

# Osteochondroma of the mandibular condyle: Report of two surgical approaches

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## ABSTRACT

Osteochondromas are common tumors of the long bones, but are rare in the craniofacial region. We detailed two different management of osteochondroma of the mandibular condyle treated utilizing three-dimensional (3D) imaging and computer-assisted planning. Simultaneous open temporomandibular joint and orthognathic surgeries were done to treat both the pathology and secondary facial asymmetry. An osteochondroma that presented as a bony mass at the lateral aspect of the left mandibular condyle of a 24-year-old Chinese female was treated with simultaneous orthognathic surgery and conservative excision. No recurrence was detected 7 months postsurgery. An osteochondroma that presented as a generalized enlargement of the right mandibular condyle of a 25-year-old Chinese male was treated with simultaneous orthognathic surgery and condylectomy. There were no significant issues 3 years postsurgery. Simultaneous orthognathic and temporomandibular joint surgeries are a viable option for the management of osteochondroma of the mandibular condyle. The availability of 3D imaging enabled better presurgical examination of the lesion, which directed treatment toward condylectomy or conservative excision.

**Keywords:** Computer-assisted planning, condylar osteochondroma, condylectomy, mandible deformity

## INTRODUCTION

Osteochondroma, also known as osteocartilaginous exostosis makes up 35.8% of all benign bone tumors.<sup>[1]</sup> An osteochondroma of the craniofacial region is a rare finding, the incidence of which is around 0.6%.<sup>[1]</sup> The mean patient age is 39.7 years, with a peak in the fourth decade.<sup>[2]</sup> The male to female ratio is 1:1.28.<sup>[3]</sup> In the facial skeleton, it is generally associated with the coronoid process and the mandibular condyle,<sup>[4]</sup> although cases involving other facial bones have also been reported.<sup>[5]</sup>

Facial asymmetry and accompanying malocclusion are the most common presentations. Clinical appearances include transverse maxillary canting, a prognathic deviation of the chin to the contralateral side, open bite on the ipsilateral side, and a crossbite on the contralateral side.

Osteochondromas may arise on different aspects of the mandibular condyle. Meng *et al.*<sup>[6]</sup> reported 34 cases of osteochondromas. In that series, the tumor arose from the medial aspect in 55.9% of the cases, the anterior-superior in 11.8%, the posterior-superior in 11.8%, the lateral in 8.8%, and the generally enlarged in 11.8% of cases.

In terms of surgical treatment, the conventional approach has been to undertake a condylectomy.<sup>[5]</sup> A conservative approach by excision of the tumor and preservation of some or all of the condylar head has also been reported.<sup>[4,5,7]</sup> In a review of 70 cases, only four reported recurrence after local excision of the lesion at the mandibular condyle.<sup>[8]</sup>

In this series, we are reporting two cases of surgical removal of an osteochondroma of the mandibular condyle with simultaneous orthognathic surgery to correct the secondary jaw deformities.

This was done with the aid of three-dimensional (3D) imaging and computer-assisted planning.

## CASE REPORTS

### Case 1

A 24-year-old Chinese female undergoing orthodontic treatment was referred to the National Dental Center Singapore for orthognathic surgery. She presented with a Class III skeletal profile with an asymmetry of the mandible and a maxillary cant. The right side of her mandible appeared broader than the left side although her chin point was coincidental with her facial midline. She had a Class III malocclusion with a left posterior open bite and a right crossbite. The inter-incisal opening was 32 mm. An orthopantomogram taken showed an incidental finding of a large bony growth at the left temporomandibular joint. The only symptom she had was an occasional left earache.

Computed tomography scans showed a bony mass  $2 \times 2$  cm arising from the lateral part of the left condyle, resulting in a downward displacement of the left condyle and facial asymmetry from a clockwise rotation of mandible when viewed from the superior and anterior aspect. The diagnosis based on the clinical presentation and radiographic appearance was an osteochondroma of the mandibular condyle. The patient was planned for a conservative excision of the lesion with simultaneous orthognathic surgery. The surgery was planned using the SimPlant Pro 2011 from Materialise Dental program and the lesion was removed digitally. The surgery was simulated achieving good occlusal relationship with correction of the facial deformity. Together with the 3dMD system simulation of soft tissue contours, 3D facial profile prediction was made of the surgical outcome.

The patient was operated on under general anesthesia through nasotracheal intubation. A Le Fort 1 osteotomy was first performed through a circumvestibular incision. The maxilla was advanced and the cant was corrected, as guided by an intermediate wafer. The maxilla was then fixed with 4 miniplates (Medicon 2.0 miniplates, Germany). After that, an endaural incision was made, followed by an anterograde blunt dissection to access the bony lesion at the left temporomandibular joint. Care was taken to preserve the neurovascular structures at the region. The mandible was retracted inferiorly, and the mass superior and lateral to the condyle was excised in pieces together with a margin of healthy bone, but preserving the medial pole of the condyle. Bilateral sagittal split osteotomies were then carried out through vestibular incisions at the posterior mandible. The mandible was setback and the asymmetry corrected, as guided by the final wafer. The remnant condylar head was repositioned into the glenoid fossa of the temporal bone. The mandible was fixed with 1 miniplate bilaterally (Medicon 2.0 miniplates, Germany) and she was placed into intermaxillary fixation. The recovery postoperation was uneventful and the patient was discharged on the second postoperative day. The intermaxillary fixation was maintained for 14 days and subsequently converted to light training elastics for one more week. Jaw exercise was

implemented after 3 weeks. Histology of the lesion confirmed the diagnosis of an osteochondroma.

At 7 months postoperation, mouth opening of 29 mm was achieved with no signs of recurrence. The decrease in mouth opening might be due to fibrosis at the operated condyle site as the patient was not very compliant with her jaw exercises [Figures 1a-g].

### Case 2

A 25-year-old Chinese male was referred for the management of a complaint of mandibular asymmetry with the right jaw being longer than the left. The patient first noticed the jaw unevenness 6 years ago and expressed increasing difficulty in mastication and speech. He presented with a Class III skeletal relationship and a Class III malocclusion with a pronounced asymmetry of the mandible and a maxillary cant. His chin point was deviated 2 cm to the left side. He also complained of right temporomandibular joint clicking on mouth opening. Intraorally, there was an open bite on the right and crossbite on the left side.

Computed tomography showed an expansion of the right mandibular condyle, and there was an abnormal bird beak like tapering in the anterior aspect due to the lesion. The articular surface of the right condyle was irregular, and there was a subchondral cyst seen in the medial aspect. The lesion was reported as an osteochondroma of the right mandibular condyle associated with remodeling deformities and degenerative change in the right temporomandibular joint. The patient was planned for a condylectomy to resect the lesion and correct the right mandibular ramus height and simultaneous orthognathic surgery to resolve the other asymmetry problems. In this case, a 3D stereolithographic model was printed using the Z Printer 450 system. The surgery was simulated on the model to achieve the optimal treatment plan for the patient.

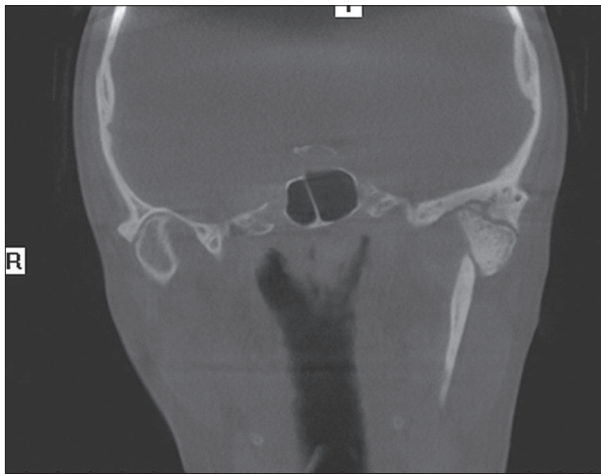
The patient was operated on under general anesthesia through nasotracheal intubation. A two-piece Le Fort 1 osteotomy with a midline split was first performed through a circumvestibular incision. The maxilla was fixed with 4 miniplates (Medicon 2.0 miniplates, Germany) under the guidance of an intermediate wafer. Next, an attempt was made to perform the right mandibular condylectomy through an intraoral approach. An ipsilateral coronoidectomy was done to gain access. The condylectomy was successfully done at the level of the condylar neck, but there was difficulty in delivering the lesion. A preauricular incision was then made and blunt dissection to the right temporomandibular joint was carried out. The lesion was delivered en bloc and the subcondylar stump was shaped to fit the glenoid fossa. Closure of the site was done with special attention to reattachment of the disc and closure of the joint capsule. An intraoral vertical subsigmoid osteotomy was performed at the left mandible in order to correct the asymmetry through decanting and rotation of the mandible to the right. The patient was kept on intermaxillary fixation for 1 month followed by light elastics placed for another month. Subsequently, jaw exercises were implemented together with the elastics. He had a mouth opening of 33 mm with deviation to the right on opening at 2 months. This gradually improved to 40 mm at 2-year follow-up, but there was still a deviation of the



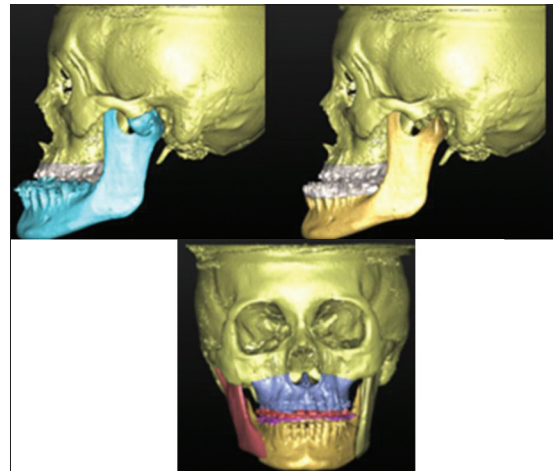
**Figure 1a:** Frontal profile showing asymmetry of mandible



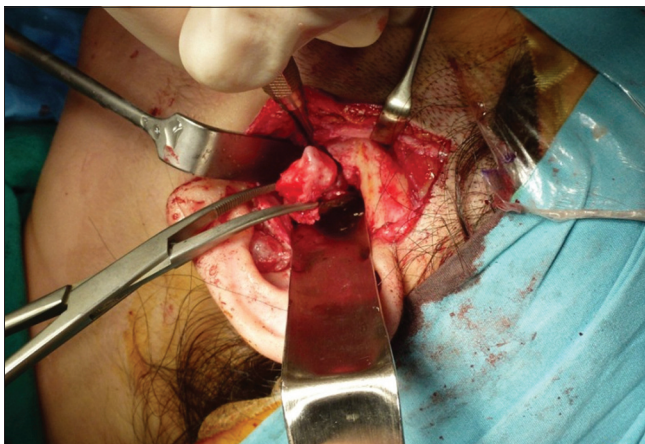
**Figure 1b:** Right profile showing a Class III skeletal relationship of the jaws



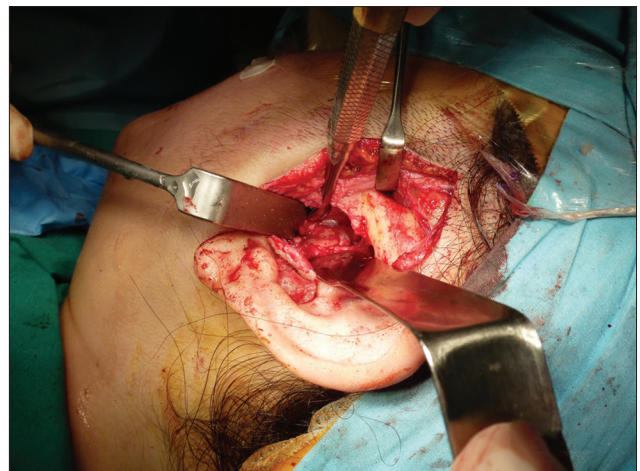
**Figure 1c:** Computed tomography scan showing the extent and lateral position of lesion and three-dimensional reconstruction. Note the delinearization between lesion and condyle head



**Figure 1d:** Three-dimensional planning of surgery



**Figure 1e:** Intraoperative picture showing removal of lesion



**Figure 1f:** Cavity after removal of lesion

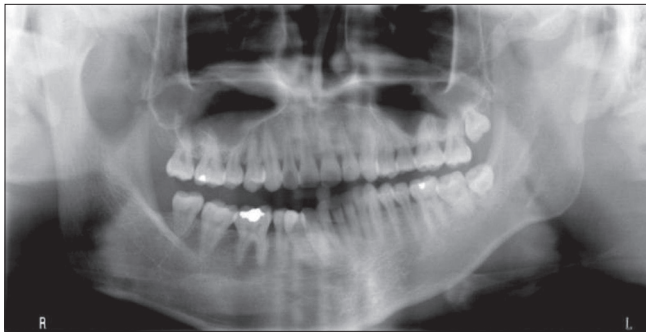
mandible to the right on opening. He started on orthodontics at 3 months postsurgically. Histology of the lesion confirmed the diagnosis of osteochondroma with features of a polypoid

osteo-cartilagenous projection from the condyle. The patient subsequently completed orthodontic treatment and showed no recurrence after 3 years [Figures 2a-e].





**Figure 1g:** Postoperative radiograph of patient showing correction of asymmetry



**Figure 2b:** Panoramic view showing lesion at right condyle with increase in vertical ramus height and bowing of mandible

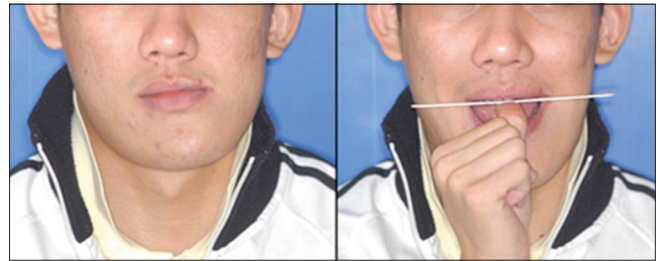


**Figure 2d:** Three-dimensional model printout of cone beam computed tomography

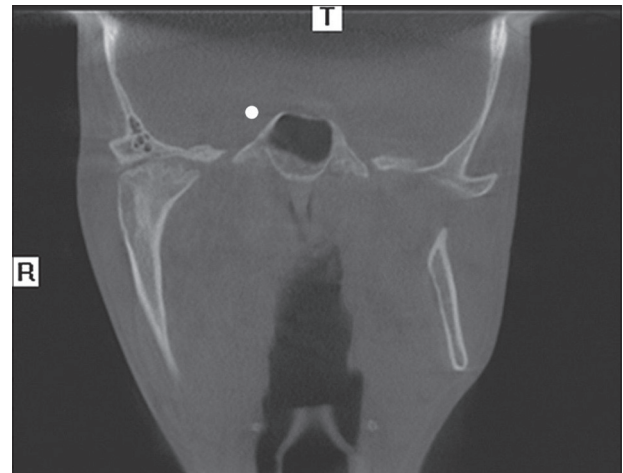
## DISCUSSION

Both condylectomy and conservative excision have been described in the literature for the management of osteochondromas of the mandibular condyle.

In 2002, Wolford et al.<sup>[7]</sup> proposed removal of the condylar



**Figure 2a:** Profile pictures demonstrating asymmetry of mandible and chin with resultant occlusal cant



**Figure 2c:** Cone beam computed tomography showing medial extension of lesion and no clear demarcation of condyle head and mass



**Figure 2e:** Clinical photographs on follow-up

osteochondroma with preservation of the remaining bone since it is an exophytic growth and not an invasive lesion. Conservative surgical approach, however, seems to be limited by technical difficulties to achieve an adequate exposure to enable a selective yet radical tumor resection. The argument against a conservative approach is the possibility of inadequate removal that may result in a recurrence of the lesion. The four cases of recurrence reported by Mikel et al.<sup>[8]</sup> gave a recurrence rate comparable to that of a long bone after treatment.

The two cases presented in this article were managed through different treatment modalities based on the different locations and presentation of the osteochondroma. Case 1 was managed conservatively as the CT scan showed the lesion to be in a lateral position in relation to the condylar head of the mandible. This location allowed good surgical access and visibility. The medial pole of the condyle was preserved thereby maintaining the ramus height. The tumor in case 2 presented as a general enlargement of the condylar head with an increase in the ipsilateral vertical height of the ramus. The condylectomy done for this case not only served

to remove the lesion, it also corrected the downward displacement and rotation of the mandible resulting from the lesion. If the osteochondroma is removed without simultaneous orthognathic surgery, the jaw deformity secondary to the osteochondroma will still be present after surgery. As the maxilla is often canted, if the cant is not corrected by osteotomy, it prevents the mandible from being repositioned after the osteochondroma removal.

The use of computer tomography allows precise information on the lesion and these findings may then help a surgeon decide on the best treatment modality for the case.

In addition, commercially available 3D software aids in presurgical planning and simulation of the soft tissue changes after the planned TMJ and orthognathic surgery. The use of 3D computerized planning seems to be especially useful as simulation in the frontal aspect is otherwise not possible with 2D simulation programs.

Wolford<sup>[9]</sup> had previously reported that temporomandibular joint and orthognathic surgery can be safely and predictably performed simultaneously. The benefits are that it decreases treatment time, avoids temporomandibular joint sequelae associated with orthognathic surgery only and avoids malocclusion arising from temporomandibular joint surgery only. His series of six patients with osteochondroma of the mandibular condyle treated with concomitant orthognathic surgery had stable outcome with no recurrence at 4 years postoperatively.<sup>[7]</sup> Similarly, the two cases reported in this article of simultaneous temporomandibular joint and orthognathic surgery for the management of mandibular condylar osteochondroma had good functional and esthetic results. Cases 1 and 2 showed no recurrence at 7 months and 3 years postoperatively, respectively.

## CONCLUSION

We reported two cases of concomitant temporomandibular joint and orthognathic surgery for the management of osteochondroma

of the mandibular condyle and 3D imaging aided in the presurgical examination of the location and spatial orientation of the lesion, which influenced the surgeon's choice between condylectomy and conservative excision. Both cases reported using the two different treatment modalities had good functional and esthetic results.

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