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UNILATERAL CONDYLAR HYPERPLASIA- A CASE REPORT AND REVIEW OF LITERATURE

Maxillofacial Surgery

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ABSTRACT

Introduction Temporomandibular joint (TMJ) is the skeletal component of the masticatory system through which mandible articulates with the temporal bone of skull 1. Anatomically and functionally it is one of the complex joints in the body. Owing to this complexity many TMJ pathologies are still incompletely understood. The condylar portion of TMJ is prone to various local and systemic joint pathologies as compared to the temporal part and many hidden mysteries revolve around this. Condylar hyperplasia is a self-limiting overgrowth of condylar portion of temporomandiular joint (TMJ) usually occurring unilaterally and causing facial asymmetry 2. The term hyperplasia literally means increase in the number of cells. As such condylar hyperplasia doesn't represent a disease by itself but is a manifestation of various condylar pathologies that cause enlargement of mandibular condyle. Therefore condylar hyperplasia has a diverse clinical and radiographic presentations which makes its diagnosis and treatment planning challenging. Here a case report of unilateral condylar hyperplasia with unusual radiographic feature is presented along with literature review.

KEYWORDS

Hyperplasia, Temporomandibular Joint (tmj), Estrogen, Condylectomy

CASE REPORT

A 24 year old female patient reported to our department with the chief complaint of pain and swelling in the right side of her lower jaw since 3 months. There was no significant past medical history. On clinical examination facial asymmetry was noted with increased vertical height of lower one third of face. Chin deviation was only slightly noticeable. Intraoral examination revealed dental midline shift towards left side by about 2mm with no occlusal problems. (Fig 1)

Fig 1a

Fig 1b

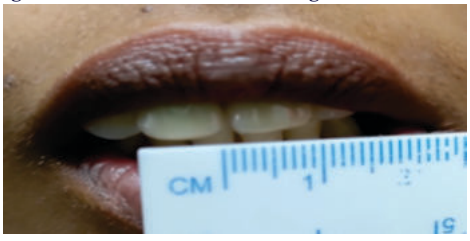

Fig 1c

Fig 1 Preoperative photographs a) Frontal view b) Right lateral view c) picture showing midline deviation of about 2mm Orthopantomograph (OPG) showed an increased ramal length on right side by about 10mm. (Fig 2) Computed tomography (CT) scan was advised. CT scan also showed increased ramal length with uniformly enlarged right condyle. (Fig 3)

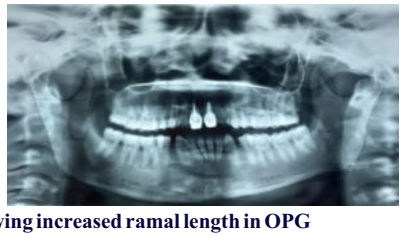

Fig 2 showing increased ramal length in OPG

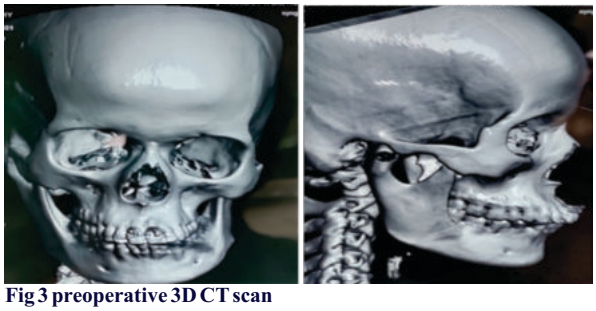

Fig 3 preoperative 3D CT scan

One more CT finding which drew our attention was the radiolucent areas found within the right condylar region. Hence we suspected hyperplasia accompanied with some resorptive pathology. As the patient was not having any esthetic or occlusal problems she was mainly planned for biopsy to diagnose the resorptive lesion. As there was risk of backward rotation of mandible following surgery arch bar was tied prior to surgery so as to guide the mandible forward in the postoperative period. Under GA condyle was exposed using Alkayat Bramley approach and the entire lesion was removed which resulted in itself a condylectomy of about 5-6mm. Articular disc was stabilized in its place using sutures. The specimen was sent for histopathological examination. HPE report mentioned about the normal tissue layers found in the condylar articular surface with increased thickness of undifferentiated mesenchymal layer and no evidence of atypia/malignancy suggestive of condylar hyperplasia. As expected mandible went backwards following surgery. IMF was done using elastics for a period of 2 weeks by bringing the mandible to a forward position. (Fig 4) Guiding elastics were given for further 4 weeks and patient was asked to practice mouth opening and closing exercises. Patient is kept on regular follow-up. (Fig 5)

Fig 4a

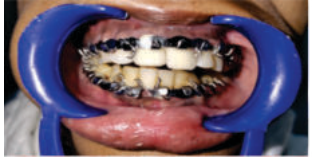

Fig 4b

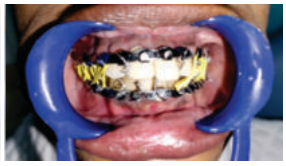

Fig 4c

Fig 4 a) Intraoperative photograph b) picture showing backward displacement of mandible c) mandible brought into position and maintained using IMF elastics

Fig 5a

Fig 5b

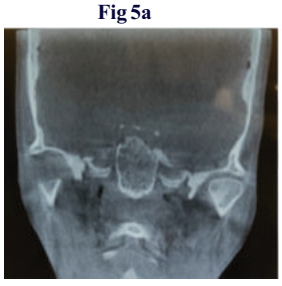

Fig 5c

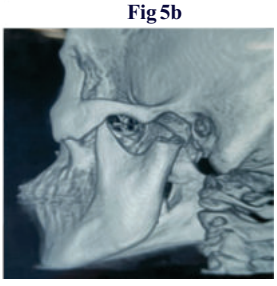

Fig 5d

Figure 5 Postoperative clinical photographs a) Frontal view b) Right lateral view c) d) postoperative radiographs

DISCUSSION

Robert Adams in 1836 first used the word hypertrophy of condyle in his book titled A Treatise on rheumatic gout, chronic rheumatic arthritis of all joints wherein he gave a special note on the disease in his chapter temporomaxillary articulation or joint of the lower jaw. He described condylar hyperplasia as a manifestation of rheumatoid arthritis. Early cases were then described by Humphry, Eve and Heath in 1880s [3,4].

The etiology of condylar hyperplasia is varied and is still poorly understood. While Adams thought rheumatoid arthritis as the etiology ,Heath suggested neurotrophic effects were responsible. Since then numerous etiologies were suggested like intrauterine malposition (Lohman,1919), otitis media (Gruca and Meisels,1926), trauma, hypervascularisation (Egyedi 1969) , hormonal influence, congenital gigantism (Eve,1883) none of which had supportive evidence and hence not accepted. Geschickter and Copeland (1931) compared condylar hyperplasia to exostoses of long bones [5].According to them both were structurally similar except for greater lobulations in case of long bones, for which functional remodelling of condyle provided a basis. But it is noteworthy to find that unlike in long bones in TMJ mainly the articular surface is involved [4].

Abnormal overgrowth in condylar hyperplasia becomes significant between the ages of 10 and 25 years [4]. Spontaneous cessation has been noted at the age of 30s some even at 40s.Condylar growth starts around 7th week of intrauterine life and reaches full development by the age of 21-22 years [6].Rushton studied the agewise changes occurring in the condylar cartilage. At birth the precartilagenous connective tissue extends down upto the mandibular foramen, by 16 years they extend only few mms beyond the cartilage mass and by 20 years the precartilagenous tissue stop its activity only to be activated in future by any stimuli [4].

Condylar hyperplasia shows a female predominance in a ratio of 2:1 [8].The presence of estrogen receptors in articular cartilage, growth plate and osteoblasts explains the hormonal influence on skeletal growth and maturation [9].animal studies have showed the negative effect of estrogen on cartilage thickness ,by inhibiting chondrocytes proliferation and increasing their maturation in skeletally mature articular cartilage [10]. On the contrary they exhibit chondro protective actions in developing cartilages. Since cartilage represents an extra-gonadal site for estrogen production this locally produced estrogen may explain the laterality in cases of unilateral condylar hyperplasia in women [11].

The clinical picture varies depending on the age of the patient.Typical features are facial asymmetry with chin deviation to opposite side,bowing of ramus and inferior border of mandible giving a swollen appearance on the affected side. If it affects during the stage of teeth eruption lateral tilting of teeth compensates for occlusion. At later stages it can cause ipsilateral posterior open bite and contralateral cross bite [12]. Occasionally symptoms of TMD like pain and functional limitations may superimpose.

Obwegeser and Makek in 1986 came out with a classification system to end the use of single term condylar hyperplasia for labelling two separate hemimandibular anomalies –Hemimandibular Hyperplasia and Hemimandibular Elongation [13]. Hemimandibular Hyperplasia (HH) is the three dimensional enlargement of one side of the mandible involving condyle,condylar neck, ramus, body and terminating at the symphyseal region. Clinically there will be obvious facial asymmetry, canting of occlusal plane if maxilla follows mandibular growth if not ipsilateral posterior open bite occurs.OPG will show elongated condyle and ramus, roundening of angle, downward bowing of inferior border and displacement of mandibular canal downward towards the lower border.

Hemimandibular elongation (HE) is purely a horizontal displacement of mandible with no vertical component. The horizontal rami on both the sides remain at the same vertical level. Clinically chin deviation towards opposite side with asymmetric prognathism can be appreciated. Posterior crossbite in the unaffected side without any occlusal canting is noted. OPG and PA view shows unilateral elongation of horizontal ramus.

Mixed forms in its true sense means a combination of HE on one side and HH on other or combination of unilateral condylar hypoplasia with HE/HH.

A more recent classification was proposed by Wolford, Movahed, Perez [14] which includes the various conditions causing condylar hyperplasia.

CH Type 1:
Pubertal onset ; accelerated and prolonged normal condylar growth that is self-limiting and that causes mandibular elongation without significant vertical component. Females are most commonly affected. Type 1A Bilateral, Type 1B Unilateral .

CH Type 2 :
Pathological unilateral condylar enlargement caused by osteochondrosarcoma. Occurs mostly in females causing a vertical overgrowth of mandible. Type 2A predominant vertical elongation of condyle Type 2B vertical component with additional horizontal exophytic tumour growth of the condyle.

CH Type 3 :
Other benign tumours that causes condylar hyperplasia

CH Type 4 :
Malignant tumours arising in condyle causing condylar hyperplasia

The histological picture differs in accordance with the etiology. Four distinct zones have been identified in the normal articular surface of mandibular condyle and fossa [15] . The outermost zone being the articular zone is composed fibrous connective tissue with collagen fibres arranged parallel to the articular surface. The second zone is the cellular proliferative zone which has undifferentiated mesenchymal tissue. It helps to meet functional demands by proliferation of articular cartilage. The third is the fibrocartilagenous zone wherein the collagen fibres are arranged in a random fashion forming a three dimensional network to withstand compressive and lateral forces. The fourth/deepest zone is the calcified cartilage zone which is composed of chondrocytes, chondroblasts and intercellular matrix.

Slootweg and Muller [16] 1985 highlighted the lack of correlation between clinical and histological features in cases of condylar hyperplasia and conducted a study to classify condylar hyperplasia on the basis of histomorphological features. In their study they examined for the presence of various tissue layers as described by Wright and Moffett (1974) . According to Wright and Moffett [7]there are fibrous articular layer, cellular proliferative layer, layer of hyaline growth cartilage which converts into fibrocartilage with aging, a zone of resorption in which cartilage is replaced by bone followed by cancellous bone.Based on this they divided their specimens into three patterns.

Type I:
Broad proliferative zone followed by thick hyaline cartilage beneath which there is resorptive zone and abundant cartilage rests were noted within the cancellous bone in the condylar neck region.

Type II:
Proliferative zone with patchy distribution of cells, fibrocartilage zone instead of hyaline cartilage with no distinct resorptive zone directly resting on subchondral bone and with few cartilage rests in the cancellous bone

Type III:
irregularly shaped masses of hyaline cartilage extending downwards into the cancellous bone or upwards into the fibrous articular layer
Type IV : Cell poor fibrocartilagenous layer immediately followed by subchondral bone plate giving a burned-out appearance.

Additionally they also found a correlation between age and histomorphological features. Type I seen in patients under 20 years and Type II in much elderly patients.

Serial assessments of frontal and lateral cephalometric radiographs and articulated casts in centric relation can help to predict the accelerated and prolonged normal growth as in Wolford's type 1A cases.

Bone scintigraphy using T99 –m MDP radioactive tracer is being commonly employed nowadays as it has affinity towards bone and highlights areas of increased osteoblastic activity but it can also show similar changes even in remodelling/degenerated joint thus misleading the diagnosis [17]. Planar bone scans gives a two-dimensional view of radioactive tracer uptake in sketeton while SPECT (Single Proton Emission Computed Tomography) provides a more accurate and precise three dimensional view [18].

Hodder and Rees in 2000 conducted a study to formulate a diagnostic cutoff based on SPECT scans. According to them an uptake ratio of more than 55:45% was considered to be constantly associated with active condylar hyperplasia [19]. A difference in uptake greater than 10% between the two joints is indicative of abnormal bone activity [20].

Lippold et al [21] attempted to correlate this increased activity in bone scans with histological findings. They found degenerative cartilage with broadened subcondylar zone in these areas of high bone activity.

Although Adams and Heath popularised condylectomies as a treatment modality for their patients in early days various well defined etiologically based treatment protocols have been devised in the recent years. Timing of surgery is important in condylar hyperplasia cases [21].

Based on the condylar activity [22,23] if abnormal condylar activity is noted after normal growth years then removal of the condyle is the definitive treatment to limit the progressive facial asymmetry. Occlusal discrepancies can be addressed by orthodontic treatment. In most of the cases esthetic deformity also gets corrected with this,if not maxillary and/or mandibular osteotomy will be needed. Bowing of lower border is corrected by lower border shaving with IAN nerve repositioning if needed.

The traditional technique of waiting for the condylar growth to complete and then proceeding for orthognathic surgeries has become absolete now concerning the unpredicted growth of condyle,the compensatory changes occurring in the maxilla and soft tissue compromising the final treatment outcome.

In cases of unilateral condylar hyperplasia however it should be kept in mind that if unilateral condylectomy was performed during the growth period the normal contralateral condylar growth can cause facial asymmetry and occlusal disturbances at a later stage. So surgery is delayed until 15 years for females and 17 years for males [24] allowing for normal condylar growth to get completed.

Based on the size of the condylar segment removed the surgical options are classified as 1) condylar shaving (~ about 3mm removed) 2) high condylectomy (about 5mm removed from medial to lateral pole) 3) low condylectomy (more than 5 mm removed) 4) proportional low condylectomy (length of segment removed is proportional to the amount of facial asymmetry)

There are experimental evidences showing that masses of hyaline cartilage with precursor cells invading the cancellous bone in condylar neck region and not only limited to the articular surfaces. This supports the use of high condylectomy technique to remove the subchondral bone in order to eliminate the growth centre completely [23] About 4-5mm of condylar head is removed from medial to lateral pole with articular disc repositioning using Mitek mini anchor to recreate a functional condyle [24]

But the use of high condylectomy technique as a single surgery for unilateral CH cases have been debated by several authors as correction of facial asymmetry is not always complete and requiring a secondary orthognathic surgery in some cases [25].In a study conducted by Farina et al comparing high condylectomy with proportional condylectomy the latter seemed to be better treatment alternative minimising the need for a second orthognathic surgery.

Low condylectomy as a single surgery to correct both the etiology and esthetic deformities was proved by Farina et al. Excess condyle was removed to match the ramal length of both the sides [26].Low condylectomy is also performed in benign tumors like osteochondroma depending on the extent of lesion followed by TMJ reconstruction.

CONCLUSION

Condylar hyperplasia is a rare joint disorder characterised by unilateral condylar overgrowth. As seen in our case not all condylar hyperplasia patients present with obvious facial asymmetry. One possible reason can be early presentation of the patient or the abnormal condylar growth got arrested by itself for some reasons. Therefore appropriate diagnosis and treatment planning is important in such cases.

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