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Low condylectomy as the sole treatment for active condylar hyperplasia: facial, occlusal and skeletal changes. An observational study

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Abstract. The purpose of this study was to measure the changes in facial, occlusal, and skeletal relationships in patients with active unilateral condylar hyperplasia whose sole treatment was a low condylectomy. A retrospective observational descriptive study was conducted. All patients had undergone a low condylectomy as the sole or initial surgical treatment. The size of the condylar segment removed was decided by matching the affected side with the healthy side, leaving them both like the healthy one. The length of the ramus was measured using panoramic X-ray (distance from the highest part of the condyle to the mandibular angle). Facial, occlusal, and skeletal changes were evaluated using clinical, photographic, and radiological records before and after surgery. Condylectomy as the sole treatment for patients with active condylar hyperplasia allowed improvements to the alterations produced by this pathology, such as chin deviation, tilted lip commissure plane, tilted occlusal plane, angle of facial convexity, unevenness of the mandibular angles, and length of the mandibular ramus. The occlusal relationship also improved with orthodontic and elastic therapy. To conclude, low condylectomy as a sole and aetiological treatment for patients with active condylar hyperplasia allowed improvements to alterations produced by this pathology.

Key words: facial asymmetry; mandibular condyle; condylectomy; low condylectomy; condylar hyperplasia.

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Condylar hyperplasia is a progressive, non-neoplastic overgrowth of the condylar head and neck.[1,2] The aetiology is not completely clear,[3] and extrinsic as well as intrinsic factors may be behind some of its causes.[4] Intrinsic factors include alterations of condylar vascularization, hormone disorders, and cartilaginous exostosis. Extrinsic factors include micro-trauma and infections. This overgrowth can cause different degrees of facial asymmetry. There are multiple ways of classifying this

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pathology.[5–7] Obwegeser and Makek[5] classified condylar hyperplasia into three categories: hemimandibular hyperplasia (HH), hemimandibular elongation (HE), and a combination of the two (HH/HE). The classification of Nitzan et al.[7] is based on the clinical features described by Obwegeser, but is determined mainly by the vector of mandibular asymmetry[5,6]: condylar hyperplasia with a vertical pattern, condylar hyperplasia with a transverse pattern, and condylar hyperplasia with a mixed pattern.

Frontal and side view photographic records are required for an adequate examination. Several X-ray projections are used for asymmetry studies.[2,6,8] A cephalometric analysis of the lateral skull projection allows vertical and sagittal problems to be evaluated. Frontal X-ray and orthopantomograms reveal a tilted occlusal plane and allow the length of both mandibular rami to be compared.[8]

To ensure the diagnosis of condylar hyperplasia, bone scintigraphy is necessary. Bone scintigraphy or SPECT (single photon emission computed tomography) with technetium-99m methylene diphosphonate (99m-Tc-MDP) determines the degree of bone metabolism. A difference of 10% in SPECT between the two condyles, in addition to a medical history of progressive asymmetry and one condyle longer than the other, allows one to diagnose an active condylar hyperplasia. This is the common way to evaluate condylar growth activity.[4,9–13]

The level of activity of the affected condyle must be quantified in order to determine an appropriate treatment plan.[5–7,10–12,14,15] When the growth rate is greater than 10%, a condylectomy is the option to prevent secondary adaptive deformations. The goal of the condylectomy is to remove the overgrowing cartilage. For its part, orthognathic surgery may be considered an option only in cases where the condylar growth has ceased,[5,6,12,14,16] with the sole objective of correcting the asymmetry. Condylectomy and orthognathic surgery can be performed simultaneously.[7,15]

Different treatment protocols have been proposed for this pathology. However, there are no clinical, radiographic, or occlusal studies that can ensure the proposed treatment is the right one. Based on the statement that all treatments ought to solve the cause of the problem, we understand that any surgical indication should contemplate the removal of the hyperplasic condylar cartilage. We pose the following question: Can a low condylectomy (removing the entire excess segment of the condyle, thus attaining balance between the healthy and the affected side) on its own resolve facial, occlusal, and skeletal alterations caused by condylar hyperplasia in the three-dimensional planes?

The purpose of this study was to measure the changes in facial, occlusal, and skeletal relationships in patients with active unilateral condylar hyperplasia whose sole treatment was a low condylectomy.

Materials and methods

A retrospective observational descriptive study was conducted. The study group was comprised entirely of patients with active unilateral condylar hyperplasia seen at the study institutions between the years 2000 and 2010. Medical charts were reviewed. The study was conducted with ethics board approval.

Inclusion criteria were the following: (1) Diagnosed active unilateral condylar hyperplasia, confirmed by a full clinical, radiographic, and scintigraphy study. The clinical evaluation for diagnosis of condylar hyperplasia was progressive mandibular deviation with occlusal changes, as well as a cross-bite of the contralateral side or an ipsilateral open bite. The radiographic characteristics compatible with condylar hyperplasia were a lengthened condyle/ramus. The amount of radiopharmaceutical intake in SPECT should exceed 55% in the affected side or exceed a difference of 10% between the two sides. (2) Orthodontic braces used, but teeth not necessarily aligned or in good occlusion when casts are in an advantageous position. (3) Condylectomy as the sole or initial surgical treatment.

Exclusion criteria were any facial asymmetry due to any cause other than condylar hyperplasia, and patients treated with orthognathic surgery at the same time as condylectomy.

Surgical and postsurgical procedures

With regard to the surgical procedure, the temporomandibular joint is exposed through a pre-auricular or endaural access.[17] The inferior joint space is then revealed, providing a full view of the condylar head. The condylar excess is removed with a burr. The size of the condylar segment removed is determined by matching the affected side with the healthy side, leaving them both like the healthy one. We call this procedure a 'proportional low condylectomy'. The length of the ramus is measured using a panoramic X-ray (distance from the highest part of the condyle to the mandibular angle). The disc is preserved.

The goal of a low condylectomy is to eliminate the cause of the mandibular asymmetry while simultaneously leaving the length of the affected side (from the highest part of the condyle to the mandibular angle) the same length as the healthy side. The same surgeon performed all of these surgeries (R.F.).

All patients underwent physiotherapy and intermaxillary elastic therapy from 1 to 3 months postsurgery, under the supervision of the surgeon. Physiotherapy was performed with ipsilateral and contralateral jaw movements, which started the day after surgery and were done three times a day for 1 month. Intermaxillary elastic therapy was applied 15 days after surgery (a heavy elastic band was attached from the upper bicuspid and upper canine to the lower bicuspid and lower canine). The objective of elastic therapy is to guide the jaw into a proper position (to align the inferior dental midline with the facial midline), achieving a centred chin and proper occlusion and avoiding an open bite. This elastic therapy lasted 3 months.

Data collection

Each patient underwent a complete clinical examination before surgery (frontal and in-profile photographs), a radiographic examination (frontal and panoramic X-rays), and scintigraphy (SPECT). All clinical and radiographic examinations were repeated 15–24 months after surgery.

For each patient we recorded the following data: age, gender, affected condyle, SPECT uptake percentage, size of the removed condylar segment, clinical and radiographic control after surgery, and total follow-up time (Table 1).

Clinical evaluation

The clinical evaluation was done using the clinical frontal and profile photographs that were standardized with a digital grid.

To assess chin deviation, the centricity of the chin was measured in degrees by determining the angle between the facial midline and the straight line connecting the chin with the facial midline on a frontal facial photograph (Fig. 1).

To assess the tilted lip commissure plane, the difference in distance between a horizontal line drawn from each pupil (bipupillary line) to each commissure was determined (Fig. 1).

The angle of facial convexity of the affected side was assessed by evaluation of the anteroposterior position of the soft tissue pogonion, determined by the intersection of straight lines between the

Table 1. Patient distribution according to age, gender, affected side, SPECT percentages, length of condyle removed, further surgery, clinical control, and total follow-up.

Patient	Age, years	Male	Female	Right condyle	Left condyle	% SPECT affected condyle	% SPECT healthy condyle	Length removed, mm	Further orthognathic procedure	Clinical and X-ray control (months)	Total follow-up (months)
1	25		X	X		61	39	10		15	55
2	15		X	X		56	44	8		15	42
3	16	X		X		69	31	6		18	36
4	19	X		X		56	44	7	Bimaxillary osteotomy	20	69
5	20		X	X		67	33	10		15	91
6	14	X			X	64	36	7		24	41
7	20		X		X	56	44	12		15	67
8	14		X	X		63	37	9		18	41
79	21		X		X	58	42	10	Le Fort I	16	95
10	15	X			X	62	38	8		18	120
11	17		X	X		60	40	10		15	107
12	20	X		X		58	42	15		15	100
13	33	X		X		64	36	9		17	84
14	19		X	X		65	35	10		16	15
15	21		X		X	57	43	10		15	15
16	17		X		X	58	42	5		15	18
Total		6	10	10	6				2		

SPECT, single photon emission computerized tomography.

glabella–subnasale point and the subnasale–pogonion point in a profile view facial photograph (Fig. 2).

The occlusal relationship was assessed as follows (Fig. 3): (1) Molar transverse relationship on the contralateral side, rated as normal or cross-bite. (2) Overjet and overbite, rated as positive, zero, or negative. (3) Deviation from the dental midlines, rated as deviated or centred.

Radiographic evaluation

The radiographic evaluation was done using frontal and panoramic X-rays.

The deviation of the chin was measured in degrees from the angle formed by the skeletal midline (vertical line in the middle of the base of the crista galli) and the straight line that connects the centre of the chin to the skeletal midline on the frontal X-ray (Fig. 4).

Unevenness of the mandibular angle was determined by measuring the distance between the pregonial notch on each side and the true horizontal line connecting both fronto-malar sutures on the frontal X-ray (Fig. 4).

The tilted occlusal plane angle was measured between the occlusal plane (the straight line that connects the highest point of the distal cuspid of the lower second molar teeth) and the horizontal line at the height of the distal cuspid of the second molar tooth on the affected side on the frontal X-ray (Fig. 4).

The length of the mandibular ramus was determined by measuring the distance in millimetres between the highest condylar point and the gonial angle (total ramus height, including the condyle) on the panoramic X-ray (Fig. 5).

Statistical analysis

All clinical parameters were measured before and after the condylectomy (15–24 months after surgery) and were analyzed in order to evaluate improvement in facial asymmetries.

Continuous variables were analyzed using a paired *t*-test. We used a level of significance of 0.05. All analyses were done using SYSTAT 13 software (Systat Software Inc., San Jose, CA, USA). The descriptive statistics for continuous and dichotomous variables were calculated using the same statistical software.

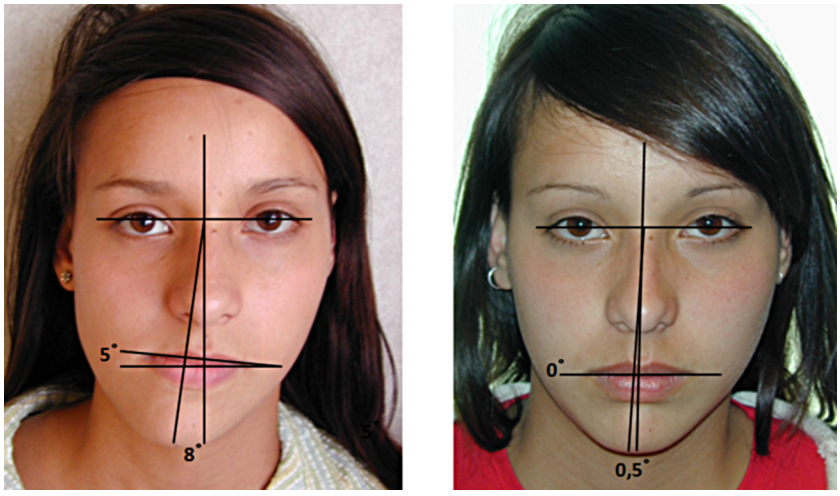

Fig. 1. Frontal photograph showing chin deviation and tilted lip commissure plane. Left: prior to surgery; right: postsurgery.

Results

Sixteen patients who had undergone a low condylectomy as the sole or initial surgical treatment of active unilateral condylar hyperplasia were included in this study. They ranged in age from 14 to 33 years; six were male and 10 were female. Details of the study patients are given in Table 1.

Chin deviation is described in Table 2. With surgery, the average correction was 4.09° (95% CI 3.36–4.82°); total centricity was gained in nine of the patients and a decrease in the deviation in the remaining

Fig. 2. Profile facial photograph showing the angle of facial convexity (glabella–subnasale–pogonion angle). Left: prior to surgery; right: postsurgery.

seven ($P < 0.05$). Changes in the lip commissure plane are described in Table 3. After surgery, levelling of the lip commissure plane was achieved in seven patients and a positive reduction in the difference between corners in the other nine ($P < 0.05$).

The angle of facial convexity (Table 4) increased after condylectomy, resulting in posterior displacement of the soft pogonion by an average 3.72° (95% CI −4.81 to −2.61°) ($P < 0.05$) (Table 4).

The occlusal relationship is described in Table 5. All patients had an anterior and contralateral open bite immediately after condylectomy. All patients underwent intermaxillary elastic therapy from 15 days after surgery for 3 months, with a normal posterior occlusal relationship and midline alignment achieved in all patients.

Of the 16 patients, 14 had frontal X-rays (two patients lost them) showing the deviation of the chin bone (Table 6) ($P < 0.05$). Regarding the unevenness of the mandibular angles, the affected side was an average 5.87% longer than the healthy side. After surgery, total levelling of the mandibular angles was achieved in three cases. In five cases the affected side remained longer by an average of just 2.3% and in the other six cases the affected side was shorter by an average of 2.1% (Table 7) ($P < 0.05$).

Changes in the tilted occlusal plane are described in Table 8 ($P < 0.05$).

The length of the mandibular ramus on the hyperplasic side was an average of 12.45% longer than on the affected side. After condylectomy, the same length was achieved on both sides in one case, the affected side remained longer by an average of 4.3% in five cases, and in the remaining 10 cases the affected side ended up shorter by an average of 5.2% ($P < 0.05$) (Table 9).

Out of 16 patients, two required deferred orthognathic surgery (1.5 years after the condylectomy). One patient (patient 4) required an advanced bilateral sagittal split osteotomy and a Le Fort I maxillary impaction (counter-clockwise) to correct a pre-existing skeletal class II. Another patient (patient 9) underwent a Le Fort I advancement osteotomy due to a

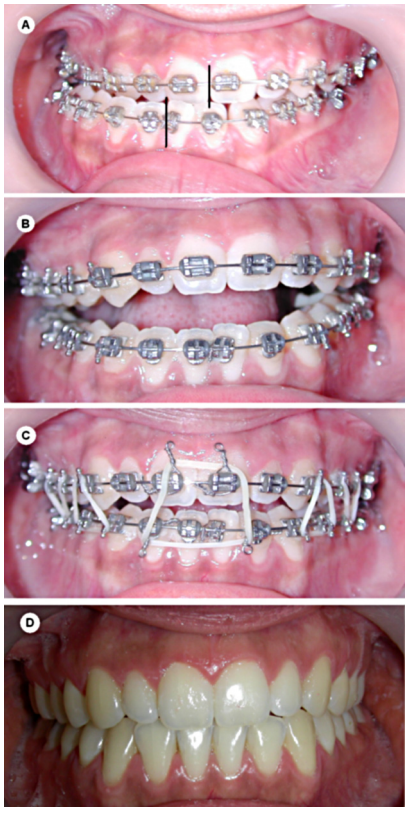

Fig. 3. Occlusal relationship: (A) prior to surgery; (B) 1 day after surgery; (C) 1 month after surgery; (D) 10 years after surgery.

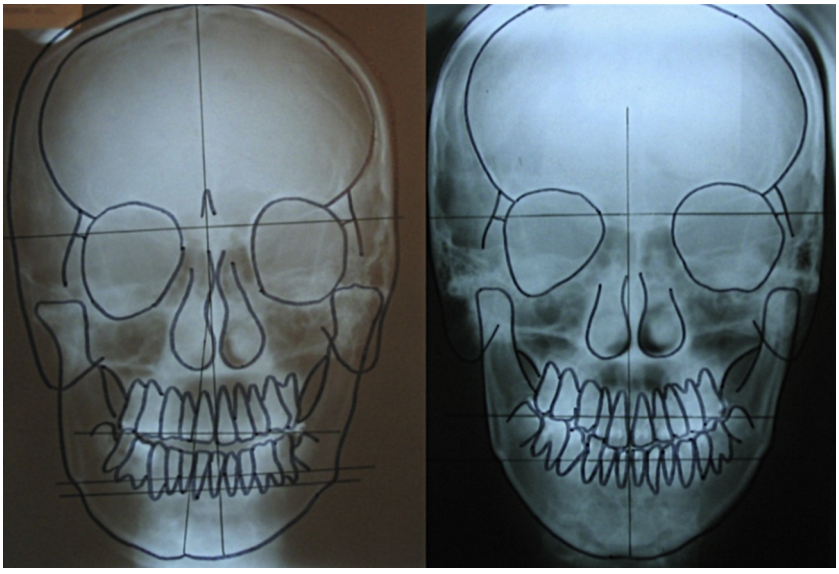

Fig. 4. Frontal cephalometry. Distance between the mandibular angle and the bizygomatic line, measured in millimetres; measurement of the occlusal plane in relation to the bizygomatic line, and the chin in relation to the skeletal medial line, measured in degrees. Left: prior to surgery; right: postsurgery.

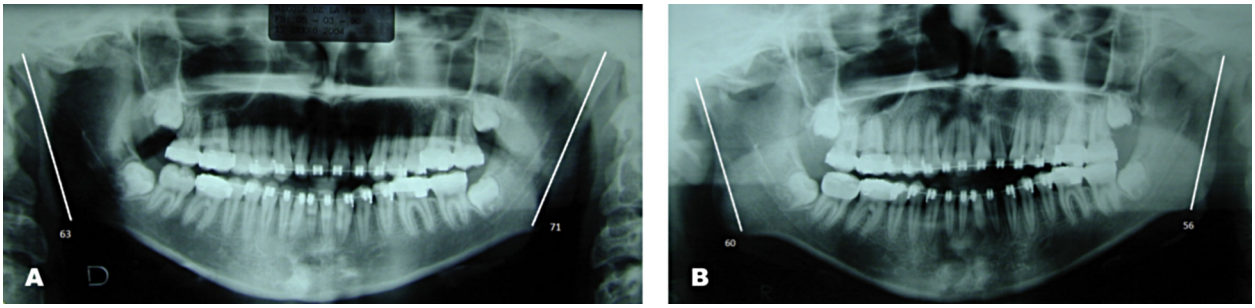

Fig. 5. Orthopantomographic cephalometry. Length of the mandibular ramus: (A) prior to surgery; (B) postsurgery.

Table 2. Chin deviation measured in degrees, from the frontal facial photograph.

Patient	Chin deviation	
	Presurgery	Postsurgery
1	5	0
2	2	0
3	4	1
4	6	2.5
5	3.5	0
6	6	2
7	4	0
8	3.5	0
9	2	0
10	8	0.5
11	5	0
12	6	0
13	5.5	1.5
14	5	1
15	5	0.5
16	4	0
Average	4.65	0.56

pre-existing class III. There was no evidence of facial asymmetry reoccurring in any patient.

After physiotherapy and elastic therapy, none of the patients had symptoms of pain or restrictions in mandibular movement within the follow-up period (mouth opening was at least 35 mm in all patients after a 3-month follow-up period).

All samples were submitted to a histological study, and all were confirmed as condylar hyperplasia.

One patient suffered a transitory facial paresis of the frontalis branch and recovered after 2 months. Figure 6 shows patient 10, with 10 years of follow-up.

Discussion

The term condylar hyperplasia is used widely in the literature, referring to many different classifications, which makes it difficult to determine its exact prevalence. This study describes the changes in

Table 4. Angle of facial convexity of the affected side, measured in degrees, from the profile facial photograph.

Patient	Angle of facial convexity of the affected side	
	Presurgery	Postsurgery
1	13.5	17
2	15	19
3	17	21
4	22.5	25
5	12	14
6	13	16
7	5	6
8	13.5	13
9	5.5	11
10	15	22
11	3.5	10
12	7.5	11.5
13	3	10
14	15	18
15	6	10
16	12	15
Average	11.18	14.90

Table 3. Tilted lip commissure plane measured in millimetres.

Patient	Affected commissure presurgery	Healthy commissure presurgery	Discrepancy affected/healthy side presurgery*, %	Affected commissure postsurgery	Healthy commissure postsurgery	Discrepancy affected/healthy side postsurgery†, %
1	22	21	4.7	21	21	0
2	21	19	10.5	19.5	19	2.6
3	23	20.5	12.1	21.5	21	2.3
4	23	21	9.5	22	21	4.7
5	23	21.5	6.9	21	20	5
6	21	20	5	23	22	4.5
7	21	19.5	7.6	20.5	20	2.5
8	26	25	4	23	23	0
9	24	23	4.3	21	21	0
10	22	20	10	24.5	25	−2‡
11	22	20	10	22	21.5	2.3
12	22	21	4.7	21	21	0
13	20.5	19	7.8	20.5	21	−2.3‡
14	23	20	15	21	21	0
15	24	22	9	23	23	0
16	23	20	15	20	20	0
Average of asymmetry			8.50			1.76

* Discrepancy affected/healthy side presurgery %: percentage of discrepancy between the affected side and the healthy side presurgery.
† Discrepancy affected/healthy side postsurgery %: percentage of discrepancy between the affected side and the healthy side postsurgery.
‡ Negative values represent an overcorrection of the affected side. They are included as positive values for the purposes of the average percentage of discrepancy.

Table 5. Occlusal relationship on the healthy side, dental midline, and incisive vertical relationship pre- and postsurgery.

	Presurgery	Postsurgery
Transverse relationship on the contralateral side		
Cross-bite	83.3%	0%
Normal occlusal relationship	16.7%	100%
Dental midline		
Centred	0%	100%
Anterior relationship		
Anterior cross-bite	75%	0%
Zero overjet	8.3%	16.7%
Normal overjet	16.7%	83.3%

different clinical and radiographic characteristics of 16 patients, which is a large case study in relation to what has been published and the population we cover. We were able to evaluate in detail the results of low condylectomy as the sole treatment for unilateral condylar hyperplasia due to the standardized study and measurements performed before and after surgery.

Most of the limitations of this study are related to its retrospective nature. According to Mawani et al.,[8] a more accurate analysis of mandibular ramus length could result from the use of computed axial tomography.

All measurements changed significantly after condylectomy, with excellent and positive correction of the chin deviation in the patients (the average deviation was 0.56°, which is clinically almost imperceptible).

Condylectomy as the sole treatment for active condylar hyperplasia cases has not been associated with backward movement of the mandibular body. In our study we saw this backward movement with an average of 3.8° of the soft tissue pogonion (Burstone's cephalometric analysis).[18]

The occlusal relationship immediately postsurgery in all patients presented an anterior and contralateral open bite. A normal posterior occlusal relationship and midline alignment was obtained in all patients after intermaxillary elastic therapy. The levelling of the occlusal plane post-condylectomy and elastic therapy could also be attributed to dentoalveolar movements (teeth intrusions on the affected side and extrusions on the healthy side), orthodontic treatment, and functional matrices.[19] None of these was measured in this study. Cone beam computed tomography could help clarify this issue.

Table 6. Deviation of the chin bone measured in degrees, presurgery and postsurgery, from frontal X-ray.[*]

Patient	Deviation of the chin bone, °	
	Presurgery	Postsurgery
1	7	5
2	5	0.5
3	6	4.5
4	6	2
5	6	0.5
6	5	3
7	5	1
8	2.5	1
9	–[†]	–[†]
10	6.5	2.5
11	–[†]	–[†]
12	7	0
13	8	4
14	6	1
15	5	0
16	4	0
Average	5.64	1.79

[*] Deviation of the chin bone difference: centricity gained post-condylectomy.
[†] Excluded from the analysis for lack of preoperative radiographic records.

X-ray measurements showed that condylectomy caused significant compensation of bone chin deviation in mandibular angle unevenness, allowing a partial but significant resolution of this type of vertical asymmetry. Panoramic X-rays revealed that the discrepancy in the length of the mandibular ramus between the two sides was reduced by 63%. Condylectomy

Table 7. Unevenness of the mandibular angle measured in millimetres.

Patient	Presurgery, affected side	Presurgery, healthy side	Discrepancy affected/healthy side presurgery[*], %	Postsurgery, affected side	Postsurgery, healthy side	Discrepancy affected/healthy side postsurgery[†], %
1	102	98	4	97	95	2.1
2	113	106	6.6	110	111	−1[‡]
3	91	88	3.4	89	88	1.1
4	91	84	8.3	96	91	5.4
5	111	104	6.7	95	95	0
6	97	94	3.1	101	99	2
7	103	100	3	98	106	−7.5[‡]
8	103	100	3	107	108	−1[‡]
9			–[§]			–[§]
10	95	90	5.5	88	88	0
11			–[§]			–[§]
12	93	82	13.4	83	84	−1.2[‡]
13	100	93	7.5	86	87	−1.1[‡]
14	112	105	6.6	104	105	−1[‡]
15	96	89	7.8	91	90	1.1
16	93	90	3.3	92	92	0
Average asymmetry			5.87			1.75

[*] Discrepancy affected/healthy side presurgery %: percentage of discrepancy between the affected side and the healthy side presurgery.
[†] Discrepancy affected/healthy side postsurgery %: percentage of discrepancy between the affected side and the healthy side postsurgery.
[‡] Negative values represent an overcorrection on the affected side. They are included as positive values for the purposes of the average percentage of discrepancy.
[§] Excluded from the analysis for lack of presurgery radiographic records.

Table 8. Tilted occlusal plane, measured in degrees, presurgery and postsurgery.[*]

Patient	Canting	
	Presurgery	Postsurgery
1	6	2
2	10	2
3	7	3
4	6	2
5	7	0
6	3	3
7	0	0
8	4	1
9	–	–
10	2	1
11	–	–
12	4	0
13	6	0
14	4	1
15	5	1
16	2	0
Average	4.71	1.14

[*] Canting difference: balance gained post-condylectomy.

improved the symmetry between the mandibular ramus lengths.

Regarding surgical treatment for condylar hyperplasia, several authors have described different ways to manage this condition. However, there are no clinical, radiographic, or occlusal studies that have ascertained which proposed treatment is the correct one. On the one hand, Obwegeser[6] states that, during childhood, correction should be based on a high condylectomy in order to prevent secondary disturbances. During puberty and post-puberty, he states that condylectomy should be performed only with scintigraphy confirmation of an active state of the pathology; in the event of an inactive state, condylectomy should be rejected and the correction should be done through orthognathic surgery. On the other hand, Wolford et al.[15] state that the treatment of choice for patients with active condylar hyperplasia is a high condylectomy combining orthognathic surgery and joint–disc replacement. Also, Sidebottom et al.[20] suggest that in patients with active condylar hyperplasia, a high condylar shave should be performed only to ensure there is no further growth, but that the facial deformity should be corrected with an orthognathic procedure in a second phase to allow a more stable condylar position. A condylectomy would be sufficient in the case of an early diagnosis of the pathology without the patient presenting a pre-existing facial deformity, unless the case calls for a major correction through orthognathic surgery. In contrast, in the case of a delayed diagnosis, a severe dentofacial deformity will result, and in addition to the aforementioned procedures, mono- or bimaxillary surgery will be required. Pantoja et al.[21] reported two cases of active vertical unilateral condylar hyperplasia that were treated only with a condylectomy. Postsurgical open bites were also managed with elastic therapy alone, achieving facial symmetry and occlusal stability in both cases. Our protocol is to do a low condylectomy as soon as there is a correct diagnosis.

A horizontal displacement of the chin towards the healthy side becomes apparent when describing the facial features among patients with hemimandibular elongation, as presented by Obwegeser in 1986,[5,6] or with transverse elongation, as described by Nitzan et al.[7] This situation was also found in our study – deviation of the chin bone and the dental midline occurred in all patients. Crossbite was also evident on the contralateral side in most patients. The classification of Nitzan et al. describes mixed deformities that coexist in a both vertical and horizontal pattern. Horizontal deformities were predominant in this study, with a small vertical component, which might imply that all condylar hyperplasias are mixed, with the vector being predominant in one of the two dimensional planes–in this study, horizontal.

From an aetiological standpoint, condylectomy is the appropriate treatment for this pathology. Its purpose is to remove the active growth site as well as the excessive condylar segment, allowing an adequate balance between the healthy and the affected sides. This study showed a significant correction of multiple facial occlusal and skeletal disturbances, such as chin deviation, mouth corner unevenness,

Table 9. Length of the mandibular ramus, measured in millimetres, from orthopantomograms.

Patient	Affected ramus presurgery	Healthy ramus presurgery	Discrepancy affected/healthy ramus presurgery[*], %	Affected ramus postsurgery	Healthy ramus postsurgery	Discrepancy affected/healthy ramus postsurgery[†], %
1	76	65	17	67	63	6.3
2	76	71	7	75	80	−6.2[‡]
3	66	65	1.5	48	49	−2[‡]
4	62	55	12.7	64	60	6.6
5	83	73	13.6	67	66	1.5
6	70	67	4.4	73	73	0
7	82	69	18.8	65	70	−7.2[‡]
8	74	65	13.8	73	77	−5.2[‡]
9	78	77	1.2	62	75	−17.4[‡]
10	71	63	12.6	56	60	−6.7[‡]
11	87	77	12.9	74	75	−1.4[‡]
12	71	56	26.7	57	54	5.5
13	72	61	18	62	64	−3.2[‡]
14	71	61	16.3	62	61	1.6
15	82	72	13.8	69	70	−1.4[‡]
16	61	56	8.9	60	61	−1.6[‡]
Average asymmetry			12.45			4.61

[*] Discrepancy affected/healthy ramus presurgery %: percentage of discrepancy between the ramus of the affected side and the ramus of the healthy side presurgery.

[†] Discrepancy affected/healthy ramus postsurgery %: percentage of discrepancy between the ramus of the affected side and the ramus of the healthy side postsurgery.

[‡] Negative values represent an overcorrection of the affected side. They are included as positive values for the purposes of the average percentage of discrepancy.

Fig. 6. Frontal photographs: (A) prior to surgery at 12 years old; (B) prior to surgery at 15 years old; (C) 1 year postsurgery; (D) 10 years postsurgery.

mandibular angle unevenness, and tilted occlusal plane.

In our series, only two patients (12.5%) required a secondary orthognathic surgery. One patient required an advanced bilateral sagittal split osteotomy and Le Fort I maxillary impaction to correct a pre-existing skeletal class II. The other patient underwent a Le Fort I advancement osteotomy due to a pre-existing class III. Nevertheless, in 87.5% of the patients, a significant, almost complete correction of asymmetries was achieved with just a low condylectomy and orthodontic treatment.

We believe that the best way to manage this pathology, in the case of an active condylar hyperplasia, is by performing an early low condylectomy, thereby achieving facial symmetry by levelling the affected side with the healthy side. If the active condylar hyperplasia presents a pre-existing dentofacial deformity, or has created severe skeletal compensations, the treatment must consist of early condylectomy to correct the condylar alteration, combined with orthognathic surgery (deferred or at the same time).

In conclusion, a proportional low condylectomy as a sole and aetiological treatment for patients with active condylar hyperplasia allowed improvements to alterations produced by this pathology, such as chin deviation, tilted lip commissure plane, tilted occlusal plane, angle of facial convexity, unevenness of the mandibular angles, and length of the mandibular ramus. The occlusal relationship also improved with orthodontic and elastic therapy. In our study, a low condylectomy alone completely resolved the facial, occlusal, and skeletal alterations in 87.5% of the patients. If a dentofacial dysmorphism is associated with condylar hyperplasia, it will require comprehensive treatment to be supplemented with orthognathic surgery.

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Competing interests

None.

Ethical approval

This study was approved by the Hospital del Salvador ethics board.

Patient consent

Patient consent was obtained.

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