Case Report

Role of SPECT/CT in Management of TMJ Condylar Hyperplasia

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Abstract

Condylar hyperplasia (CH) is a distinct entity, a unilateral disorder in which the pathology occurs at the head of the condyle consequently affecting facial symmetry and occlusion and may be associated with pain and dysfunction. Clinical correlation along with imaging studies as well as histopathological evaluation will help in diagnosing CH. Imaging studies such as orthopantamogram skull PA cephalometric tomography and temporomandibular joint tomography shows the differences in the size of both condylar head. In advance diagnostic modalities such as bone scintigraphy – single-photon emission computed tomography (SPECT) was done to assess the activity of condylar site. This paper reports a case of severe facial asymmetry secondary to unilateral CH and the role of SPECT in diagnosing and treatment planning.

Keywords: Condylar hyperplasia, Condylectomy, Facial asymmetry, Scintigraphy, Temporomandibular joint.

Introduction

Temporomandibular joint (TMJ) condylar hyperplasia (CH) is a rare pathology that was first described in 1836 as overgrowth of the mandibular condyle; comparable pathology has not been described in any other joint. CH is a distinct entity, a unilateral disorder in which the pathology occurs at the head of the condyle consequently affecting facial symmetry and occlusion and may be associated with pain and dysfunction.[1-4]

There is a simple classification given by Walford to identify the various types of CH based on the clinical findings, imaging, histology, and the surgical procedures necessary to get the best treatment outcomes. CH type 1A is the most frequently occurring form and involves an accelerated growth rate of the "normal" growth mechanism of the mandibular condyle bilaterally with relatively normal architecture of the condyle but elongation of the condylar head, neck, and mandibular body. This type occurs at puberty with a predominant horizontal growth vector, which causes the mandible to grow forward of the maxilla, creating a Class III occlusal and skeletal relationship, although occasionally a vertical growth vector may occur, histological features showing normal chondrocyte proliferation during active phases, with normal bone after growth ceases. CH type 1B is similar to type 1A, but it occurs unilateral. CH type 2 occurs unilaterally and involves enlargement of the condylar head; usually the condylar neck increases in thickness and the vertical height of the mandibular ramus and body increases on the ipsilateral side, often accompanied by a compensatory downward growth of the ipsilateral maxilla, usually occurs in 2nd decade with histological features showing osteochondroma. CH type 3 includes unilateral facial enlargement with no specific age, imaging presenting as condylar enlargement, histological features showing the characteristic of benign tumors such as osteoma, fibrous dysplasia, and giant cell tumor. CH type 4 unilateral facial enlargement with no specific age, imaging presenting as condylar enlargement with lytic lesion, histological features showing the characteristic of malignant tumors such as osteosarcoma, Ewing sarcoma, and chondrosarcoma.[4] CH type 3 and 4 can occur at any age and is not self-limiting. CH 1 and 2 frequently occurs during the growth phase, especially in adolescence. The age of onset for unilateral CH (UCH) is ranging from 20 to 27.9 years.[5]

Case Report

A 23-year-old female patient reported to Department of Oral and Maxillofacial Surgery, Indira Gandhi Institute of Dental

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Sciences, Pondicherry, India, with the chief complaint of swelling in the left side of lower jaw since 5 months and her history revealed developing asymmetry on the entire left side of the face and mandibular deviation toward the right side and progressed slowly until it reached present proportion. She also developed pain in the TMJ region while opening the mouth. There was no history of trauma, any systemic diseases, infection, or surgery of the face and jaws. Medical and family histories were non-contributing to the present state.

On extraoral examination, the patient has tapered and triangular face with facial asymmetry due to the diffuse swelling over left side of the face which is firm in consistency measuring 4 × 2 cm extending posterosuperiorly from the upper border of ramus of mandible and anteroinferiorly from parasymphysis to posterior border of ramus, and fullness of face on the left side and there was increase in vertical height of the mandible, rounded antigonial notch, and TMJ on palpation revealed mild clicking on the left side, no nerve paresthesia was noted. The condylar movements were limited on the left side as compared with the right side. On intraoral examination, there was a slight shift of the mandibular midline towards right side; overbite seen in the left side and did not reveal any occlusal cant. Posterior teeth of both the jaws were slightly tilted lingual to maintain occlusion.

Imaging studies such as orthopantamogram (Figure 1), skull PA cephalometric tomography, and TMJ tomography were made, which showed differences in the size of both condylar heads as well as severe elongation of the neck of the left mandibular condyle. The left gonial angle was characteristically rounded off, ascending ramus appears to be elongated, and the mandibular canal was displaced to the lower border of the mandible which is bowed downward indicating the possibility of CH.

Hence, bone scintigraphy – single-photon emission computed tomography (SPECT) (Figure 2) was done to assess the activity of the left condylar site. The patient was administered 25 mCi of 99mTc-MDP intravenously; immediate flow and blood pool images of head region acquired and delayed whole body static images were acquired after 2 h. Blood flow and the soft-tissue pool images of the head region showed no significant abnormality. Delayed images show focal increased tracer uptake in left mandibular condylar region. SPECT/computed tomography (CT) shows enlarged left condyle of the mandible on CT and focal increased tracer uptake on SPECT. Rest of the skeleton shows physiological tracer uptake. Bilateral kidneys are visualized, representing physiological tracer excretion pathway. Bone scan nuclear medicine is suggestive of increased osteoblastic activity at enlarged condyle of mandible consistent with the left CH. Based on the history and clinical findings, the provisional diagnosis was UCH type 1B.

Management

Following preparation for administration of general anesthesia, the patient was prepared to be taken up for high condylectomy and inferior border osteotomy. The treatment included

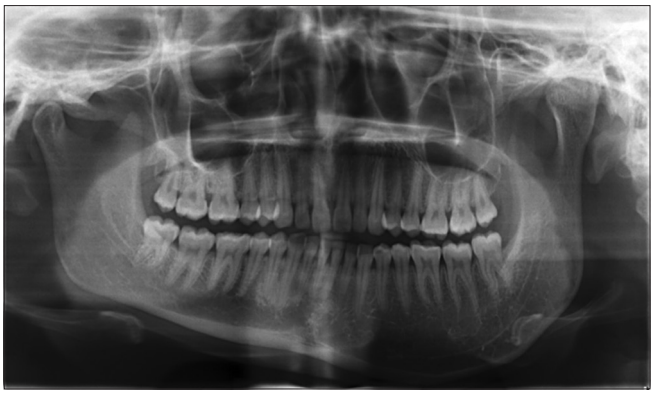

Figure 1: OPG revealing elongation of neck of left condyle and mandibular canal displaced toward lower border

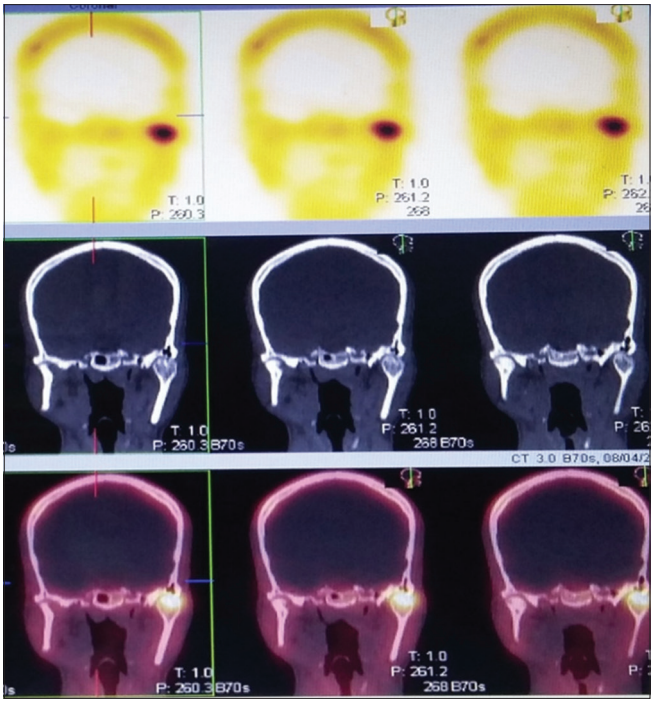

Figure 2: Scintigraphy – bone scan suggestive of increased osteoblastic activity at enlarged condyle of mandible

high condylectomy (Figure 3) removing 10 mm of the left condyle; horizontal osteotomy cut with copious irrigation was carried out with surgical bur at the level of condylar neck, vital structures on the medial surface of condylar neck was protected, head separated from superior attachment, remaining stump smoothened out, and articular disk repositioning without anchor placement. Inferior border osteotomy and contouring was done in the body of the mandible to match the opposite side (Figure 4) to correct the mild dentofacial deformity and the mandibular planes. The Specimen was sent for further histopathological examination (Figure 5).

The histopathological evaluation (Figure 6) showed a wide proliferative zone and many cartilaginous clusters/islands inclusion within the bony trabeculae of spongy bone suggestive of hyperplasia (condylar) type 1B. A follow-up evaluation

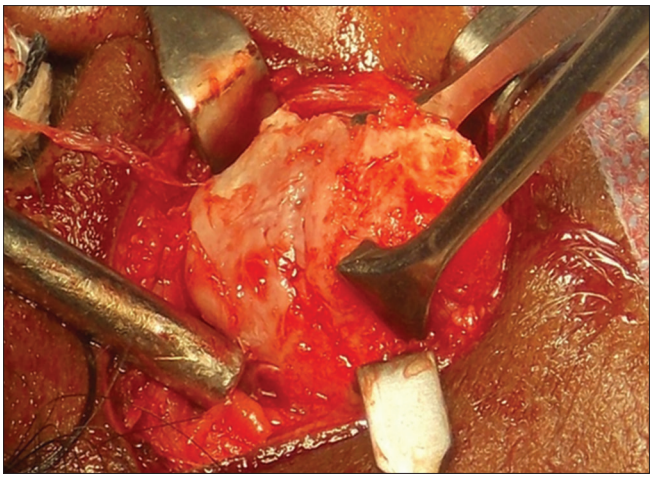

Figure 3: High condylectomy

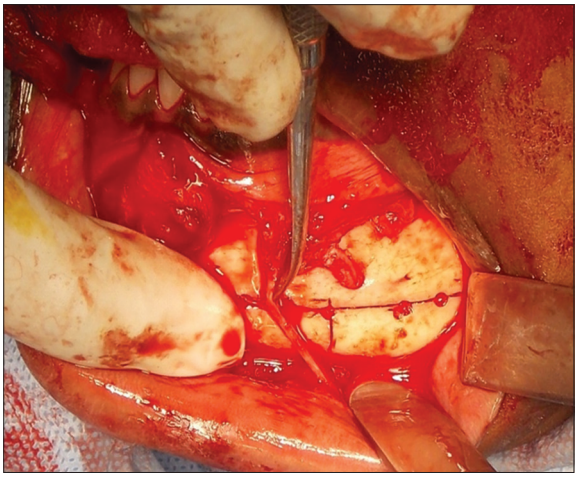

Figure 4: Inferior border osteotomy

Figure 5: Resected Specimen – condyle and portion of lower border of mandible

after 1 year showed good aesthetic and functional results. No changes in occlusion were noted, indicating stable results using this technique.

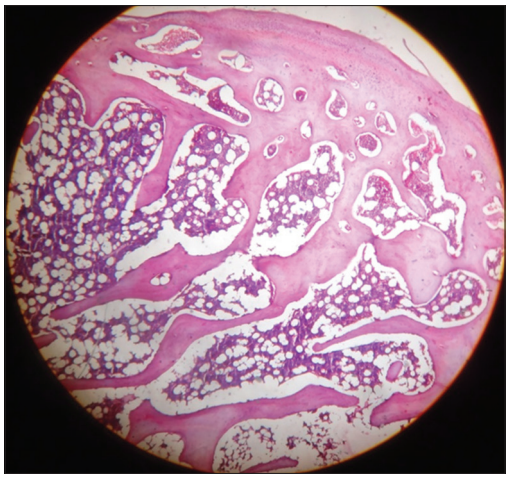

Figure 6: Histopathological evaluation

Discussion

CH can be considered to be the end result of primary cartilage formation and secondary bone replacement. UCH is one of the rare conditions which result from increased activity of the condylar growth center.[6] The etiology of CH is still remains unclear. Local circulatory problems, previous trauma, endocrine disturbances, traumatic lesions and arthrosis, abnormal loading, and cartilaginous exostosis have been suggested as possible etiologic factors.[7] Although CH is a self-limiting condition, it is characterized by progressive and independent growth that always results in the bone volume of one condyle being greater than that of the other. According to the growth state, CH is divided into an active phase and stationary phase. The activity level of the condyle is considered to be highly correlated with mandibular asymmetry.[8,9]

Prominent features of CH include an enlarged mandibular condyle, elongated condylar neck, outward bowing and downward growth of the body and ramus of the mandible on the affected side, causing fullness of face on that side, and flattening of face on the contralateral side.[10] Although clinical signs may suggest CH, a radiological examination showing elongation of the neck and head of the condyle is necessary for a definitive diagnosis.

Bone scan SPECT has demonstrated superior performance in this application compared to planar imaging through providing data leading to accurate and quantifiable assessment of the mandibular condyles growth. Bone scans can highlight areas of increased osteoblastic activity aiding in diagnosis of active or inactive CH. This can guide treatment decisions: partial condylectomy for active CH or definitive operations for inactive CH. A 10% or more difference in the radionuclide uptake between the left and right condyles with increased uptake in the CH side is considered to be evidence of active, growing CH.[11,12]

Wolford *et al*. showed that patient with active CH treated with high condylectomy, articular disk repositioning, and

orthognathic surgery have stable predictable outcomes compared with those treated with orthognathic surgery alone.[13]

Warrier and Sathasivasubramanian discussed that condylectomy on the affected side and inferior border osteotomy is the accepted method of treatment for CH. It gives the best possible result with little post-operative discomfort to the patient.[14]

Conclusion

Any abnormality in the soft or hard tissue can lead to asymmetry. It is prudent for the surgeon to consider the etiology of asymmetry, extent and its severity in all three dimensions in order to provide an optimal treatment plan. CH usually produces facial asymmetry, clinical correlation, and imaging studies as well as histopathological evaluation will help in diagnosing CH. However, nuclear imaging study like SPECT/CT are helpful not only for diagnosis but for choosing an appropriate treatment and in this case report high condylectomy with lower border osteotomy was done to correct the dentofacial deformity without altering the midline and occlusion.

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