical aspects of dental CBCT: state of the art. *Dentomaxillofac Radiol*. 2015; 44 (1): 20140224.

13. Cassiano L, Barriviera M, Suzuki S, Januario A, Hilgert L, Duarte W. Soft tissue cone beam computed tomography (ST-CBCT) for the planning of esthetic crown lengthening procedures. *The International Journal of Esthetic Dentistry*. 2016; 11 (4): 482-493.
14. Gargiulo AW. Dimensions and relations of the dentogingival junction in humans. *The Journal of Periodontology*. 1961; 32 (3): 261-267.
15. Silva JCO. Aesthetic crown lengthening: periodontal and patient-centred outcomes. *J Clin Periodontol*. 2015; 42 (12): 1126-1134.

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