

CASE REPORT

Correction of canine class II and anterior crowding with asymmetric extractions: Case Report

Corrección de clase II canina y apiñamiento anterior con extracciones asimétricas: Reporte de caso

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ABSTRACT

Background: Extractions are performed to improve dental alignment, facial esthetics and occlusal function. The teeth to be extracted are chosen according to the diagnosis of the case. Indications for extractions include dental crowding, malocclusions, and skeletal discrepancies. The most common extraction sequence is that of the first premolars. Extraction of the lower incisor may be considered in specific cases, but may affect esthetics and occlusal function. Asymmetric extractions can be effective.

Objective: To perform asymmetric extractions based on accurate planning and diagnosis to correct midlines, achieve class I canines, free crowding, improve upper and lower incisor proinclinations and achieve a harmonious patient profile.

Case report: 21-year-old male patient, skeletal class II, moderate upper and lower anterior crowding, right molar class II, left molar class I and bilateral canine II relationship. The decision was made to perform asymmetric extraction of the right upper first premolar and right lower central incisor.

Results: Crowding was corrected in both arches, the lower incisors were retroinclined, occlusal stability was obtained, functional class II molar on the right side, class I molar on the left and bilateral IC canine relation, overjet of 2 mm and overbite of 40%.

Conclusion: The choice of teeth to be extracted is based on a thorough analysis that considers the biomechanics of treatment, accurate diagnosis, as well as individual patient factors. The asymmetric extraction approach has proven to be effective and can result in faster and more stable treatment, provided that proper planning is performed.

CLINICAL RELEVANCE

The extraction of dental organs in orthodontic treatment should be a decision based on an accurate diagnosis that allows the success of the treatment to be achieved. In this clinical case, asymmetric extractions were chosen with the aim of correcting the midlines, achieving class I canines, freeing crowding, improving the proinclinations of the upper and lower incisors and achieving a harmonious patient profile.

INTRODUCTION

In orthodontics, therapeutic extractions are performed to obtain ideal molar and canine relationships, favorable changes in the release of dental crowding, improvement in proinclinations of the incisors, in the profile and soft tissues.¹ In most cases the first premolars are chosen to obtain a space

closer to the anterior segment.² However, the teeth to be extracted will depend on the biomechanics to be performed. When diagnosing and planning a case, some variables should be evaluated by means of complementary examinations such as: cephalometric analysis, CBCT, model analysis and clinical analysis, besides including important data such as age and other factors such as periodontal health status, restorations and extracted or congenitally absent teeth, elements that also have an impact on the clinician's decision. After taking these factors into account, the treatment plan is established and the need for extractions or not is justified.³

Among the indications for extractions are: severe crowding, pronounced curve of Spee, to improve facial harmony, to achieve ideal molar and canine relationships, in convex profiles with labial protrusion, open vertical overbites or camouflage when there are skeletal discrepancies.⁴⁻⁶ The sequence of extractions most commonly used in orthodontics is that of maxillary and mandibular permanent first premolars, since it allows direct access for the correction of severe crowding and dentoalveolar protrusions.⁷

The extraction of the lower incisor is used in adult patients with moderate or severe anteroinferior crowding or with Bolton index excesses no greater than 3 mm, with a maxillary arch without crowding problems or severe protrusion of the incisors.

It should be taken into account that, when removing a lower incisor, the upper dental midline would coincide with the center of the lower incisor, which will sometimes compromise esthetics. In turn, the intercanine distance is reduced, which may cause occlusal interference with the lower canines and upper teeth, in addition to increasing the canine overjet.⁸⁻¹¹

Opting for a pattern of asymmetric extractions is usually an alternative recommended by many authors since there are cases where it is necessary to restore symmetry to the dental arches and at the same time facial harmony, thus favoring the unilateral movement of the posterior teeth and facilitating the asymmetric movement of the dental pieces, This is why they are useful when it is necessary to correct midline deviations, improve the molar and canine relationship, and some authors speak of a reduction in treatment time and the amount of tooth movement, which allows stable and functional results to be obtained.^{12,13}

The aim of this clinical case is to transmit that the approach of performing asymmetric extractions is still an excellent option to treat this type of dentofacial discrepancies, with effective results and in a short period of time if there is a good diagnosis. In the present case we chose to extract the lower right incisor to free crowding, avoid proinclination of the anterior-inferior teeth and prevent a convex labial profile. In addition, the right upper first premolar was extracted to achieve an ideal canine relationship.

CLINICAL CASE REPORT

A 21-year-old male patient from Tehuacán, Puebla, Mexico, came to the FEBUAP Orthodontics Clinic for consultation: "I want my teeth to be as straight as possible, I don't like my bottom tooth". In the anamnesis the patient refers to a previous surgery, he had undergone a frenillectomy at 10 years of age, he smokes occasionally, in his TMJ examination he did not report any discomfort nor was any pathological symptom detected, he is a skeletal class II. At the extraoral clinical examination, in her front photograph (Figure 1A) we observe a patient with an oval face shape with a dolichofacial biotype, the lower third is enlarged. In the smile photograph (Figure 1B), a complex, flat and non frank smile is observed; the upper midline is deviated 2 mm to the left and the lower midline is deviated 1 mm to the right with respect to the facial midline. In her profile photograph (Figure 1C), she presents an orthognathic facial profile, convex labial profile, vertical growth.

INTRAORAL STUDIES

The intraoral analysis shows upper and lower anterior crowding, left lateral upper incisor in infraocclusion, microdontia, right molar class II, left molar class I and bilateral canine II relationship (Figure 1 D-F), spee curve right 1 mm and left 0 mm, asymmetric oval upper arch form with discrepancy of -5 mm with moderate crowding (Figure 1G), and asymmetric oval lower arch form with discrepancy of -4 mm, slight crowding, lingualized left lower incisor, multiple gyroversions (Figure 1H). (Figure 1H).



Figure 1. A. Forehead, B. Smile, C. Profile, D. Right lateral intraoral, E. Frontal intraoral, F. Left lateral intraoral, G. Upper occlusal, H. Lower occlusal.

RADIOGRAPHIC STUDIES

The lateral skull radiograph (Figure 2A) and cephalometry (Table 1) show the bony class II, vertical growth, mandibular posterorotation and its posteroposition with respect to the skull base, as well as an increase in maxillary height, anteroposition and proinclination of upper and lower incisors. The tomography analysis (Figure 2 B-D) shows bone loss at the cervical level in the anteroinferior and anterosuperior zone, very close to the vestibular cortex.

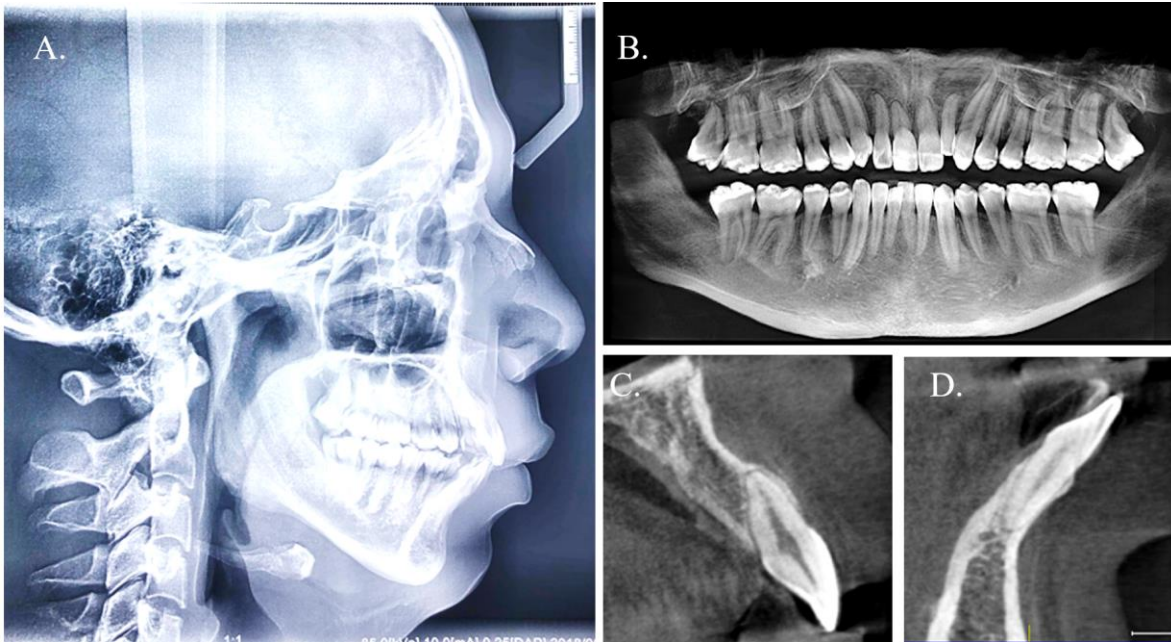


Figure 2. A. Lateral skull radiograph, B. Panoramic CBCT radiograph, C. Sagittal CBCT section of the right upper central incisor, D. Sagittal CBCT section of the right lower central incisor.

Table 1. Cephalometric analysis: initial and final.

| MEASURE | STANDARD | PX INTIAL | INITIAL | PX FINAL | FINAL |
|---------------------|----------|-----------|----------------------------|----------|----------------------------|
| SNA | 82° | 80° | Norma | 80° | Norma |
| SNB | 80° | 75° | Posteroposición mandibular | 75° | Posteroposición mandibular |
| ANB | 2° | 5° | Clase II ósea | 5° | Clase II ósea |
| PM (GO-GN-SN) | 32° | 30° | Norma | 32° | Norma |
| PO-SN | 14° | 15° | Norma | 12° | Norma |
| Interincisal | 131° | 104° | Incisivos Proinclinados | 116° | Incisivo proinclinados |
| IS-PP | 70° | 65° | IS Proinclinado | 68° | Norma |
| IMPA | 90° | 110° | II Proinclinado | 96° | Incisivo Proinclinado |
| PROT. LS (Ricketts) | -2mm | 4mm | Norma | 2.5mm | Norma |
| PROT.LI (Ricketts) | 0mm | 3mm | Norma | 2mm | Norma |

TREATMENT

The decision was made to perform the asymmetric extraction of the upper right first premolar and lower right central incisor. The orthodontic phase started with the placement of fixed appliances MBT (3M Unitk™ Gemini metal bracket, U.S.A.) slot 0.22" in the upper and lower arches, for the archwire sequence, first a 0.014" NiTi (Ormco™) was used. Followed by 0.016" NiTi (Ormco™ arch). The third arch started the second stage of the treatment with a 0.016x0.022" NiTi (Ormco™ Arch), as the third arch 0.017x0.025" NiTi (Ormco™ Arch), a fourth arch of 0.017x0.025 steel (Ormco™) was placed when moving to the final stage of treatment.

Twenty months after starting treatment, the space of tooth organ 41 that was extracted was self-consumed giving rise to the release of crowding and the lower proinclination of the incisors was improved, it was splinted with metal ligature in 8 from tooth organ 13 to 26 and a three-link closed chain was used, Once mesialized, a semi-open elastic chain was placed from the upper right first molar to the upper left first molar, thus closing existing spaces and consolidating a functional CII on the right side. In the lower arch the same mechanics with elastic chain was used to take advantage of the retroinclination effect that this mechanics offers. The following months we continued with the 0.019x0.025 steel arch (Ormco™) splinted with 0.010" metal ligature in 8 of 6 to 6 in both arches to consolidate what was obtained.

RESULTS

The objectives of the treatment plan were met. On extraoral analysis a consonant and more harmonious smile was observed, neither the facial profile nor the labial profile was altered, the upper midline coincided with the facial midline (Figure 3 A-D). On intraoral inspection it was observed that crowding was corrected in both arches, the lower incisors that were proinclined were retroinclined, occlusal stability was obtained, functional class II molar on the right side, class I molar on the left and bilateral IC canine relation, overjet of 2 mm and overbite of 40% (Figure 3 E-G). Regarding the final radiographic analysis, when comparing the superimposition of the initial cephalometry with the final one, a better inclination of the anterior dental organs within their bony base was observed (Figure 4). For the retention stage, Hawley type removable retention was placed.

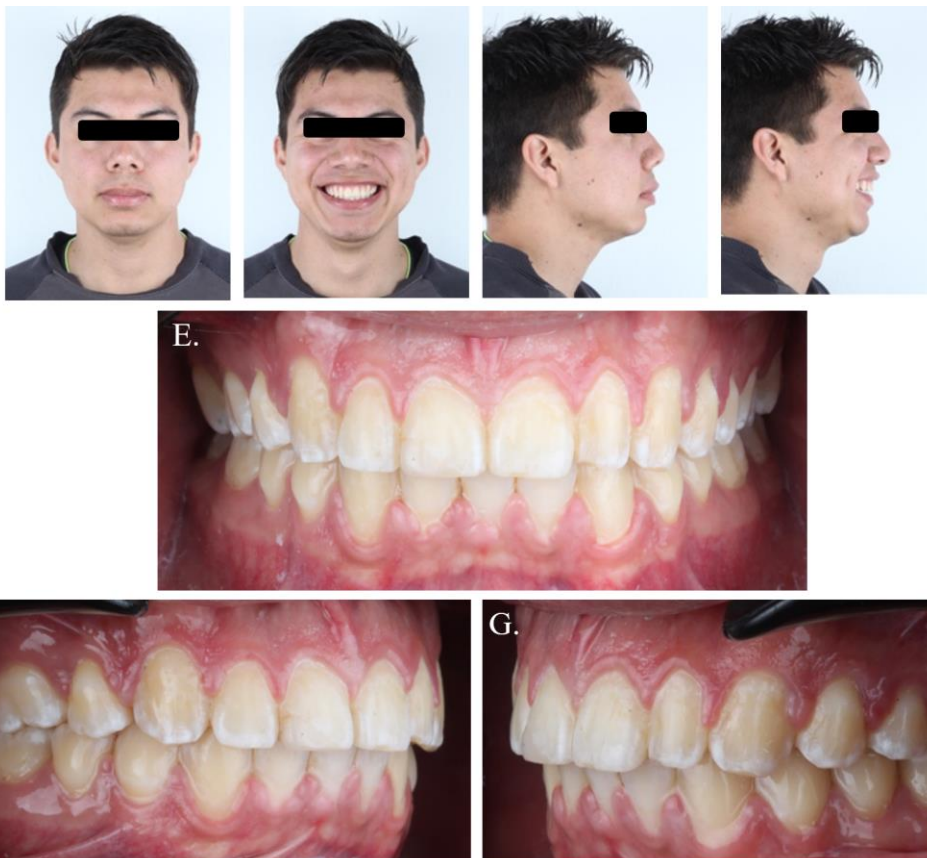


Figure 3. A. Frontal, B. Smile frontal, C. Profile, D. Smile profile, E. Frontal intraoral, F. Right lateral intraoral, G. Left lateral intraoral.

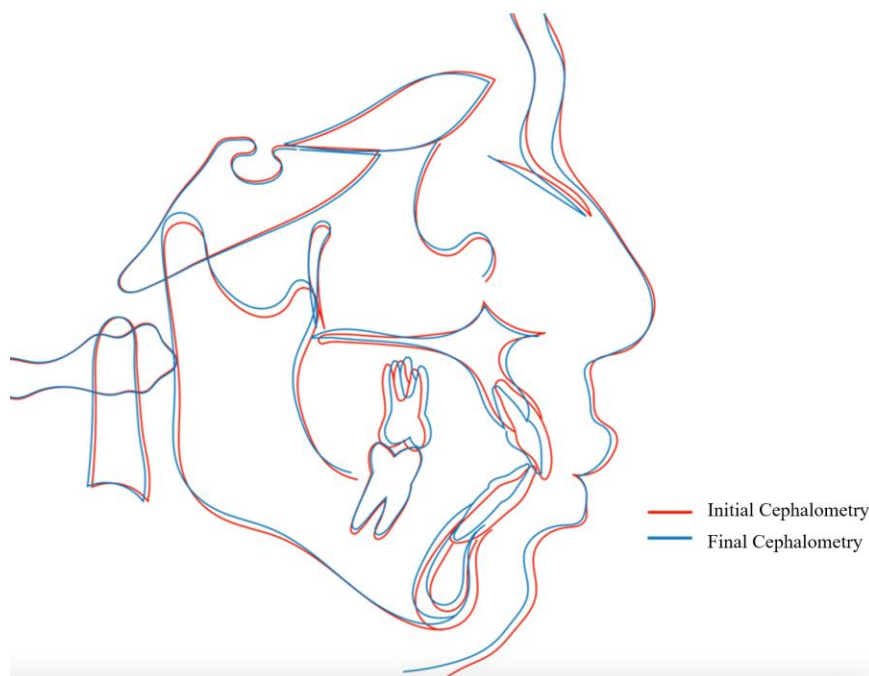


Figure 4. Superimposition of initial and final cephalometry.

DISCUSSION

The decision for extraction in orthodontic treatment is one of the most critical. In cases of asymmetric extractions it is important to identify the specific area of arch asymmetry when we find discrepancies in the initial canine and molar relationships in order to obtain class I canine relationships. Asymmetric extraction protocols in subdivisions of class II malocclusions is often a successful treatment as it maintains existing molar relationships, facilitates biomechanics and reduces treatment time.^{14,15}

The treatment objectives in the present clinical case were: to free dental crowding and avoid dental proinclination of the anterior dental organs, to obtain an IC canine relationship on the right side and consolidate that on the left side, to obtain occlusal stability to achieve a functional molar CII on the right side, not to alter the facial or labial profile and to maintain the dental organs within their bony bases.

Janson et al. mention that the decision to perform asymmetric extractions provides good results to correct dental and facial asymmetries, where one dental arch presents more crowding or protrusion than the other. When the case requires it, it is possible to make the decision to extract a tooth and not to do it in the conventional way such as the symmetric extractions of two dental organs, this can contribute to improve the facial profiles by better aligning the lips and the smile and reduce the treatment time.¹⁶ In the present case, this coincides with the aforementioned, since there was a lower arch with moderate crowding and an upper arch without crowding, and a CII molar and canine malocclusion on the right side, therefore, performing a protocol of symmetrical extractions of four premolars could influence the facial profile of the patient unfavorably and possibly generate vertical and horizontal overbite compromises, which coincides with the study by Vilhjálmsón G. et al, they mention the compromise that can occur when making symmetrical extractions in cases where it does not meet the ideal characteristics, consequently, an adequate diagnosis is the key to decide the ideal pattern of extractions to be performed.¹⁷ For the resolution of the present clinical case, it was decided to extract the lower right central incisor, however, in opposition to the extraction of the incisors, Faerovig et al. point out that the interproximal papillae represent a possible disadvantage as they are diminished and facilitate the formation of black triangles.¹⁸ The case presented was handled with great care to obtain adequate esthetics without leaving compromises such as black triangles. According to Duron Rivas et al, the extraction of an incisor is an effective treatment in patients with mild crowding compared to premolar extractions, it can avoid deepening the anterior bite and leave an increased overbite and retroinclined incisors,¹⁹ which was

demonstrated with the result of the present clinical case, it was avoided to increase the overbite by only performing the extraction of a lower incisor and it was also observed that the overjet had positive modifications. Unlike Whitley JB. mentions that he observed a significant increase of the overjet and mentions that it should be considered as a compromise that can occur.²⁰

CONCLUSION

Performing asymmetric extractions in an orthodontic case can be beneficial for several reasons. First, it allows the needs of each patient to be specifically and precisely addressed by tailoring treatment to each individual's unique facial structure. In addition, it is important to keep in mind the compromises that may be present, so a thorough diagnosis is essential to provide an accurate and personalized treatment plan. Asymmetric extractions can improve facial harmony and masticatory function by providing optimal and satisfying results for the patient.

CONFLICT OF INTEREST STATEMENT

We declare that we have no financial and personal relationships with other persons or organizations that might inappropriately influence our work, there is no professional or personal interest of any nature or kind in any product, service and/or company that could be construed as influencing the position presented in the present manuscript.

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