Unilateral progressive condylar resorption post-orthognathic surgery: a case report

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Abstract

Introduction
Progressive condylar resorption is a rare complication following orthognathic surgery. Its aetiology and pathogenesis remains unclear, although several theories have been suggested to explain it. Management modalities for progressive condylar resorption range from conservative follow-up to a second corrective orthognathic surgery. This is a report of a unilateral case of severe progressive condylar resorption that occurred in a female patient with class II skeletal deformity after bimaxillary osteotomy. The patient was followed-up for 9 years post-operatively.

Case Report
A 17-year-old female patient referred to the Department of Oral and Maxillofacial Surgery by her orthodontist presented with mandibular hypoplasia with 5-mm overjet, high mandibular plane angle with anterior open bite, and mandibular asymmetry with deviation to the right side.

Conclusion
The 9-year follow-up of this case suggests that the treatment policy for future patients with PCR should be based on stabilization of the occlusion with splint followed by a long period of follow-up.

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Introduction
Progressive condylar resorption (PCR), a major complication of orthognathic surgery, is a process of destructive remodelling of the condylar process of the mandible that leads to progressive alteration of shape and mass decrease.

The occurrence of PCR has been identified in many studies as being associated with orthodontic treatment and orthognathic surgery; however, the real aetiology and pathogenesis of condylar resorption following orthognathic surgery remains unclear. There is a predilection for females with pre-existing temporomandibular joint (TMJ) dysfunction in whom large mandibular advancement is performed. Some investigators claim that a high mandibular plane angle is also a predisposing factor.

Several theories have been suggested to explain this phenomenon: one suggests the concept of avascular necrosis of the condyle due to compromised blood supply; another theory is based on genetic preference and is supported by its association with a high mandibular plane angle; and other theories suggest hormonal influence supported by predilection for young females.

The management of PCR remains a controversial issue. Distraction osteogenesis correction has been advocated as a less stressful treatment modality compared with the classical orthognathic procedure, as there is less TMJ loading due to the gradual increase in mandibular ramus length.

We report a case of severe progressive condylar resorption that was refractory to several treatment modalities in a female patient with class II skeletal deformity who underwent orthognathic surgery.

Case report
A 17-year-old female patient referred to the Department of Oral and Maxillofacial Surgery at Marienhospital-Stuttgart (Germany) by her orthodontist presented with mandibular hypoplasia (class II skeletal malocclusion) with 5-mm overjet, high mandibular plane angle with anterior open bite, and mandibular asymmetry with deviation to the right side (Figure 1).

Bimaxillary osteotomy was performed with Le Fort I osteotomy and bilateral sagittal split osteotomy and genioplasty fixed with rigid internal fixation.

The initial results were good with class I occlusion. However, 9 months after the operation, the first changes of the right condyle appeared, as assessed radiographically, and 3 months later, condylar resorption became progressive with signs and symptoms of relapse, which included shortening of the right ascending ramus and progressive class II skeletal malocclusion with deviation of the mandible to the right side (Figure 2).

A second operation was performed for the removal of plates and insertion of a distraction apparatus to lengthen the right ascending ramus according to strict protocol, with the vector of distraction parallel to the mandibular plane (Figure 3). However, no satisfactory results were obtained and condylar resorption with relapse proceeded.

The third operation was performed 6 months later, wherein the mandibular distractor was removed and a

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right side sagittal split osteotomy of the mandible was performed to correct facial asymmetry. This resulted in ongoing osteolysis with approximately 15 mm shortening of the mandibular ascending ramus compared with the first preoperative radiograph (Figure 4).

A conservative protocol of treatment was decided for this patient by stabilizing the occlusion with occlusal splint and supportive treatment with non-steroidal anti-inflammatory drugs followed by long-term follow-up.

The last follow-up for the patient was performed in October 2011 (9 years after the first operation). The patient had a stable mild class II occlusion with mandibular facial asymmetry but with acceptable facial profile (Figure 5).

Discussion
It seems that PCR is not an isolated event; it is clearly an multi-factorial phenomenon based on interaction between two groups of factors: mechanical stimuli and host adapting capacity. Crawford et al. assumed that one possible explanation for the ongoing resorption could be the adaptability of the TMJ complex; and those who had ongoing PCR may not have had adaptation of the TMJ during the initial episodes to resist further PCR or had not reached the point of adaptation to accept new vectors of force applied and thus resist further episodes of PCR.

Based on the diagnosis and the patient’s chief complaint, we believe that we had good reasons for our treatment planning of bimaxillary osteotomy, although there were some predisposing factors such as female gender, high mandibular plane angle, signs of osteoarthritis seen in the right condyle pre-operative radiographs and a relatively large amount of mandibular advancement (about 7 mm) during operation with counter-clockwise rotation. Late skeletal relapse caused by PCR.

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There is an increasing trend in the literature to limit a second corrective orthognathic surgery to cases of condylar resorption of small magnitude\(^6,9\). Huang \(\text{et al.}\)\(^4\) suggest that orthognathic surgery should only be performed when the condyles are stable as determined by clinical examination, radiographs or bone scans as appropriate, and it is best limited to maxillary surgery.

The occurrence of PCR in this case seems to support the hypothesis of predisposing risk factors mentioned above. However, this is the only case of refractory PCR that has occurred so far in our series of more than 1000 patients who have undergone bimaxillary osteotomies in the past 12 years, starting from 2000. In retrospect, it is very difficult to find out what happened at what moment in our case. We are fortunate not to have seen other patients with this problem, but if we do encounter such a patient, it would be a real problem to solve.

**Conclusion**

From our experience of the 9-year follow-up of this case of PCR, we suggest that the treatment policy for future patients with PCR should be based on stabilization of the occlusion with splint followed by a long period of follow-up. Subsequently, the next step can be determined either with non-invasive treatment, such as orthodontics or prosthetic therapy, or with more invasive treatment, such as distraction osteogenesis and maxillary and mandibular segmental osteotomies after explaining the risks to the patient.

**Consent**

Written informed consent was obtained from the patient for publication of this case study and accompanying images. A copy of the written consent is available for review with the Editor-in-Chief of this journal.
References