

Condylar asymmetries: a review of literature

Sodawala J*, Reddy R*

*Department of Orthodontics, Rungta College of Dental Sciences & Research, Bhilai

ARTICLE INFO

Keywords

Asymmetry indexes, Condylar asymmetry, Mandibular asymmetry.

Corresponding Author

Dr Javed Sodawala
Senior lecturer, Dept. of Orthodontics,
Rungta College of Dental Sciences
& Research,
Kohka-Kurud Road, Bhilai (CG)
Contact: +918109747871
Email : drjavedazher@gmail.com

ABSTRACT

Condylar asymmetries are one of the most important causes of mandibulofacial asymmetries. It cause aesthetic and functional problems because of its role in stomatognathic system. A number of causes and factors are associated with the development of condylar asymmetries which can give rise to temporomandibular disorders. Panoramic radiographs have been widely used for evaluating condylar asymmetry. The validity of these radiographs for measuring condylar asymmetry is low. Future studies should rely on 3D imaging technologies for evaluating condylar asymmetry.

Introduction

'Symmetry' is defined as the correspondence in size, form, and arrangement of parts on opposite sides of a plane, line or point. Simon and McCoy had emphasized the importance of symmetry in human body.[1] Conversely, 'asymmetry' means lack of balance. 'Facial asymmetry' refers to disproportion between two normally alike facial landmarks on the opposite sides of median sagittal plane. Hasse first recorded craniofacial asymmetry in early Greek statuary.[1] Radiographic studies have revealed varying degrees of craniofacial asymmetry as a characteristic of all faces.[1-3]

Asymmetry in the lower third of the face is referred as 'mandibular asymmetry'. 'Condylar asymmetry' is the disproportion of vertical condylar height between right and left mandibular condyles. Condylar asymmetries are one of the most important causes of mandibulofacial asymmetries.

Etiology

The causes of condylar asymmetry can be genetic, environmental or both. Developmental abnormalities such as hemifacial microsomia, condylar hyperplasia, syndromes such as Treacher Collins syndrome, Auriculo-condylar syndrome, trauma, joint pathologies such as rheumatoid arthritis and osteoarthritis, infections, internal derangements, myogenic problems such as myospasm, chronic muscle shortening or muscle splinting and occlusal interferences can cause condylar asymmetries.

Diagnostic aids

Clinical examination, photographs, lateral and posteroanterior cephalographs, conventional and digital panoramic radiographs, laminographs, computerized tomography and magnetic resonance imaging had been used to evaluate condylar asymmetry. The asymmetry had been measured by recording condylar height, ramus height, total ramus height, gonial angles and depth of antegonial notch.

Factors affecting condylar asymmetry

Cranio-mandibular disorders

The patients treated for craniomandibular disorders were found to have significantly greater condylar asymmetry when compared to control groups.[4,5]

Myogenous and arthrogenous origin of pain

The patients with myogenous origin of pain were younger and showed significantly greater asymmetry than the patients with arthrogenous origin of pain. [6]

Juvenile chronic arthritis (JCA)

The patients with JCA had a significantly shorter relative condylar height and greater asymmetry index measurements than the normal or postnormal occlusion groups. [7]

Angle's Class II subdivision malocclusion

Kurt G et al found that the asymmetry index values and gonial angle measurements for Class I and Class II sides in the Angle's Class II subdivision group and for right and left sides in the Class I group showed no statistically significant differences.[8]

Angle's Class II division 2 and Class III malocclusions

Miller VJ and Smidt A and Millers VJ and Bodner L found no correlation between age and asymmetry index in these groups.[9,10]

ANB angle

Saglam AM observed that condylar plus ramus asymmetry measurements were affected by the change of ANB angle.[11]

Occlusion patterns

Setzgein OS, Celenk P and Arici S found that Angle's Class II division 1 malocclusion has a significant effect on the condylar asymmetry index when compared to Angle's Class II division 2 and Class III malocclusion and normal occlusion types.[12]

Sex

No gender related differences were found in the asymmetry indexes.[8,11,12]

Growth

Liukkonen M, Sillanmäki L and Peltomäki T observed that healthy young individuals generally have a statistically significant mandibular asymmetry, which, however, was only seldom clinically significant. Their study further showed that mandibular asymmetry may diminish or appear during growth of healthy subjects.[13]

Complete denture wearers

The right gonial angle was significantly smaller and correlated negatively with the ramus height in both sides but positively with the increased EMG activity in the right masseter muscle in complete denture wearers.[14]

Internal Derangement

Unilateral or bilateral pathology of the osseous components of the temporomandibular joint (TMJ) can result in pronounced facial asymmetry because of dissimilar size and shape of the right and left sides of the mandible.[15]

Parafunction

Muscle hyperactivity may be a factor in the increased asymmetry found in patients with TMD.[16]

Handedness

No relationship was observed between condylar asymmetry and handedness of dentate patients with temporomandibular disorders.[17]

Clinical implications

Condylar asymmetry has been evaluated in patients with and without temporomandibular disorders and it has been accepted that there is a statistically significant condylar asymmetry indexes measurements in patients suffering from temporomandibular disorders. Condylar asymmetry has been used to validate clinical tests of diagnostic categories in patient with TMD. It may affect the skeletal morphology, symmetry and growth pattern of the affected individual. The clinician should be aware of these possibilities especially while planning treatment of children and orthognathic surgery patients.

Limitations

Majority of the studies evaluating condylar asymmetry measurements had been done using panoramic radiographs. The validity of detecting vertical asymmetries of condyle, ramus or both on panoramic radiographs is low. The panoramic radiographs are known for having disproportionate magnification and distortion. The horizontal and angular measurements are less accurate than vertical measurements, which in turn depends on the specific machine used by the researcher. The transverse component of asymmetry is often ignored by the researcher. A cut-off factor of 6% has been accepted when measuring asymmetry indexes on panoramic radiographs. Therefore, the patients with a less than 6% difference between the right and the left sides might not be diagnosed with panoramic radiograph.[7,18]

Future studies

With the advent of 3D imaging technologies, researchers can assess the condylar asymmetry in all the three planes- horizontal, vertical and transverse. With new technologies such as computed tomography, there is potential to improve diagnostic accuracy and patient treatment. Future studies should use both conventional and forthcoming technologies to assess the horizontal, vertical, and transverse dimensions in mandibular asymmetries. The cost associated with these 3D imaging technologies and

their availability and accessibility to the researchers can prove to be a limiting factor.

Conclusion

Asymmetries of mandibular condyles and rami are part of the biologic variation of humans. It serves to characterize and to individualize the aesthetically pleasing face rather than to disfigure it. However, it still remains unclear, when such asymmetries should be considered "unphysiological."

References

1. Shah SM and Joshi MR. An assessment of asymmetry in the normal craniofacial complex. *Angle Orthod.* 1978; 48: 141-8.
2. Fischer B. Asymmetries of the dentofacial complex. *Angle Orthod.* 1954; 24: 179-92.
3. Letzer GM and Kronman JH. A posteroanterior cephalometric evaluation of craniofacial asymmetry. *Angle Orthod.* 1967; 37: 205-11.
4. Habets LLMH et al. The orthopantomograph, an aid in diagnosis of TMJ problems II. The vertical symmetry. *J Oral Rehabil.* 1988; 15: 465-71.
5. Bezuur JN, Habets LLMH and Hansson TL. The recognition of craniomandibular disorders; a comparison between clinical, tomographical and dental panoramic radiographical findings in thirty one subjects. *J Oral Rehabil.* 1988; 15: 549-54.
6. Bezuur JN, Habets LLMH and Hansson TL. The recognition of craniomandibular disorders; condylar symmetry in relation to myogenous and arthrogenous origin of pain. *J Oral Rehabil.* 1989; 16: 257-60.
7. Kjellberg H et al. Condylar height on panoramic radiographs. A methodologic study with a clinical application. *Acta Odontol Scand.* 1994; 52: 43-50.
8. Kurt G et al. Mandibular asymmetry in Class II subdivision malocclusion. *Angle Orthod.* 2008; 78: 32-7.
9. Millers VJ and Smidt A. Condylar asymmetry and age in patients with Angle's Class II division 2 malocclusion. *J Oral Rehabil.* 1996; 23: 712-5.
10. Millers VJ and Bodner L. Condylar asymmetry measurements in patients with Angle's Class III malocclusion. *J Oral Rehabil.* 1997; 24: 247-9.
11. Saglam AM. The condylar asymmetry measurements in different skeletal patterns. *J Oral Rehabil.* 2003; 30: 738-42.
12. Sezgin OS, Celenk P and Arici S. Mandibular asymmetry in different occlusion patterns- a radiographic evaluation. *Angle Orthod.* 2007; 77: 803-7.
13. Liukkonen M, Sillanmäki L and Peltomäki T. Mandibular asymmetry in healthy children. *Acta Odontol Scand.* 2005; 63: 168-72.
14. Raustia AM, and Salonen MAM. Gonial angles and condylar and ramus height of the mandible in complete denture wearers - a panoramic radiograph study. *J Oral Rehabil.* 1997; 24: 512-6.
15. Trpkova B et al. Craniofacial asymmetry and temporomandibular joint internal derangement in female adolescents: a posteroanterior cephalometric study. *Angle Orthod* 2000; 70: 81-8.
16. Miller VJ et al. The effect of parafunction on condylar asymmetry in patients with temporomandibular disorders. *J Oral Rehabil.* 1998; 25: 721-4.
17. Miller VJ. Condylar asymmetry and handedness in patients with temporomandibular disorders. *J Oral Rehabil.* 1997; 24: 549-51.
18. Kamblyafkas P et al. Validity of panoramic radiographs for measuring mandibular asymmetry. *Angle Orthod.* 2006; 76: 388-93.

Source of Support: Nil. Conflict of Interest: None