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## Review

## Condylar hyperplasia: current thinking

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## Abstract

Unilateral condylar hyperplasia is a rare disease that causes facial asymmetry as a result of excessive vertical or horizontal growth, or both, of the mandibular condyle. Investigation should address the patient's concerns, and establish whether the disease is active with the use of single positron emission tomography (PET). Proportional reduction of the condyle arrests active disease and restores mandibular height, and any residual asymmetry can be corrected according to conventional orthognathic principles. We recommend the use of 3-dimensional virtual planning for such complex movements. The rarity of the disease means that, to our knowledge, high-quality evidence is lacking and further research is needed.

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## Introduction

Unilateral condylar hyperplasia is a rare condition that leads to considerable facial asymmetry. The biology is poorly understood, medical options are limited, and treatment is therefore surgical.

The condition initially presents as asymmetry of the lower third of the face, but is not found in all patients who present with this problem. Perceived facial asymmetry is common, and is cited in over 35% of patients who present for orthognathic evaluation.<sup>1</sup> Deviation of the chin of 5 mm or less is not discernible by clinicians or patients, but larger amounts have exponential effects on perceptions of “acceptability” and the need for surgical correction.<sup>2</sup>

Epidemiological data are scarce. As most patients present in adolescence or young adulthood, other differential diagnoses should be considered (particularly condylar osteochondroma) when older patients present with mandibular

asymmetry.<sup>3,4</sup> Most patients are female, but it is not clear whether this is a true predilection, or whether women are more likely to seek referral. An association that was postulated between the sex of the patient and the side affected<sup>5</sup> has been disproved by meta-analysis.<sup>6</sup>

## Clinical features

Unilateral condylar hyperplasia is characterised by ipsilateral fullness of the lower third of the face with contralateral flatness and deviation of the chin away from the affected side. The precise changes in facial appearance and occlusion, however, vary because abnormal growth can be vertical or horizontal. Obwegeser and Makek reported that in many cases, one of these vectors predominates, and they proposed three subtypes, one for each vector and one combined form.<sup>7</sup> These have acquired many different names (Table 1),<sup>5,7,8</sup> but we recommend simple terminology that reflects the clinical findings: vertical, horizontal, or combined.<sup>5</sup>

In vertical cases, there is down-growth of the ipsilateral mandibular condyle with minimal deviation of the chin or

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Table 1

Summary of some of the different nomenclature used to classify clinical patterns of condylar hyperplasia. Wolford includes all subtypes as one classification.<sup>8</sup> We favour the simplicity and clinical focus of that by Nitzan et al.<sup>5</sup>

| First author and reference | Excess vertical growth        | Excess horizontal growth        | Excess growth in both vectors     |
|----------------------------|-------------------------------|---------------------------------|-----------------------------------|
| Nitzan <sup>5</sup>        | Vertical condylar hyperplasia | Horizontal condylar hyperplasia | Combined condylar hyperplasia     |
| Obwegeser <sup>7</sup>     | Hemimandibular hyperplasia    | Hemimandibular elongation       | Hybrid hemimandibular hyperplasia |
| Obwegeser <sup>7</sup>     | Type I                        | Type II                         | Type III                          |
| Wolford <sup>8</sup>       | Type 1b                       | Type 1b                         | Type 1b                           |

occlusal midline, and substantial sloping of the ipsilateral mandibular occlusal plane. The entire hemimandible looks enlarged in three dimensions, from ipsilateral condyle to symphysis. Initially, it causes an ipsilateral open bite, but gradual compensatory growth of the maxillary and mandibular dentoalveolar complexes results in an occlusal cant. Ipsilaterally, the mandibular body is bowed and the angle rounded; contralaterally it looks flattened. The inferior alveolar bundle remains in its position close to the lower border of the mandible because of overgrowth of the dentoalveolar segment. The whole face appears rotated.<sup>5,7,9</sup>

The horizontal form presents with deviation of the chin and mandibular occlusal midline to the contralateral side, with a contralateral crossbite. The ipsilateral mandibular molars usually tip to maintain occlusion.<sup>5,7</sup> The combined form presents with excess growth in both planes and clinical features of the vertical and horizontal types.

The horizontal form seems to be more common than the vertical form, but estimates of relative incidence vary widely.<sup>4,5,10</sup> In all cases, the increased functional load may cause contralateral temporomandibular dysfunction with associated pain and clicking.<sup>5</sup>

## Aetiology

Unilateral condylar hyperplasia constitutes organised growth that is both accelerated and prolonged in the area affected (growth can continue until the patient's mid-twenties),<sup>11</sup> but the underlying biology is poorly understood. Traumatic, genetic, hormonal, and mechanical causes have been proposed, but conclusive evidence is lacking.

The histological appearances of the condition are characteristic, with an undifferentiated mesenchymal layer, a hyperplastic cartilage layer, and pathognomonic cartilage "islands" in the proximal bony trabeculae.<sup>12,13</sup> These layers vary in thickness, but the importance of this is uncertain.<sup>14</sup>

Insulin-like growth factor 1 (IGF-1) has been implicated in the development of condylar hyperplasia. High concentrations are found in the proliferating zone of hyperplastic condyles,<sup>15</sup> and chondrocytes cultured from such condyles express more than their normal counterparts. The addition of IGF-1 to normal cultured chondrocytes increases their proliferation.<sup>16</sup> This, however, is inconclusive, and the factors underlying the process remain unclear.

Table 2

Differential diagnoses of facial asymmetry.<sup>1,9,17–19</sup>

Causes of facial asymmetry and differential diagnoses

### Abnormal positioning:

- Torticollis
- Condylar dislocation
- Dental interference
- Mandibular posturing
- Macroglossia

### Contralateral ankylosis of the TMJ:

- Delivery trauma
- Condylar fracture
- Juvenile condylar arthritis
- Childhood TMJ radiotherapy

### Abnormal facial development:

- Unilateral coronal craniosynostosis
- Deformational plagiocephaly
- Hemifacial microsomia (contralateral)
- Mandibular hypoplasia (contralateral)
- Parry-Romberg syndrome

### Ipsilateral tumour:

- Osteochondroma
- Chondroma
- Fibro-osteoma
- Giant cell tumour
- Fibrosarcoma
- Neurofibromatosis
- Fibrous dysplasia
- Myxoma
- Fibrosarcoma
- Ameloblastoma
- Metastatic disease
- Proteus syndrome

## Investigation

### History

Clinical evaluation is crucial for diagnosis and the planning of treatment. The patient's main complaint is paramount, and their concerns and expectations should be central to the plan. Aesthetic and functional problems should be recorded.

Progressive asymmetry of the lower face that presents during the pubertal growth spurt supports a diagnosis of condylar hyperplasia. Asymmetry that has been present since birth probably suggests another disease, and photographs may help. A full medical and social history should be taken, as with any surgical patient.

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