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Case Report

Multidisciplinary Treatment of Peripheral Osteoma Arising from Mandibular Condyle in Patient Presenting with Facial Asymmetry

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Abstract

While osteomas often occur in the orofacial area, it is relatively rare for one to occur in the temporomandibular joint area. Here, we report a patient who underwent multidisciplinary treatment including high condylectomy for peripheral osteoma arising in the left mandibular condyle. The patient was a 46-year-old woman with the chief complaint of facial asymmetry. Cephalometric analysis revealed skeletal anterior crossbite due to anterior deviation of the mandible, with chin deviation of 10 mm to the right. A computed tomography scan revealed bone hyperplasia in the mesiodistal and inner areas of the left mandibular condyle, which exhibited outward anterior displacement. Bone scintigraphy showed a circular area of strong radioisotope accumulation with indistinct boundaries, consistent with the lesion in the left mandibular condyle. The above findings led to a diagnosis of skeletal mandibular prognathism with facial asymmetry due to peripheral osteoma originating in the left mandibular condyle. After orthodontic treatment and surgical resection of the tumor and mandibular condyle, preservation and prosthetic treatment were undertaken. A well-balanced facial appearance and good occlusion were achieved.

Key words: Facial asymmetry — Osteoma — Condylar ectomy — Orthodontic treatment — Multidisciplinary treatment

Introduction

Maxillofacial deformity can be congenital, a developmental anomaly, or acquired later in life. One reason for the onset of maxillofacial deformity is facial asymmetry due to peripheral osteoma on one side of the mandibular condyle. Osteomas are benign tumors composed of mature bony tissue and most often appear in the long bones. The majority of these are central osteomas that develop within the jawbone or outer periosteum peripheral osteomas[8]. Because they generally grow very slowly and often do not produce any symptoms until they have enlarged, causing pressure symptoms in surrounding structures, they are often left untreated[6]. However, tumor growth speed, location, and pressure direction can cause various symptoms to appear such as facial deformation, ocular protrusion, visual disturbance, maxillary sinus loss, and occlusal disharmony. In particular, since mandibular condyle lesions can lead to disorders such as facial asymmetry, impaired jaw movement, and malocclusion, osteomas are often detected by x-ray in patients who present with these symptoms[10]. Occlusal reconstruction is then often required, because temporomandibular joint (TMJ) support can be lost after ablative surgery for lesions such as these. While there have been numerous case reports of patients who underwent surgical treatment for such lesions[1,3,5,7,12,14], there have been few reports investigating multidisciplinary dental treatment including high condylectomy[13].

Here, we report a patient with a peripheral osteoma arising from the mandibular condyle who presented with the chief complaint of facial asymmetry. The patient underwent preservation and prosthetic treatment after high condylectomy, resulting in a well-balanced facial appearance and good occlusion.

Case Report

The patient, a 46-year-old woman, presented with the chief complaint of facial asymmetry and a sense of discomfort in the left ear area. She had a history of hypertension, but had not experienced any external injury in the TMJ area. The history of the present illness constituted edge-to-edge occlusion appearing when the patient was in her 30s, with facial asymmetry worsening with age. The patient had become aware of pain on chewing and discomfort in her left TMJ and ear area 4 or 5 prior to visiting us. The pain temporarily disappeared, but a clicking noise then appeared. She sought an examination at our department when she experienced marked deviation to the right of her lower jaw, along with a feeling of protrusion.

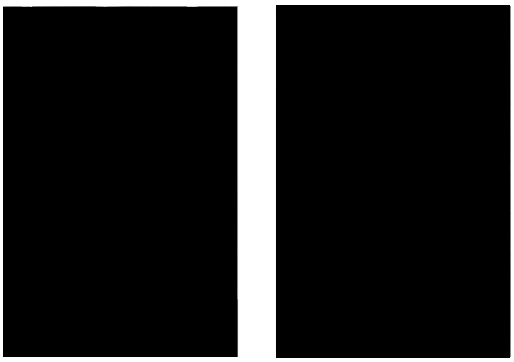

Fig. 1 Pre-treatment facial photographs at age 46y9m

Her present status showed facial findings of anterior protrusion and right deviation in the chin area, along with marked facial asymmetry (Fig. 1). Intraoral findings indicated an overbite and overjet of −10 mm and 2.5 mm, respectively, and the molar relation was Class III. The mandibular midline was deviated 10 mm to the right, and posterior crossbite was observed from the left maxillary lateral incisor to the right second molar and from the left mandibular canine to the right second molar. Mouth-opening capacity was 32 mm, and no trismus was noted. The maxillary central incisors, right first premolar, and right first molar were missing. The patient had been fitted with a bridge from the maxillary right second premolar to the second molar, along with overlay dentures in

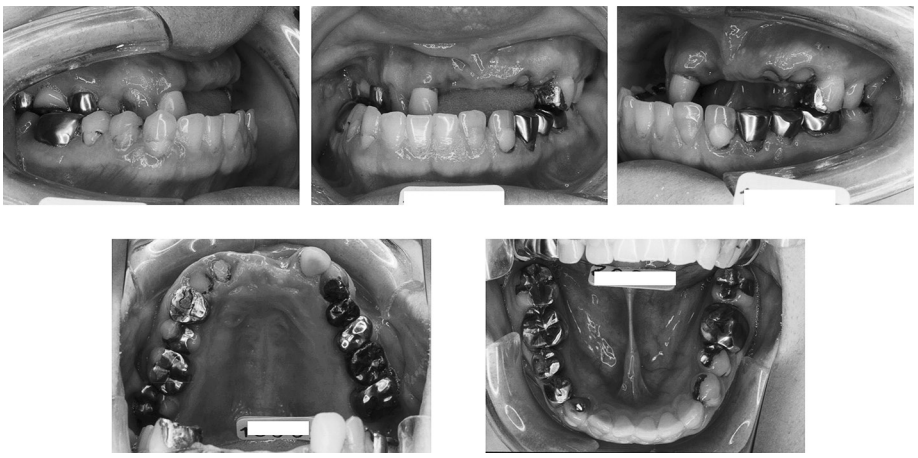

Fig. 2 Pre-treatment intraoral photographs at age 46y9m

Measurements	Mean	Pre-treatment
Facial angle (deg.)	85.9±1.63	91.5
Convexity (deg.)	5.5±2.93	−5.0
A-B plane (deg.)	−4.3±1.81	3.0
Mand. plane (deg.)	26.4±3.83	27.0
Y-axis (deg.)	64.3±2.27	61.0
Occlusal plane (deg.)	8.6±5.56	7.0
Interincisal (deg.)	121.9±3.69	
L1 to Occlusal (deg.)	23.7±5.30	25.0
L1 to Mand. (deg.)	98.2±4.08	95.5
U1 to AP plane (mm)	9.3±2.24	
FH to SN plane (deg.)	5.8±3.07	5.5
SNA (deg.)	83.2±3.44	83.5
SNB (deg.)	80.4±3.22	85.5
SNA-SNB diff. (deg.)	2.8±1.80	−2.0
U1 to FH plane (deg.)	115.2±5.86	
L1 to FH plane (deg.)	58.0±5.98	57.0
Gonial angle (deg.)	120.2±4.04	123.0
Ramus angle (deg.)	85.7±4.55	103.0

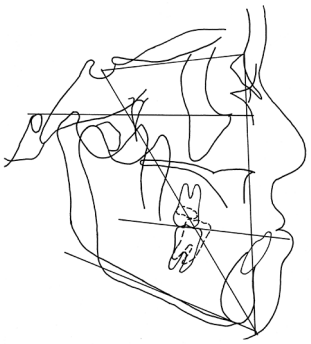

Fig. 3 Tracing and measurements on lateral cephalometric radiograph

the anterior tooth region from the maxillary left central incisor to the right canine. Many other non-vital teeth and dental implants were also observed (Fig. 2).

Cephalometric analysis revealed a skeletal pattern with a facial angle of 91.5°, SNB of 85.5°, convexity of −5.0°, and ANB of −2.0°, indicating skeletal anterior crossbite due to anterior displacement of the mandible. Vertical findings revealed the patient to be of the short face type, with a mandibular plane angle of 27.0° and a Y-axis of 61.0°. Denture patterns revealed that the patient had a nearly normal mandibular incisor axis, with an L1 to FH plane of 57.0° and L1 to mandibular plane of 95.5° (Fig. 3). A frontal cephalogram analysis revealed mandibular deviation of the menton 10 mm to the right, but barely any maxillary occlusal plane cant (Fig. 4). Panoramic x-ray findings revealed no marked alveolar bone absorption due to periodontal disease, but inadequate prostheses and periapical lesions were observed in many teeth. Images of mesiodistal bone hyperplasia in the left mandibular condyle revealed anterior deviation from the glenoid cavity (Fig. 5).

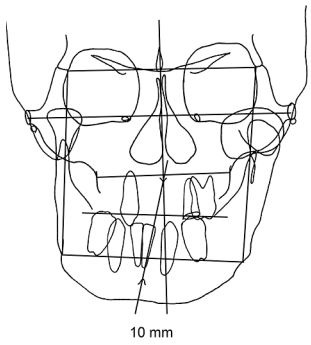

Fig. 4 Tracing on frontal cephalometric radiograph

Fig. 5 Pre-treatment panoramic radiograph at age 46y9m

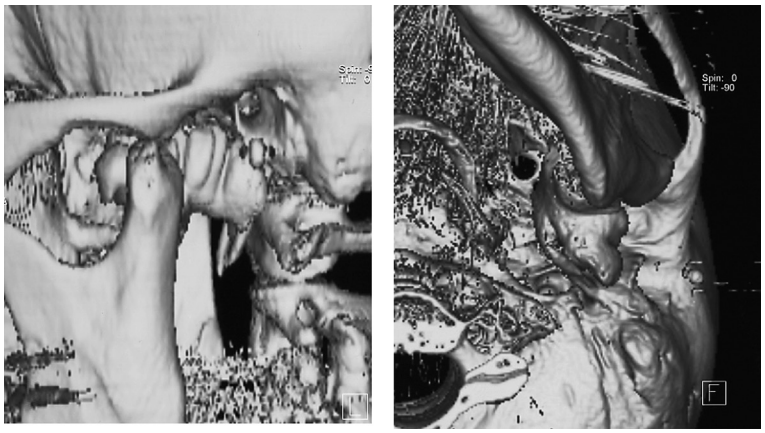

Fig. 6 3-D CT image of left mandibular condyle

CT revealed bone hyperplasia in mesiodistal and inner areas of left mandibular condyle, which also exhibited outward anterior displacement.

Computed tomography findings indicated mesiodistal and inner bone hyperplasia in the left mandibular condyle, and the mandibular condyle exhibited outward anterior displacement (Fig. 6). Bone scintigraphy showed a circular area of strong radioisotope accumulation with indistinct boundaries, consistent with a lesion in the left mandibular condyle (Fig. 7). Gnatho-hexagraphic jaw movement testing indicated that the opening and closing paths deviated to the right, mastication was unstable, and left mandibular condyle sliding motion was limited.

This case presented the following problems: (1) skeletal mandibular asymmetry due to left mandibular condyle-peripheral osteoma; (2) anterior displacement of the mandible; (3) a Class III molar relationship; (4) anterior crossbite; (5) loss of the central maxillary incisors; and (6) the presence of many prostheses in the molar region. These problems led to a diagnosis of skeletal mandibular protrusion accompanied by facial asymmetry due to peripheral osteoma arising in the left mandibular condyle.

The treatment objectives were to (1) acquire facial symmetry and improve mandibular anterior protrusion; (2) achieve appro-

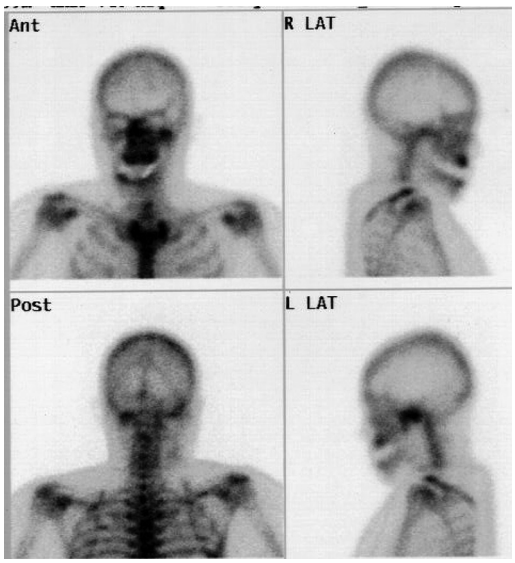

Fig. 7 Bone scintigraphy
Bone scintigraphy showed circular area of strong radioisotope accumulation with indistinct boundaries, consistent with lesion in left mandibular condyle.

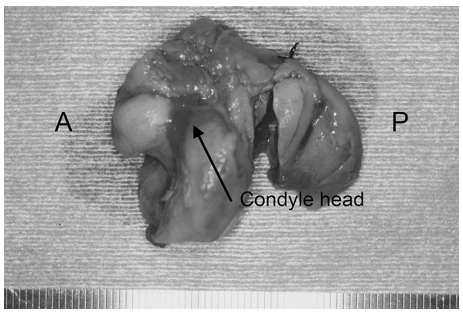

Fig. 8 Lateral view of extracted osteoma
A: Anterior, P: Posterior

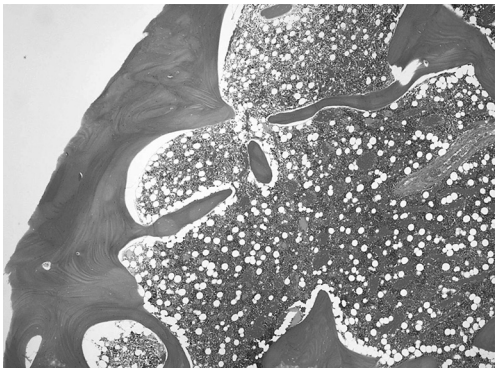

Fig. 9 Histopathological image stained with hematoxylin and eosin (magnified 4 times)

priate anterior tooth overlap; (3) achieve Class I molar and canine relationships; and (4) achieve occlusal reconstruction with preservation and prosthetic treatment. Our treatment strategy was to initially perform high condylectomy before orthognathic surgical treatment with two-jaw surgery, followed by preservation and then prosthetic treatment.

For treatment, a 0.018 slot programmed edgewise appliance was used. A 0.014 inch Ni-Ti wire was fitted to the mandibular dentition, and leveling and alignment were initiated. One month after the initiation of treatment, tumor resection including the left mandibular condyle was performed. The TMJ region was exposed with a preauricular incision and coronal section, after which the lesion and mandibular condyle were partitioned and extracted. The defect area was then reconstructed with an artificial articular head made of silicone. The extracted specimen, including the mandibular condyle, measured 40×5 mm. It exhibited bone-like hardness and had a smooth surface (Fig. 8). Because histopathological findings showed it to be hyperplasic tissue composed of beam-shaped osteoma lamellar bone and red bone marrow, including dilated capillaries and some adipose tissue, the pathological diagnosis was osteoma. The diagnosis was a benign neoplastic lesion, with the clinical course, imaging findings, and pathological diagnosis taken into account (Fig. 9).

We reviewed our postoperative treatment strategy and determined that the treatment objectives could be achieved with postoperative orthodontic treatment and preservation and prosthetic treatment. When the postoperative orthodontic treatment was initiated, the molar region bridge was removed, and a temporary crown fitted after root canal

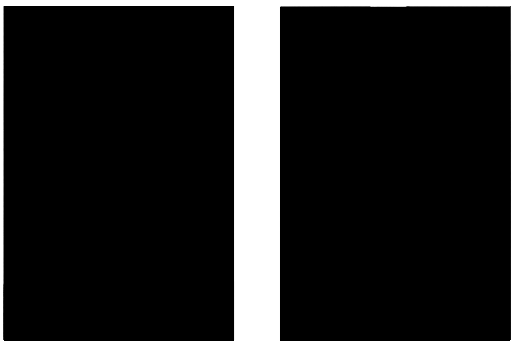

Fig. 10 Post-treatment facial photographs at age 49y3m

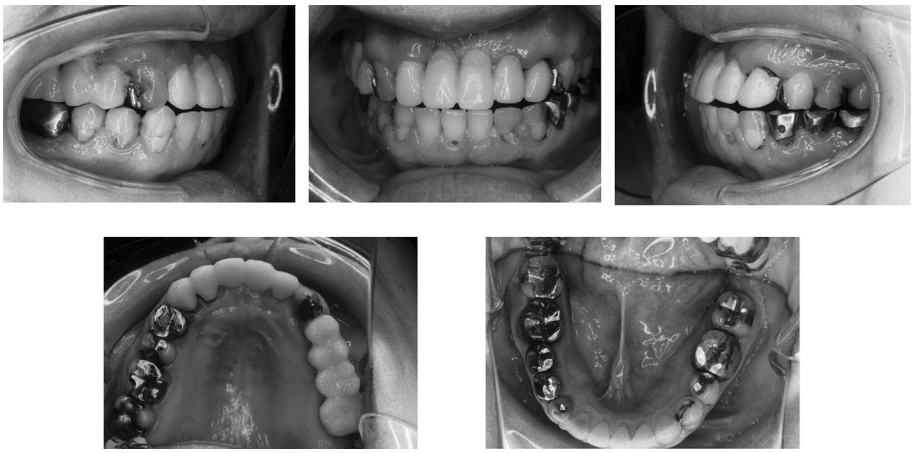

Fig. 11 Post-treatment intraoral photographs at age 49y3m

therapy was performed in the anterior tooth region. An edgewise appliance was also fitted to the maxillary dentition and leveling and alignment initiated. Wires were then successively replaced until both the upper and lower jaws were fitted with 0.016×0.022 inch SS wire. One year and 9 months after initiation of treatment, molar occlusion had stabilized and a Class I molar relationship had been achieved. The edgewise appliance was then removed, because the mandibular midline almost completely matched the facial midline. Near-perfect bilateral facial symmetry was achieved, along with a well-balanced facial profile. We decided to improve the anterior tooth overlap by prosthodontic treatment. The patient's personality became brighter, and she was satisfied with the surgical outcome. Moreover, compared with preoperative measurements, her mouth-opening capacity improved by 42 mm. Jaw movement remains slightly unstable, but does not impair the patient's daily lifestyle (Figs. 10, 11). The post-treatment findings of the cephalometric analysis indicated that nearly perfect skeletal symmetry had been achieved (Fig. 12).

After the appliance was removed, the final restoration was inserted. At present, 2 years and 10 months after completion of treatment, there is no sign of tumor recurrence (Figs. 13, 14).

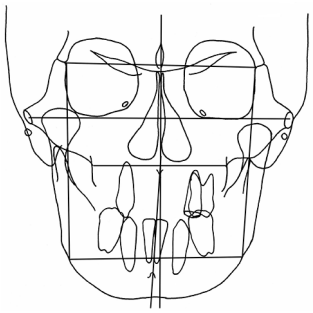

Fig. 12 Tracing on frontal post-treatment cephalometric radiograph

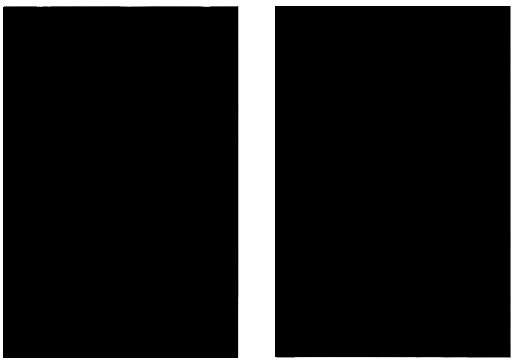

Fig. 13 Post-retention facial photographs at age 52y1m

Fig. 14 Post-retention intraoral photographs at age 52y1m

Discussion

Osteoma causes unilateral mandibular condyle enlargement, leading to facial asymmetry, as in the present case. Kaneko *et al.*[3] proposed standards for classifying osteomas from hyperplasia, stating that they could be classified into hyperostoses, in which the mandibular condyle itself becomes enlarged, or a true neoplasm, in which a tumor develops in a pedunculated manner from part of the mandibular condyle. They reported that while there are differences in developmental morphology, there are many points of similarity, making them essentially identical. Moreover, Thoma[15] reported that tumors that became enlarged while retaining the characteristic morphology of the mandibular condyle could be classified as mandibular condyle hyperplasia, and that tumors growing in lobular and spherical shapes could be classified as osteocartilaginous exostosis. The present case was first diagnosed as a neoplastic lesion from the clinical course and imaging findings and then as an osteoma arising from the mandibular condyle when the above findings were combined with histopathological findings.

Osteomas in the oromandibular region often appear in the upper jaw in the canine fossa, hard palate, and maxillary sinus, and in the lower jaw in the inner mandible and outer circumference and lingual side of the molar region. Osteomas arising in the mandibular condyle are relatively rare, with no difference in frequency between the left and right sides, and almost never occurring on both sides[2,3,5,6]. Furthermore, many reports have stated that osteomas commonly occur when patients are approximately 40 years of age[3,10,11], apparently because, although subjective symptoms appear relatively quickly in the long bones, mandibular condyle tumors grow inside the bone, so it takes a long time before subjective symptoms appear, and patients seek a medical examination at a later age[9]. It has been reported that there is a sex-related difference in onset frequency, with these lesions occurring approximately twice as frequently in women as in men[3,10,11]. As stated above, the present patient was also of a woman in her 40s, and because over 10 years had elapsed between the age of first onset and the age at which she sought medical examination, it appeared to be a typical case of osteoma arising in the mandibular condyle.

In general, symptomless osteoma does not necessarily require treatment. However, when symptoms such as functional disorders are also present, the osteoma is resected[6]. Moreover, differences in the developmental stage mean that, for true neoplasm osteomas, tumor resection preserving the mandibular condyle is performed, while for hyperostoses, condylectomy is performed, because the healthy margins are unclear[13]. However, when the focus is located near the anteromedial mandibular condyle or cranial base, it can often be difficult to accurately extract the tumor[9]. In the present case, the tumor appeared to be a neoplastic lesion with active growth capacity, so, in addition to the tumor, we decided to extract the area from the base of the condyloid process to the top of the condyloid process. Furthermore, because the tumor was growing from the front into the center of the mandibular condyle and was relatively large, we determined that opening the site to allow for an anteromedial visual field would be difficult and somewhat unsafe with conventional TMJ open surgery. Therefore, tumor resection with a preauricular approach was performed.

In the present case, resection of a left mandibular condylar osteoma which had caused facial asymmetry resulted in restoration of facial symmetry and a greatly improved molar occlusal relationship. Once the problem had been diagnosed, our treatment plan was to simultaneously perform early tumor resection and two-jaw surgery after occlusion had been established by postoperative orthodontic treatment, as the second stage of surgery. However, because we judged that an adequate treatment outcome could be achieved by performing postoperative orthodontic treatment and subsequent preservation and prosthetic treatment along with tumor resection alone, we did not perform the second-stage jaw surgery. In general, Le Fort I osteotomy combined with two-jaw surgery is often performed to improve facial appearance and occlusion in patients who present with the chief complaint of lower skeletal facial asymmetry. However, Kent and Craig[4] examined the effects of condylar hyperplasia on the upper jawbone and reported that the age of onset affected subsequent changes, with facial asymmetry accompanied by compensatory deformation being observed in younger patients and lower jawbone deformation resulting in mandibular asymmetry alone in older ones. It appears that, in the present case, there was hardly any effect on the cant of the maxillary occlusal plane, because facial deformity was caused by acquired mandibular condyle osteoma. This meant that an adequate treatment outcome could be achieved with tumor resection alone, without the need for second-stage jaw surgery.

Two years and 10 months after tumor resection, the present case is progressing well, with no recurrence and stable occlusion. While there have been no reports of malignant transformation in such cases without

recurrence after tumor resection, the onset site was relatively rare, in addition to being functional and continually subject to load. Therefore, we believe that long-term postoperative observation is necessary.

Conclusion

A well-balanced facial appearance and good occlusion were achieved by performing multidisciplinary treatment including orthodontic and surgical treatment in addition to high condylectomy in a 46-year-old woman with a peripheral osteoma arising in the left mandibular condyle.

This study was approved by the Ethics Committee of Tokyo Dental College (Approval no.403).

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