Content available at: https://www.ipinnovative.com/open-access-journals

IP Indian Journal of Orthodontics and Dentofacial Research

Journal homepage: https://www.ijodr.com/

Case Report

Unilateral condylar hyperplasia - Management with relative condylectomy and mandibular border contouring combined with tad assisted orthodontics

Ratna Parameswaran[1]*, J Shruthi[1], Manikandhan Ramanathan[1], Harsha Vardhan BG[1]

[1]*Dept. of Orthodontics, Meenakshi Ammal Dental College, Chennai, Tamil Nadu, India*

ARTICLE INFO

Article history:
Received 11-07-2023
Accepted 18-09-2023
Available online 19-01-2024

Keywords:
Asymmetry
TADS
Skeletal anchorage system
Unilateral condylar hyperplasia
Condylectomy

ABSTRACT

A case report of unilateral condylar hyperplasia left side, with asymmetry of the face, presenting Angles Class III subdivision malocclusion has been treated conservatively by using skeletal anchorage mechanics and a minimal surgical approach. The article highlights the diagnosis, clinical considerations, and treatment mechanics involved in the successful management of unilateral condylar hyperplasia.

1. Introduction

Condylar hyperplasia (CH) is a comprehensive term that is characterized by an unrestricted bone growth of either or both mandibular condyles and the ramus on the concerned side, extending until the midline of the symphysis (Arora et al., 2019). CH is a non-cancerous, developmental anomaly mostly manifesting between 11 to 30 years of age (Kaur et al., 2013, Fisch et al., 2011) having a female predominance with theories in literature remarking the role of estrogen hormone as an etiological factor (Obwegeser et al., 2001, Raijmakers et al., 2012, Olate et al., 2013). However, no preponderance for the left or the right side was observed (Kaur et al., 2013, Fisch et al., 2011).[1–6]

It is a self-restricting disorder that usually develops unilaterally giving rise to an appreciable facial asymmetry. Condylar hyperactivity is apparent only when it is unilateral. In unilateral condylar hyperplasia, chin deviation is associated to the uninvolved side, and the inferior border of the mandible is dissymmetric (Higginson et al., 2018).[7]

The diagnosis is carried out by clinical, radiological, and bone scintigraphy. Adams in 1836 and Humphrey in 1856 had proposed condylectomies primarily as a curative option for the treatment of CH (Adams et al., 1836). Thenceforth, several remedial options have been put forward.[8]

Acknowledging the oddity of the condition here we exhibit a case of unilateral CH in a adolescent female patient with the aim of diagnosing accurately and minimally intervening to terminate the pathological activity thereby providing an ideal occlusion and an aesthetically agreeable profile.

2. Case Report

An adolescent female patient reported to the Department of Orthodontics, Meenakshi Ammal dental college, Chennai with the prime complaint of facial asymmetry and abnormal smile pattern.

On extraoral examination, the patient featured an asymmetrical face, canting of lips, and a prominent chin point deviation towards the right side. (Figure 1)

* *Corresponding author*.
E-mail address: abraryounus94@gmail.com (R. Parameswaran).

https://doi.org/10.18231/j.ijodr.2023.049

Figure 1: Pre-treatment extraoral photographs

Figure 2: Pre-treatment intraoral photographs taken at the first visit

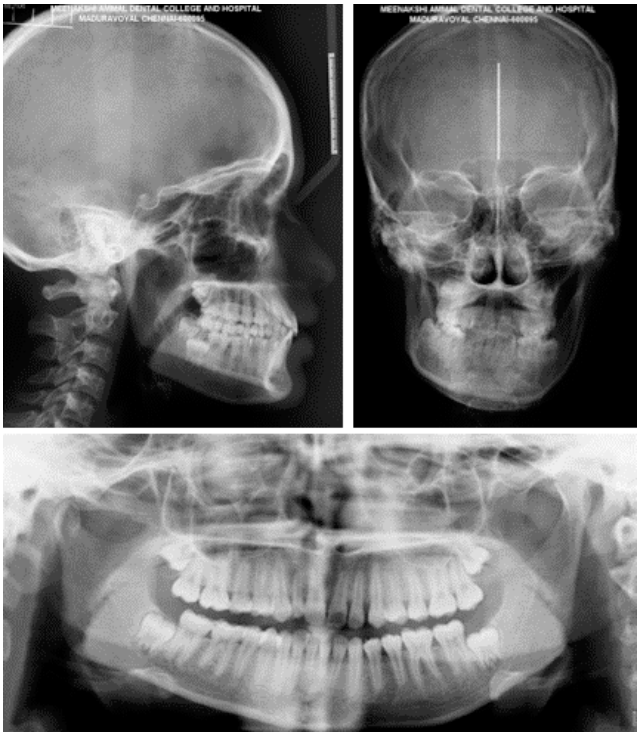

Figure 3: Pre-treatment Lateral and Posteroanterior cephalograms and Panoramic radiographs

Intraorally, during the smile, there was increased exposure of posterior teeth on the left side than the right side with an additional gingival exposure of 3mm on the left-side indicative of cant. (Figure 1) There was a maxillary midline shift of 6mm towards the left side and the mandibular dental midline was coincident with the mandibular skeletal midline which was evidently shifted to the right from the facial midline by 12mm. The patient had a crossbite in relation to 13. The patient had a Class I molar relation on the right side and a Class III canine and molar relation on the left side. Canine relation on the right side could not be established due to crossbite (Figure 2)

Orthopantomogram exhibited lengthening of the left condyle in comparison with the right condyle. (Figure 1, Table 1)

The lateral cephalogram reveals a class I skeletal base (ANB = 2°) with an orthognathic maxilla (SNA = 84°) and an orthognathic mandible (SNB = 82°) on a low mandibular plane angle (FMA = 23°) with horizontal growth pattern (Bjork sum = 386°). The inclination of Maxillary incisors was average (U1 to SN = 106°) and Mandibular incisors were lingually inclined (IMPA = 87°) (Figure 3,Table 1)

PA cephalometric analysis revealed a 12mm chin point deviation (CPD) on the right side, 4°, and 9mm MXTOP cant. There was an obvious increase in condyle, ramal, and body length on the left side compared to the right side.

Table 1: Cephalometric measurements pre- and post-treatment

Measurement	Taken at Initial visit	Taken at debonding
SNA °	84.4	85
SNB °	81.9	82
ANB °	2.5	3
A to N perpendicular (mm)	2.3	3
Pog to N perpendicular (mm)	-1.8	-1
FMA °		
Right side	23.8	25.2
Left side	29.7	26
Gonial angle °		
Right side	126.8	128.6
Left side	130	127.1
U1 to SN °	106.8	104.9
IMPA °	87.6	90
Interincisal angle	154.7	150.1
Chin point deviation	12	3
MxTOP cant	4	1
MxTOP cant (mm)	9	0.2
Overbite (mm)	2.7	2.1
Overjet (mm)	3.1	2.22

(Figure 3,Table 1)

In our case, the focal area of the left mandibular condyle had a well-appreciable intake of Tc99m – MDP which proposed that there was an increased activity of condyle on that side indicating active unilateral condylar hyperactivity. (Figure 4)

There was a well-evident cant in this patient since maxillary posteriors on the left side have extruded leading to a descending growth of maxillary alveolus as a compensatory mechanism for the exorbitant growth of the left condyle. Hence, the patient was diagnosed with Angle's Class III malocclusion, facial asymmetry, occlusal cant of 9mm with an etiology of left condylar hyperplasia.

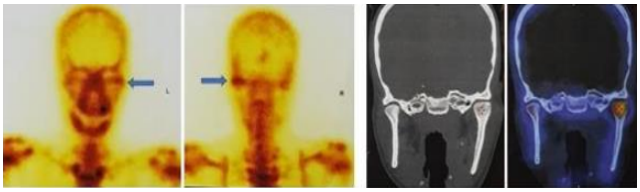

Figure 4: Focal uptake of Tc99m-MDP by the left mandibular condyle

3. Treatment Objectives

The treatment objectives were:

1. To evaluate the active growth potential of the left condyle.
2. To correct asymmetry of the face.
3. To address the occlusal cant and smile line.
4. To accomplish functional occlusion.

Figure 5: Pre-surgical intraoral photographs post orthodontic correction of occlusal cant with fixed appliance therapy with bite plane followed by mini-implant and post condylectomy photographs

3.1. Treatment Planning

3.1.1. Stage 1: TAD assisted Orthodontics for Occlusal cant correction

Fixed orthodontic treatment with bite plane and miniscrew therapy was proposed to relatively intrude and extrude the posteriors to correct the MXTOP cant. (Figure 5)

3.1.2. Stage 2: Surgical correction of unilateral condylar hyperplasia

To synchronously stop the active growth potential in the left condyle and correct the CPD, relative condylectomy of the left condyle was planned. The extent of the vertical difference between right and left ramus heights was 20.5mm, which was gauged with 3D-CT. (Figure 6)

3.1.3. Stage 3: Correction of the persisting occlusal discrepancy and mandibular deviation

To correct the Class III relationship and mandibular deviation, settling elastics were recommended.

3.1.4. Stage 4: Correction of chin point deviation with Genioplasty

Genioplasty was suggested after the completion of growth for the correction of hard tissue chin and soft tissue overlying it.

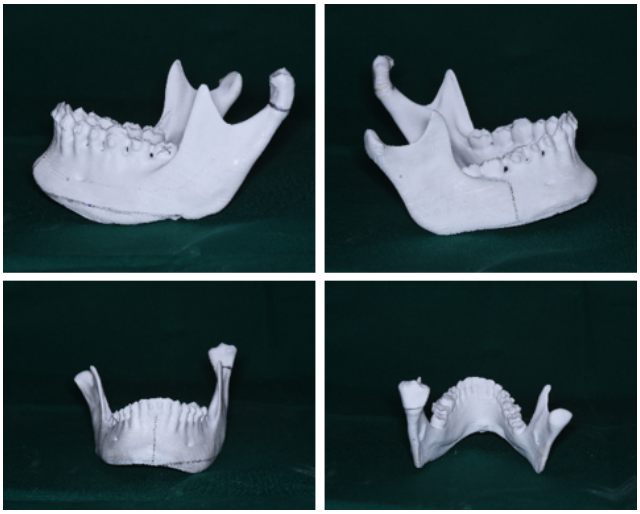

Figure 6: Stereolithographic model to gauge the vertical difference between right and left ramal heights

3.2. Treatment progress

3.2.1. Phase 1 – Pre-Surgical Orthodontic Intervention for correction of occlusal cant

In the initial appointment, fixed orthodontic treatment was commenced with the union of round nickel titanium wires, disoccluded posterior teeth with bite plane cemented to the

mandibular arch with the trimming of the bite plane on the right side. As a result, the roll was corrected with the extrusion of posteriors on the right side. (Figure 5)

Furthermore, heavy rectangular stainless-steel wires were combined with miniscrews installed at the buccal gingiva on the left side and elastomeric chain traction, leading to the intrusion of the posteriors (Sugawara et al., 2002, Wolford et al., 2014).[9,10] (Figure 5) As a sequel, the vertical position of the posteriors was corrected by the differential eruption. A 1mm SS wire was bonded on the occlusal surface of the left maxillary posteriors to retain the intrusion. (Figure 5)

3.2.2. Phase 2 – Minimal Surgical Phase for Management of UCH

Succeeding this, mock surgery was performed with the stereolithographic model of the mandible. The extent of the vertical difference between the right and the left condyle of 20mm was calculated with the 3D model. (Figure 6)

After the preauricular incision, relative condylectomy with 20mm shaving of the left condylar head in conjunction with the lateral and medial poles was executed. (Figure 5)

Figure 7: Post treatment extraoral and intraoral photographs at the time of debonding

3.2.3. Phase 3 – Correction of the persisting occlusal discrepancy and Mandibular deviation

Post condylectomy, the correction of persisting occlusal discrepancies and mandibular deviation was accomplished with fixed mechanotherapy combined with settling elastics for 3 months.

3.2.4. Phase 4 – Correction of CPD with Genioplasty

Genioplasty was not performed as the patient soft tissue chin drape provided a good camouflage and did not show deviation evidently. Lower border of the mandible was shaved off on the left side for the purpose obtaining symmetry. (Figure 9)

3.3. Treatment results

After 36 months of treatment time, ideal overjet, and overbite, Angle's Class I canine and molar relation were established. Also, MxTOP was significantly improved. (Figure 7) The chin point deviation was corrected from 12mm to 3mm. (Figure 8)

The panoramic radiograph revealed physiologic bone remodeling of the condyle on the affected side. (Figure 9)

Lateral cephalometric analysis showed a skeletal base of Class I with an orthognathic maxilla and orthognathic mandible on a low mandibular plane angle with a horizontal growth pattern. With the average inclination of the maxillary and mandibular incisors, normal overjet and overbite were obtained. (Figures 9 and 10)

Figure 8: Post treatment extraoral and intraoral photographs after shaving of lower border of mandible

3.4. Retention

After debonding, the Hawleys retainer was placed in the maxillary arch and fixed lingual retainers were bonded on the mandibular anterior teeth.

4. Discussion

Condylar hyperplasia is an infrequent disorder recognized by excessive condyle growth on one side, resulting in functional and aesthetic problems. A few classifications have been put forward for condylar hyperplasia in literature (Arora et al., 2019, Rodrigues et al., 2015).[1,11] The most recognized one is Obwegeser and Mekek's classification which was proposed in the year 1986 in which they classified condylar hyperplasia into 3 types;

type 1 hemimandibular hyperplasia (characterized by three-dimensional enlargement of the mandible on one side), type 2 hemimandibular elongation (characterized by horizontal displacement of mandible and chin on the unaffected side) and type 3 is a combination of both. Our case is a brew of a self-limiting case of hemimandibular elongation (type 1B) (Obwegeser and Makek et al., 1986).[12]

Nuclear imaging has the potential to lay out the physiological minutiae of condylar hyperplasia with help of radionuclide-labelled tracers. Imaging was done using skeletal scintigraphy and SPECT/CT scan which utilizes technetium 99m methylene diphosphate which employs bone blood flow and metabolism to evaluate mandibular growth at a single time point (Alexander et., 1976, Beirne et al., 1980, Kaban et al., 1982, Cisneros et al., 1984).[13–16] Customarily in bone scintigraphy, the abundant activity of condyle is diagnosed by a difference in ingestion of more than 10% of Tc99m – MDP. SPECT scan has an added advantage over planar scintigraphy in producing a three-dimensional image (Cisneros et al., 1984).[16]

As per the guidelines for the treatment of unilateral condylar hyperplasia, surgery should be adjourned till the completion of the condylar growth as there is a hazard of the mandibular shift to the affected side due to the normal growth ensuing in the unaffected side. In consonant with that, the cessation of the condylar growth, in this case, was confirmed by taking SPECT images during and after the growth span following which orthodontic therapy was carried out trailed by proportional condylectomy (Wolford et al., 2014).[10]

Because of the complex mechanics and ambiguous stability of the treatment, asymmetric cases are a huge challenge in the field of orthodontics. Occlusal plane canting is one of the additional complexities in the treatment of asymmetries (Farrat et al., 2019).[17] Due to the mixed etiology of canting in this patient, there was a challenge in correcting the skeletal overgrowth in three dimensions caused by the condylar hyperplasia in addition to dental over-eruption due to lack of functional posterior occlusal contacts (Gibson et al., 2021).[18]

Before the development of the skeletal anchorage system, occlusal plane canting was treated with mechanics such as asymmetric archwire, high pull headgears, elastics, and bite blocks. In case of severe deviations, orthognathic surgeries were considered. Archwire systems for intrusion, such as the utility arch (Ricketts et al., 1979),[19] can result in the extrusion of other arch units due to the reactive force (Jain et al., 2014).[20] With the advent of mini-implants and miniplates, the corrections of occlusal plane deviations are being carried out effectively. However, a 3- to 4-mm MXTOP cant only can be corrected through intrusion with miniscrews or miniplate therapy while a MxTOP cant greater than 4 mm might need orthognathic surgery (Woldford et al., 2014, Akan et al., 2013).[10,21]

In their study, Lin et al., 2010[22] reported using mini-implant mechanics to attain a LeFort 1 impaction effect. Though the clinical results achieved were favorable, there was an inclination towards minimal invasive technique requiring fewer mini-implants and the mechanics for the intrusion with the buccally positioned TADs with a vertical intrusive force applied directly to the teeth. Hence occlusal canting in this patient was initiated with a bite block followed by two buccally placed TADS for the intrusion of the upper posteriors on the left side in order to obtain a vertical intrusive force (Kim et al., 2022).[23]

Also, intrusion with skeletal anchorage has better results in the maxilla than the mandible, since the mandible is composed of thicker cortices than the maxilla which might suggest that it resists the intrusive force more than the maxilla. Relapse rates after molar intrusion varies in the literature, with reported figures in the range of 10%–30% (Sugawara et al., 2002, Akan et al., 2013, Deguchi et al., 2011, Baek et al., 2010).[9,21,24,25]

The stereolithographic model of the mandible was fabricated. SL model can show better the deformities or disease status of certain cases. The SL model is a good presurgical approach as it has a profit of visualization of the problem, planning of surgical approach along with the meticulous plan of osteotomies, and determining the extent of resection. Thus, time-consuming "fitting and Chipping" is avoided because the surgeon knows exactly the shape and dimensions involved before the surgery. (Shaari et al., 2013).[26]

The universally accepted treatment for UCH is unilateral condylectomy which was described by Humphrey in 1856. Al-Kayat and Bramley in 1979 advocated a modified preauricular approach for improved visibility and safety in the surgical approach.[27]

Complete condylar resection is recommended as a radical approach for active cases (Hampf et al., 1985).[28] The relative condylectomy procedure removes the active growth potential of the condyle and helps in the correction of the vertical height difference between the affected and nonaffected condyles.

As described by Enlow and Hans, the chin tends to grow and assumes a forward position relative to the upper face until 14-16 years of age in females.[29] According to Genecov et al., soft tissue chin thickness increases in females up to 18 years of age.[30]

Thus, the treatment choice relies on careful assessment and the confirmation of the status of the condylar growth. Three-dimensional visual planning and simulation will deliver a more accurate result.

4.1. Critical appraisal

The mandibular dental midline was shifted to the right as the Bolton discrepancy was not addressed. The maxillary right lateral incisor needs to be restored for esthetic and bolton

Figure 9: Post-treatment lateral and Posteroanterior cephalograms, Panoramic radiographs

discrepancy.

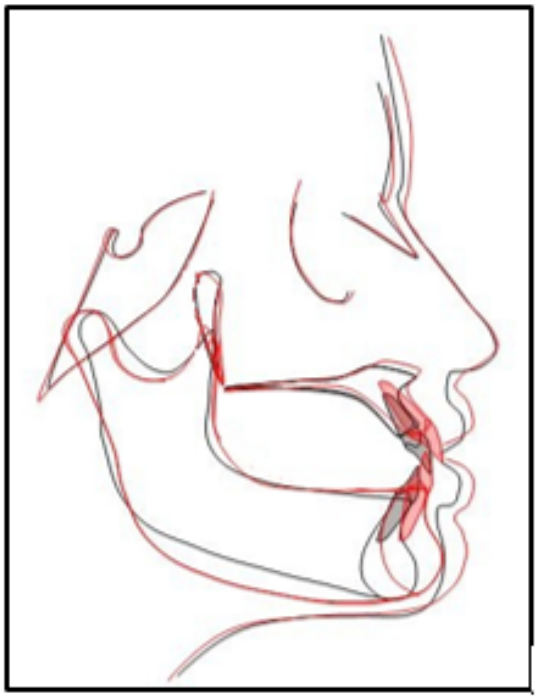

Figure 10: Superimposition pre- and post-treatment lateral cephalograms

5. Conclusion

Deviating from believed norms of attractiveness may make targets of appearance stigma exposed to hostile environments that affect their psychosocial and physical health. The overdevelopment of the mandible causes both functional and esthetic problems which generally manifest as facial asymmetry, occlusal interferences, and joint dysfunction that can lead to comorbidities.

Diagnosis and management of patients with condylar hyperplasia call for a multidisciplinary approach that involves contributions from various specialties of the medical and dental fraternity. The use of microimplants has recently paved the way towards an efficient correction of dentoalveolar cant. Henceforth, a conservative surgical approach may be promoted to offer optimal functional occlusion and desirable facial esthetics.

6. Source of Funding

There is no specific grant declared for this research.

7. Conflict of Interest

The authors declare that they have no conflict of interest

References

1. Arora KS, Bansal R, Mohapatra S, Pareek S. Review and Classification Update: Unilateral condylar hyperplasia. *BMJ Case Rep*. 2019;12(2):227569. doi:10.1136/bcr-2018-227569.
2. Kaur A, Boparai C, Singh B. Facial asymmetry secondary to mandibular condylar hyperplasia - a case report with review of literature. *Indian J Comprehensive Dent Care*. 2013;3:356–8.
3. Fisch AW, Espinosa CI, Quezada SR. Facial asymmetry secondary to mandibular condylar hyperplasia: A case report. *Revista Odontológica Mexicana*. 2011;15(4):250–6.
4. Obwegeser HL. Mandibular growth anomalies terminology- aetiology diagnosis- treatment. Berlin, Heidelberg; Berlin Heidelberg: Spriner; 2001.
5. Raijmakers PG, Karssemakers LH, Tuinzing DB. Female predominance and effect of gender on unilateral condylar hyperplasia: a review and meta-analysis. *J Oral Maxillofac Surg*. 2012;70(1):72–6.
6. Olate S, Netto HD, Rodriguez-Chessa J, Alister JP, De Albergaria-Barbosa J, De Moraes M, et al. Mandible condylar hyperplasia: a review of diagnosis and treatment protocol. *Int J Clin Exp Med*. 2013;6(9):727–37.
7. Higginson JA, Bartram AC, Banks RJ, Keith DJW. Condylar hyperplasia: current thinking. *Br J Oral Maxillofac Surg*. 2018;56(8):655–62.
8. Adams R. Case history of Mary Keefe. In Medical Section of the British Association, Bristol Meeting ; 1836.
9. Sugawara J, Baik UB, Umemori M, Takahashi I, Nagasaka H, Kawamura H, et al. Treatment and post-treatment dentoalveolar changes following intrusion of mandibular molars with application of a skeletal anchorage system (SAS) for open bite correction. *Int J Adult Orthodon Orthognath Surg*. 2002;17(4):243–53.
10. Wolford LM, Movahed R, Perez DE. A classification system for conditions causing condylar hyperplasia. *J Oral Maxillofac Surg*. 2014;72(3):567–95.
11. Rodrigues DB, Castro V. Condylar hyperplasia of the temporomandibular joint: types, treatment, and surgical implications. *Oral Maxillofac Surg Clin North Am*. 2015;27(1):155–67.
12. Obwegeser HL, Makek MS. Hemimandibular hyperplasia-hemimandibular elongation. *J Maxillofac Surg*. 1986;14(4):183–208.
13. Alexander JM. Radionuclide bone scanning in the diagnosis of lesions of the maxillofacial region. *J Oral Surg*. 1976;34(3):249–56.

14. Beirne OR, Leake DL. Technetium 99m pyrophosphate uptake in a case of unilateral condylar hyperplasia. *J Oral Surg*. 1980;38(5):385–6.
15. Kaban LB, Cisneros GJ, Heyman S, Treves S. Assessment of mandibular growth by skeletal scintigraphy. *J Oral Maxillofac Surg*. 1982;40(1):18–22.
16. Cisneros GJ, Kaban LB. Computerized skeletal scintigraphy for assessment of mandibular asymmetry. *J Oral Maxillofac Surg*. 1984;42(8):513–20.
17. Farret MM. Occlusal plane canting: a treatment alternative using skeletal anchorage. *Dental Press J Orthod*. 2019;24(1):88–105.
18. Gibson C, Critchlow S, Patel B. Unilateral intrusion in a medically complex patient using an orthodontic mini-implant: A case report. *J Orthod*. 2021;48(4):435–43.
19. Ricketts RM, Bench RW, Gugino CR, Hilgers JJ, Schulhof RJ. Bioprogressive therapy. Denver, Colorado: Rocky Mountain Orthodontics; 1979. p. 111–26.
20. Jain RK, Kumar SP, Manjula WS. Comparison of intrusion effects on maxillary incisors among mini-implant anchorage, J-hook headgear, and utility arch. *J Clin Diagn Res*. 2014;8(7):21–4.
21. Akan S, Kocadereli I, Aktas A, Tasar F. Effects of maxillary molar intrusion with zygomatic anchorage on the stomatognathic system in anterior open bite patients. *Eur J Orthod*. 2013;35(1):93–102.
22. Lin JC, Liou EJ, Bowman SJ. The simultaneous reduction in vertical dimension and gummy smile using miniscrew anchorage. *J Clin Orthod*. 2010;44(3):157–70.
23. Kim HJ, Noh HK, Park HS. Nonsurgical orthodontic correction of facial asymmetry by condylar remodeling and mandibular repositioning following occlusal cant correction with microimplants: a case report. *Angle Orthod*. 2023;93(1):111–25.
24. Deguchi T, Kurosaka H, Oikawa H, Kuroda S, Takahashii I, Yamashiro T, et al. Comparison of orthodontic treatment outcomes in adults with skeletal open bite between conventional edgewise treatment and implant-anchored orthodontics. *Am J Orthod Dentofacial Orthop*. 2011;139(4 Suppl):60–8.
25. Baek MS, Choi YJ, Yu HS, Lee KJ, Kwak J, Park YC, et al. Long term stability of anterior open-bite treatment by intrusion of maxillary posterior teeth. *Am J Orthod Dentofacial Orthop*. 2010;138(4):396.e1–e9.
26. Shaari R, Mustafa WM, Alam MK, Rahman SA. Stereolithography model in management of unilateral mandibular condylar hyperplasia. *Int Med J*. 2013;20(3):382–4.
27. Al-Kayat A, Bramley P. A modified pre-auricular approach to the temporomandibular joint and malar arch. *Br J Oral Surg*. 1979;17(2):91–103.
28. Hampf G, Tasanen A, Nordling S. Surgery in mandibular condylar hyperplasia. *J Maxillofac Surg*. 1985;13(2):74–8.
29. Enlow DH, Hans M. Handbook of Facial Growth. 2nd Edn. Philadelphia, Pa, USA: WB Saunders; 2008.
30. Genecov JS, Sinclair PM, Dechow PC. Development of the nose and soft tissue profile. *Angle Orthod*. 1990;60(3):191–8.

Author biography

Ratna Parameswaran, Professor

J Shruthi, Consultant Orthodontist

Manikandhan Ramanathan, Professor

Harsha Vardhan BG, Professor

Cite this article: Parameswaran R, Shruthi J, Ramanathan M, Harsha Vardhan BG. Unilateral condylar hyperplasia - Management with relative condylectomy and mandibular border contouring combined with tad assisted orthodontics. *IP Indian J Orthod Dentofacial Res* 2023;9(4):285-291.