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CASE REPORT

COMBINATION OF ORTHOGNATHIC SURGERY AND CONDYLECTOMY IN ACTIVE CONDYLAR HYPERPLASIA: A CASE REPORT

Combinación de cirugía ortognática y condilectomía en hiperplasia condilar activa: informe de caso

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ABSTRACT

Case Report: Active condylar hyperplasia is a rare condition that often leads to progressive facial asymmetry in adolescents and young adults. Surgical treatment, usually involving a condylectomy, is necessary to stop condylar overgrowth. In certain cases, orthognathic surgery is also required to correct associated skeletal abnormalities.

This case report presents an 18-year-old female with right-sided active condylar hyperplasia who underwent simultaneous low condylectomy and orthognathic surgery. Digital planning with virtual surgical simulation was used preoperatively to guide the procedure. A postoperative evaluation revealed a discrepancy of approximately 2 mm compared to the planned outcome, indicating a high degree of surgical accuracy.

Conclusions: This case highlights the potential of combining condylectomy with orthognathic surgery, supported by virtual planning, as an effective strategy to correct asymmetry and achieve long-term functional and aesthetic stability in specific patients.

Keywords: *Orthognathic surgery; Mandibular condyle; Hyperplasia; Dentofacial deformities; Case reports; Dentistry.*

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RESUMEN

Reporte de caso: La hiperplasia condilar activa es una afección poco frecuente que suele provocar asimetría facial progresiva en adolescentes y adultos jóvenes. El tratamiento quirúrgico, generalmente una condilectomía, es necesario para detener el crecimiento excesivo del cóndilo. En algunos casos, también se requiere cirugía ortognática para corregir anomalías esqueléticas asociadas. Este informe de caso presenta a una mujer de 18 años con hiperplasia condilar activa en el lado derecho, quien se sometió a una condilectomía baja y cirugía ortognática simultáneas. Se utilizó planificación digital con simulación quirúrgica virtual preoperatoria para guiar el procedimiento. La evaluación postoperatoria reveló una discrepancia de aproximadamente 2 mm con respecto al resultado planificado, lo que indica un alto grado de precisión quirúrgica

Conclusión: Este caso destaca el potencial de combinar la condilectomía con la cirugía ortognática, con el apoyo de la planificación virtual, como una estrategia eficaz para corregir la asimetría y lograr una estabilidad funcional y estética a largo plazo en pacientes específicos.

Palabras clave: *Cirugía ortognática; Cóndilo mandibular; Hiperplasia; Deformidades dentofaciales; Informes de casos; Odontología.*

INTRODUCTION

Mandibular condylar hyperplasia (MCH) is considered an abnormal growth or tumor of the temporomandibular joint, resulting in progressive asymmetry.[1,2] In most cases, MCH presents unilaterally and it is associated with facial and mandibular asymmetry.[3,4] When the condyle is continuously growing in active condylar hyperplasia, it is often associated with class II and III dentofacial anomalies.[5]

MCH mainly affects the hemimandible and sometimes involves the maxilla.[6] Although its etiology is unclear, its development is associated with several risk factors, including infections and trauma, as well as other genetic, embryological, microvascular or hormonal factors.[7] Treatment for MCH is determined by the pattern of growth and the progression of facial asymmetry.

In active disease, it is generally recommended to perform the combination of condylectomy with orthognathic surgery[8] Gallagher *et al.*,[9] reported that simultaneous condylectomy and orthognathic surgery significantly improved soft tissue symmetry, with stable outcomes despite postsurgical condylar remodeling. On the contrary, it has been suggested that performing an or-thognathic surgery alone is not stable and it should be discarded.[8]
Condylectomy is the first-line treatment aimed at eliminating the overgrowth of the temporomandibular joint's condyle by removing the overactive portion and restoring the occlusal plane.[10]

Furthermore, orthognathic surgery is recommended for cases of facial asymmetries with significant discrepancy, and it is best combined with condylectomy for stable, predictable results.[6] This article presents a

case where simultaneous condylectomy and orthognathic surgery were performed to stop condylar growth and restore facial symmetry.

CASE REPORT

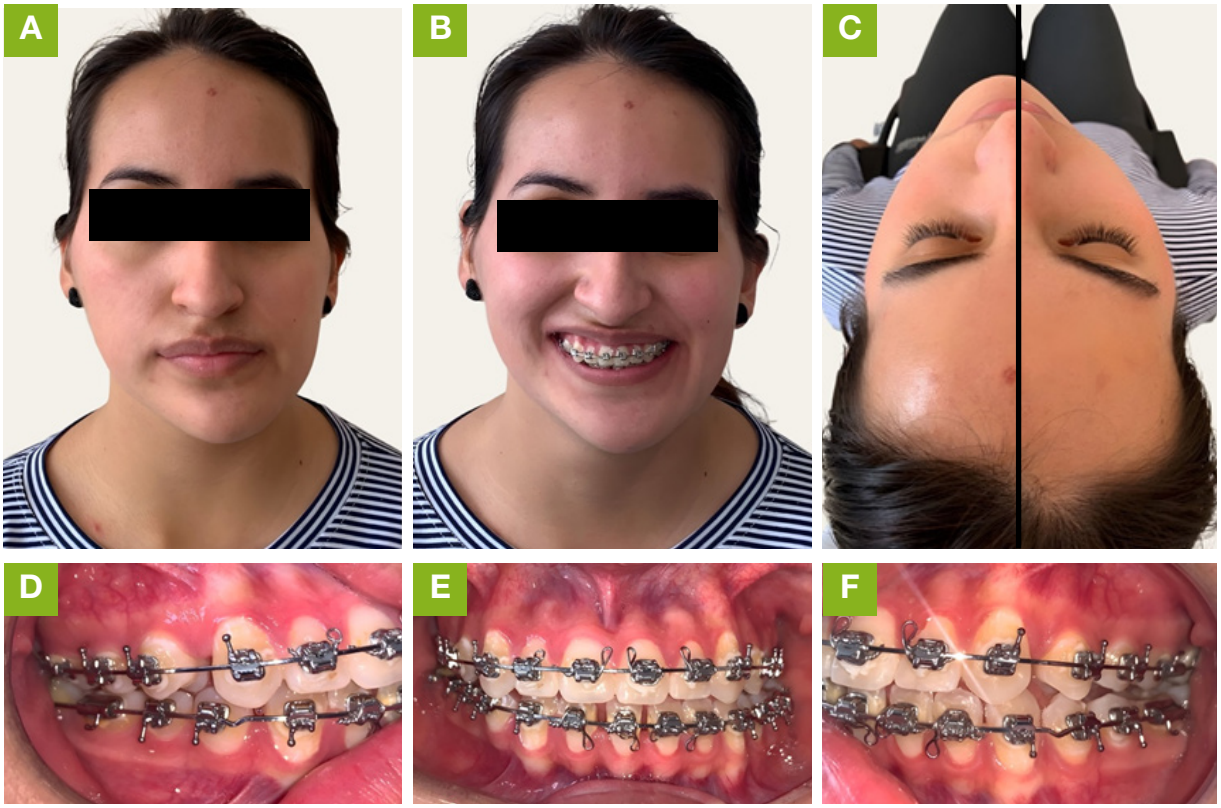
An 18-year-old female patient was referred to the Maxillofacial Surgery Service due to a left mandibular deviation diagnosed at the age of 11. She underwent approximately four years of orthodontic treatment.

However, the treatment did not yield significant clinical improvement, and the deviation persisted. Clinical examination revealed left-sided facial asymmetry, with a 6 mm deviation of the lower dental midline to the left. The upper dental midline was aligned with the facial midline, right canine class I, left canine class II, right molar class II, left molar class I, and left posterior crossbite on the left side (Figure 1).

Facial tomography revealed an enlarged right condyle. The diagnosis of MCH was confirmed via SPECT-CT, which demonstrated a greater than 10% difference in radiotracer uptake between the two condyles (Figure 2A). Consequently, low condylectomy combined with orthognathic surgery was planned using digital planning software (Figure 2B and Figure 2C).

Under general balanced anesthesia, a right preauricular approach was used for low condylectomy (11 mm resection), and a maxillary circumvestibular approach for Le Fort I osteotomy. At the mandibular level, a 4 cm linear incision was made in the retromolar

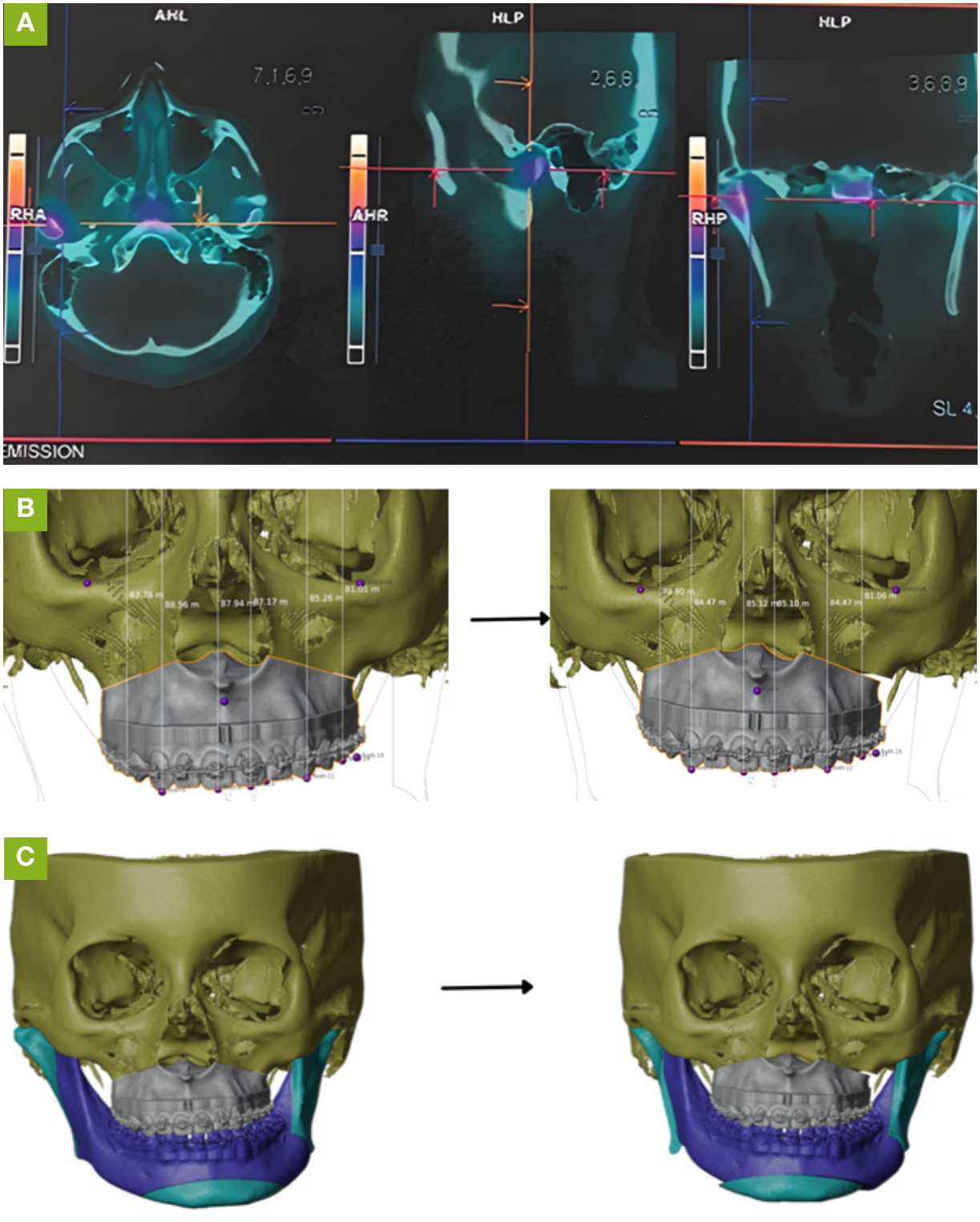
Figure 1
Pre-surgical photographs



A: Frontal rest position photograph showing facial asymmetry. **B:** Frontal smile photograph. **C:** Cephalocaudal photograph demonstrating mandibular deviation to the left. **D:** Right lateral intraoral view. **E:** Intraoral frontal view showing dental midline shift. **F:** Left lateral intraoral view evidencing posterior crossbite.

Figure 2

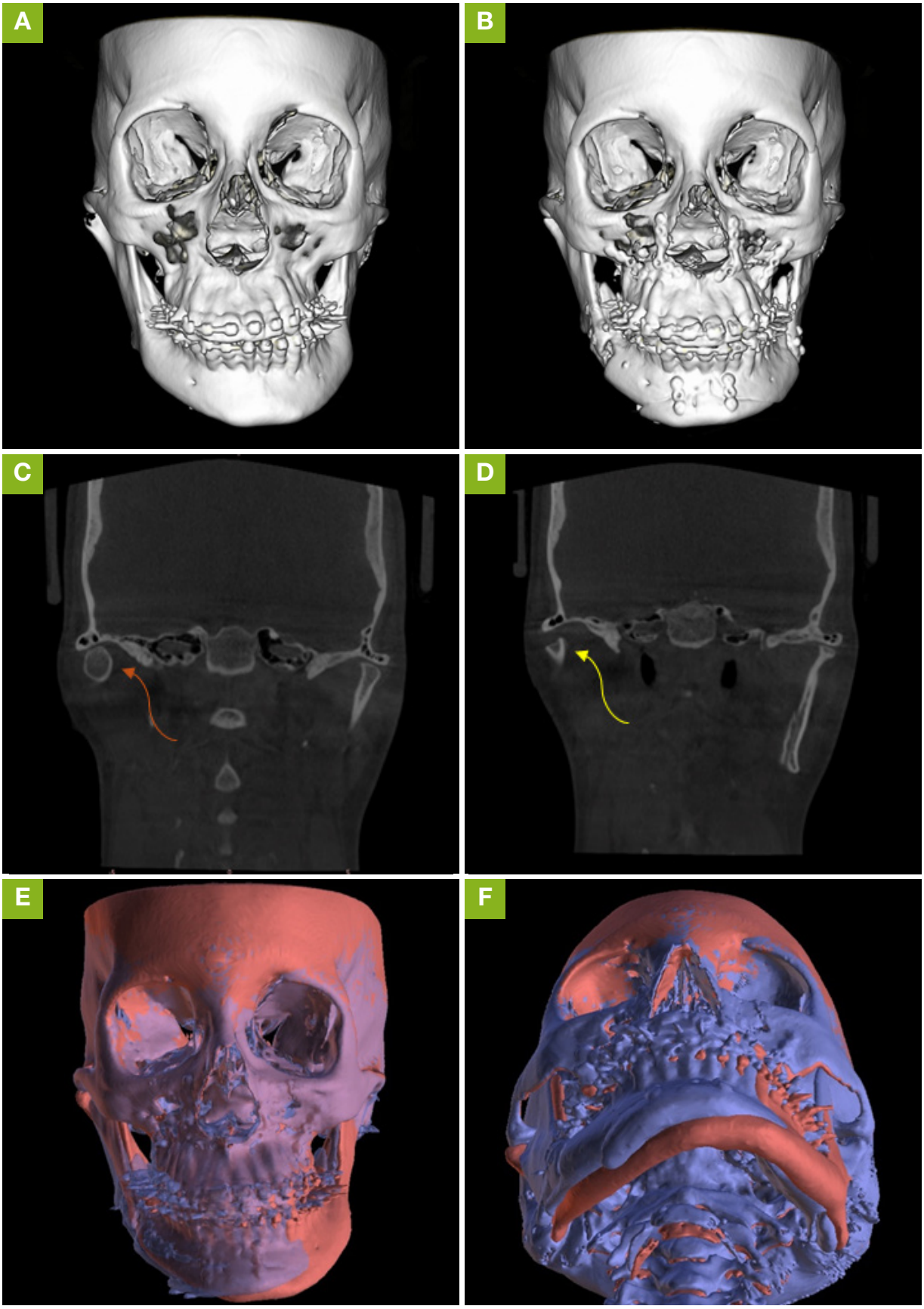
Presurgical planning using cone-beam computed tomography (CBCT) data analysed with Blue-Sky Plan 4 software (version 4.7.5, Libertyville, IL, USA)



A: SPECT-CT showing more than 10% increased uptake in the right condyle (yellow arrow). **B:** Lefort type I osteotomy planning using virtual 3D software. **C:** Virtual planning for sagittal mandibular osteotomy and mentoplasty.

Figure 3

Pre- and post-surgery cephalometric measurements



A: Pre-surgical 3D reconstruction showing facial asymmetry. **B:** Post-surgical 3D reconstruction showing correction of asymmetry. **C:** Right condyle before surgery, showing increased volume (orange arrow). **D:** Right condyle after resection, showing decreased volume (yellow arrow). **E AND F:** Superimposition of pre- and post-surgical CBCT scans showing skeletal correction and post-surgical stability (pink: pre-surgical; purple: post-surgical).

Figure 4

Post-surgical extraoral and intraoral documentation (22-month follow-up)

A: Frontal rest position photograph showing restored facial symmetry. **B:** Frontal smile photograph. **C:** Cephalocaudal photograph demonstrating alignment of facial and mandibular midlines. **D:** Right lateral intraoral view. **E:** Intraoral frontal view with corrected dental midline. **F:** Left lateral intraoral view, with resolution of the posterior crossbite.

Table 1

Pre- and post-surgery cephalometric measurements

Type of measurement	Pre-surgery	Post-surgery
SNA (degrees)	83.44°	89.14°
SNB (degrees)	82°	87.29°
ANB (degrees)	1.44°	1.85°
Lower facial height (ANS-Me) (mm)	57.15 mm	56.41mm
Condylar length (R *versus* L) (mm)	R: 16.31 mm / L: 13.77 mm	R: 11 mm / L: 13.33 mm
Dental midline deviation (mm)	6 mm	1 mm
Pogonio (Pg) (mm)	1.48mm	7.9mm

region to perform a bilateral sagittal split osteotomy of the bilateral mandibular ramus. The latter was fixed with 3 bicortical screws of 12 mm bilaterally, allowing an 8 mm advancement. Finally, advancement genioplasty and midline correction were performed. The initial surgical plan involved performing a vertical ramus osteotomy on the right side of the mandible and a sagittal ramus osteotomy on the left side.

However, during the procedure, bilateral mandibular retrognathism was noted, prompting the surgical team to modify the

approach. Bilateral sagittal split ramus osteotomies were then performed on both sides to achieve the necessary mandibular advancement.

Planning and outcome evaluation were carried out using Blue-Sky Plan 4 software (version 4.7.5, Libertyville, IL, USA). Presurgical and postsurgical CBCT scans were aligned using stable skeletal landmarks unaffected by surgery (Figure 3A and Figure 3B). Condylar volume changes were measured by comparing the segmented images (Figure 3C and Figure 3D).

Additionally, a superimposition of the pre- and postsurgical CBCT files was performed (Figure 3E and Figure 3F) with the aim of demonstrating treatment stability over time. This overlay, based on volumetric reconstructions, shows that the anatomical structures remained aligned according to the surgical plan, supporting the long-term predictability and success of the intervention. Additionally, to evaluate skeletal changes, a cephalometric comparison was conducted using pre- and postsurgical CBCT scans. Results demonstrate the morphological changes achieved by the treatment (Table 1).

At the 22-month follow-up visit, the patient demonstrated a favorable clinical outcome, with no signs of recurrence and maintained facial symmetry (Figure 4).

DISCUSSION

Previous studies have shown that performing condylectomy and orthognathic surgery at the same time resolves condyle hyperplasia as well as facial asymmetry in vertical and sagittal proportions during a single surgery.[11,12] These results are reflected in this case, as vertical asymmetry was corrected through occlusal plane leveling, and sagittal discrepancy was resolved by proper maxillomandibular repositioning. The dental midline deviation improved from 6 mm to 0–1 mm. These outcomes remained stable over 22 months, confirming long-term correction in both dimensions.

It has also been shown that the combination of orthognathic surgery with condylectomy does not result in functional limitation of mouth opening (>35 mm) one year after the surgery.[11] In this case, mouth opening was monitored for 5 months, and no functional limitations were observed during the follow-up period. In addition, Fariña *et al.*,[13] demonstrated that performing proportional condylectomy alone for MCH offers stable long-term results and avoids the need for secondary surgeries by 85% in patients with early stages of the disease. However, in this case, the condylectomy was performed at an advanced stage of the disease, when maxillary and dental compensations had already developed. As a result, simultaneous condylectomy with orthognathic surgery was required, guided by virtual planning, to achieve stable long-term outcomes over a 22-month follow-up period.

Beltrán *et al.*,[2] found that a second surgery was needed in 9.5% of patients under 16, compared to 42.8% of those aged 17 to 45. While the difference was not statistically significant, the trend suggests that earlier intervention may result in better functional and aesthetic outcomes. Olate *et al.*,[14] also emphasized that early intervention in adolescents can improve facial symmetry control and reduce the need for other complex procedures.[14]

In the present case, although the patient required a complex procedure of simultaneous condylectomy and orthognathic surgery, the treatment experience also indicates

that intervening during the transition from skeletal maturity to adulthood may reduce the likelihood of additional surgeries, while having stable long-term results. Orthognathic surgery for dentofacial deformities requires precise presurgical planning, including the prediction of soft tissue changes.[6]

However, accurately forecasting these outcomes is challenging due to the complexity of facial soft tissues and their dynamic connection to the continuously changing bone structures.[15] Despite these challenges, following orthognathic surgery, surgical outcomes are typically compared with the computeraided simulation results to assess whether the planned objectives are achieved.
In the present case, the use of complementary examinations such as virtual planning allowed for pre- and post- surgical measurements of soft tissue and bone. The comparison demonstrated a high similarity between the predicted and actual outcomes, with a maximum discrepancy of 2 mm between the virtual plan and the postoperative results.
This confirms the accuracy and reliability of the virtual planning process, as differences of 2 mm or less were maintained, which have been regar-ded as clinically acceptable.[16]

The 2 mm discrepancy between the virtual plan and the postoperative results observed in this case are possibly due to the sagittal mandibular ramus osteotomy technique that was performed instead of the vertical ramus osteotomy, considering the lack of mandibular advancement. This case report does not aim to establish statistical significance due to its single-case nature, however, differences could be further explored in future studies that perform a sagittal mandibular ramus osteotomy technique. In terms of "adaptable condylectomy," as described in recent literature, there are two protocols associated with condylar hyper-plasia that can be applied depending on the occlusal condition.[17–19] In our case, the patient presented with condylar hyperplasia and an acquired malocclusion, aligning with the criteria of Protocol II. A condylectomy adapted to the altered occlusion, combined with orthognathic surgery, allowed us to reposition the mandible effectively and restore facial symmetry.
Our results support this approach, as the combination of both procedures led to stable out-comes without the need for further surgical interventions.[17–19]

A major limitation of the present case was the advanced stage at which the unilateral condylar hyperplasia was diagnosed, which required a more complex surgical intervention. The lack of prior clinical photographs and imaging hindered early recognition of the progressive facial asymmetry. In contrast, Shetty *et al.*,[20] reported a similar case documented through serial photographic records, which enabled earlier detection and facilitated a less extensive surgical approach. This highlights the critical role of standardized longitudinal documentation in the early diagnosis and treatment planning of craniofacial growth abnormalities.

CONCLUSIONS

This case demonstrates that simultaneous condylectomy and orthognathic surgery, supported by virtual planning, can effectively manage advanced unilateral condylar[15] hyperplasia in young adults.
Stable functional and aesthetic outcomes remained at 22 months after the surgery. Although promising, these results come from a single case and should be interpreted with caution. Further studies are needed to validate these findings.

CONFLICT OF INTERESTS

There is no conflict of interest to disclose with respect to this manuscript.

ETHICS APPROVAL

The patient provided written informed consent for the publication of this case report, including the use of clinical and radiographic images. Additionally, this study was reviewed and approved by the Research Commission (COI) of the Faculty of Dentistry at Central University of Ecuador, in accordance with institutional and international ethical standards for case report publication

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AUTHORS' CONTRIBUTIONS

Jorge Maldonado-Alvear: Conceptualization; Data collection; Investigation; Methodology; Project administration; Resources; Software; Validation; Visualization; Writing - original draft; Writing - review & editing.

Leonardo Orellana: Conceptualization; Methodology; Project administration; Supervision; Validation; Visualization; Writing - original draft; Writing - review & editing.

Camila Montesinos-Guevara: Conceptualization; Methodology; Writing - review & editing.

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