



ORIGINAL RESEARCH PAPER

Orthodontology

A NOTE ON CRANIOFACIAL ASYMMETRY ITS CLINICAL EVALUATION AND TREATMENT MODALITIES

KEY WORDS: facial asymmetry, skeletal asymmetry, surgical approach

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ABSTRACT

Asymmetry is described as lack or absence of symmetry. When applying this to the human face, it illustrates an imbalance or disproportionality between the right and left side .In the past mild facial asymmetry was disregarded by clinicians because it was believed that normal craniofacial skeletons had some asymmetry, and that this was sub clinical and could be compatible with normal dental occlusion.. Significant facial asymmetry results not only in functional, but also aesthetic issues, under these conditions, its etiology should be carefully investigated in order to achieve an adequate treatment plan. Facial asymmetry assessment comprises patient's interview, extra and intra oral examination, photographic, study model, functional and imaging examination. This study aims in compiling important aspects to be considered to get an accurate diagnosis and treatment plan for facial asymmetry.

INTRODUCTION

Symmetry is defined as correspondence in size, shape and relative position of parts on opposite sides of a dividing line or median plane. The word symmetry is derived from the Greek word 'Symmetria' which means 'of like measure'. Gross facial imbalance is readily discernable, but what is not as evident is subclinical facial imbalance or asymmetry. In diagnosing and treating facial asymmetry, healthcare providers should be aware of the patients concerns and be able to diagnose as well as determine the required treatment for predictable and stable correction. Clinical facial asymmetry in the craniofacial complex ranges from the barely detectable to gross discrepancies between the right and left halves of the face.

ETIOLOGY OF FACIAL ASYMMETRY

According to You-Wei Cheong, et al facial asymmetry can be congenital, developmental or acquired .The Developmental type of asymmetry is idiopathic and non-syndrome in nature According to Bishara, Sarver et al the etiology is genetics, intrauterine environmental factors, trauma and infection. Causes of mandibular asymmetry by Mathew Sychia is developmental, pathological, traumatic and functional .Another etiology is Congenital anomalies Developmental anomalies which includes Intrinsic Jaw-Growth Deformities Acquired facial asymmetries are Condylar Trauma, Juvenile Idiopathic Arthritis, Degenerative Joint disease Etiology of arch asymmetries are Congenitally missing teeth, Malformed teeth ,Ankylosis of primary molars, Supernumerary teeth, Ectopic eruption, Early loss of primary teeth.

CLASSIFICATION OF FACIAL ASYMMETRY

I. According to the structures involved

Skeletal , Muscular ,Functional ,Dental

11 Classification of facial asymmetry by cluster analysis

Based on three variables on a frontal cephalogram:-

- Menton deviation
- Apical base midline discrepancy
- Vertical difference of Ag between the right and left sides

11.1. Classification of facial asymmetry by TML system

They are

- The menton deviation with transverse asymmetry (T)
- Maxillary cant(M)
- Lip cant (L)

1V. Classification for surgical treatment planning of maxillomandibular asymmetry

The classification consisted of assessing three major anatomical areas

(maxilla, dental midline, mandible)

Type I-: that caused by asymmetry of the symphysis of the mandible are symmetric with the dental midlines in the centre of the face.

Type II-: that in which the discrepancy is primarily in the body, ramus or condyle of the mandible. The maxillary dental midline coincides with the facial midline and the mandibular dental midline coincides with the Symphysial midline.

Type III-: that in which maxillary midline is still coincident to the facial midline but the mandibular midline is asymmetric to the maxillary midline and the symphysis is still more asymmetric to the mandible

Type IV-: that in which the discrepancy involves the maxilla, mandible and the symphysis. The maxillary midline is asymmetric to the facial midline while the body of the mandible to the maxillary midline is further asymmetric and the mandibular symphysis is asymmetric to the body of the mandible.

V. Lundstorm describes facial asymmetry

- Qualitative
- Quantitative

CLINICAL EVALUATION OF FACIAL ASYMMETRY

The most important phase in patient care centres on evaluation of the existing problems and definition of treatment goals. At the initial appointment a thorough interview should be conducted with the patient to discuss the patients perception of problems and the goals of any possible treatment .Clinical evaluation includes:- Detailed history, extra oral and Intraoral examination.

Extra oral examination

a. Frontal view

The frontal view examination can be performed by direct clinical examination and properly oriented photographs to determine the amount of vertical and transverse asymmetry. Transverse facial discrepancies can be determined by Rule of Fifths, the face is divided sagittal into five parts from helix to helix of the outer ear. Vertical asymmetry can be assessed by using three reference planes, first is the plane passing through the hair line, second the line connecting the supraorbital ridges and the third plane which passes through the base of the nose .Placing a tongue blade transversely across the occlusion between the maxillary and mandibular cuspid or first bicuspid area can be used to determine the transverse cant of the occlusal plane relative to the pupillary plane. Facial midline is also evaluated.

b. Profile view

Evaluating the left and right side from the profile view will allow

assessment of asymmetries in the forward projection of the forehead, globes, orbital rims, cheeks malar areas as well as the maxilla, mandible and chin. The sequential analysis of the upper, middle, and lower third face in profile is carried out.

c. Axial view

Another method of viewing the face is helpful in the identification of subtle asymmetries of anteroposterior facial projection. From this position, symmetric projection of the forehead, brows, zygomas, malar eminences, paranasal area, alar cartilages and mandibular border back to the angles are sequentially assessed.

Intraoral examination

1. Evaluation of dental midline

Dental midline is evaluated in mouth open, centric relation, and centric occlusion. In orthodontic diagnosis, the extent to which the maxillary midline deviates from facial soft tissue midline is commonly recorded. Generally a 2 mm or greater deviation of the dental midline should be considered when formulating an orthodontic treatment plan.

2. Evaluation of occlusion

1. Vertical occlusal evaluation
2. Transverse occlusal evaluation
3. Anteroposterior occlusal evaluation

FUNCTIONAL ANALYSIS

The most important aspect of orthodontic functional analysis are:-
 a) Examination of postural rest position and maximum intercuspation
 b) Masticatory muscle and Temporomandibular joint evaluation
 c) Examination of orofacial dysfunctions

PHOTOGRAPHIC ANALYSIS

Photographic analysis is used to analyse the relationship between the craniofacial skeleton and the soft tissue facial contours. Extraoral 4 photographs taken are Full face with lips relaxed, Full face smile, 45 degree oblique (right and left) and Profile (right and left).

STUDY MODEL ANALYSIS

Study model analysis is a three dimensional assessment of the maxillary and mandibular dental arches and the occlusal relationships. The most important advantage of study model analysis is that the degree of malocclusions can be diagnosed in three dimensions. Abnormal and asymmetric axial inclinations can either produce a dental asymmetry or if compensatory in nature may mark an underlying skeletal problem. For the necessary examination, models are oriented with respect to three reference planes, which lie at right angles to one another. They are:-

Midpalatal raphe (Midsagittal plane)
 Tuberosity plane
 The occlusal plane

ACCORDING TO BERNKLAU RADIOGRAPHIC ASSESSMENT OF ASYMMETRIES

All orthodontic patients deserve an equally comprehensive three-dimensional diagnostic examination, assessment of posteroanterior and basilar cephalometric views in cases of dentoalveolar and facial asymmetries, dental and skeletal cross bites, and functional mandibular displacements.

Radiographs used for assessing asymmetries are:- Cephalometric radiography, Cone Beam Computed Tomography, 3D CT, OPG, Submentovertex view, MRI, TMJ Imaging.

Types of PA analyses used to assess asymmetry

Rickets analysis, Svanholt and Slow analysis, Grummons analysis, Grayson analysis, Hewitt analysis, Chie

TREATMENT OF DENTAL ASYMMETRIES

Once the diagnosis of dental asymmetry is established specific goals of treatment are determined and a mechanotherapeutic

plan is developed. This allows the orthodontists to use symmetric mechanics during the remainder of treatment. Dental asymmetries in orthodontics can be divided into four groups:-

1. Diverging occlusal planes
2. Asymmetric left to right buccal occlusion, with or without midline deviation
3. Unilateral Cross bite
4. Asymmetric arch form

SKELETAL ASYMMETRIES

Asymmetries of a skeletal nature treated with orthodontics alone may dictate certain compromises that need to be explained to the patient before treatment is initiated. Severe discrepancies may require a combination of surgery and orthodontics. Important concerns are: Symmetry of the Orbit, Symmetry of the malar bones, Symmetry of the nose, Symmetry of the maxilla, Symmetry of the mandible.

Surgical approaches

Facial asymmetry can be corrected by:

- Bringing the mandibular symphysis to the midsagittal plane.
- Aligning the maxillary and mandibular occlusal planes to the horizontal plane
- Aligning the bilateral facial height in order to attain optimum esthetic result.

Treatment of skeletal asymmetry in preadolescent children

Growth modification with asymmetric functional appliances

The primary tool for growth guidance in children with asymmetry is an asymmetric (hybrid) functional appliance. It is necessary not only to bring the mandible forward and to the midline, but also to open vertically more on the affected side.

Herbst Appliance

AJO-DO 1982 Sarnas, Pancherz- Roentgen stereo metric method. The Herbst appliance works as an artificial joint between the maxilla and the mandible. A telescope mechanism on either side maintains desired mandibular position. The appliance is constructed to displace the mandible anteriorly and to the unaffected side for correction of the mandibular retrusion and asymmetry.

Twinblock AJO 1988- Clarke- When activated unilaterally - corrects postural mandibular displacement. **Hemifacial Microsomia** is corrected by Growth guidance and

Surgical correction which includes
 Surgical phase I: Tissue augmentation
 Surgical phase II: Jaw relationships
 Surgical phase III: Contour modification

Maxillary asymmetry

Vertical asymmetry of the maxilla is characterized by the vertical dimensional difference between the two sides of the maxilla in relation to the horizontal plane. Horizontal asymmetry is characterized by difference in width if the right and left sides of the maxilla in relation to the sagittal plane.

Surgical correction of mandibular asymmetry

The most commonly employed procedures are as follows:

1. Osteotomies (sagittal split, vertical ramus, inverted C, segmental osteotomies, others)
2. Autogenous or combined autogenous and/or allogeneic (cadaveric) grafts
3. Distraction osteogenesis
4. Alloplastic reconstruction of the ramus and/or temporomandibular joint

Extended lateral sliding Genioplasty

SOFT TISSUE ASYMMETRIES

Etiology is Cleft lip- repaired/ unrepaired, Muscular hypertrophy/atrophy, Scar deformities, Neurofibromatosis, Cerebral palsy. **Treatment Possibilities** are Cosmetic recontouring, Alloplastic augmentation, Prevention of wound contraction.

CONCLUSION

Asymmetry in the craniofacial areas can be recognized as differences in the size or relationships of the two sides of the face. This may be the result of discrepancies either in the form of individual bones or a mal-position of one or more bones in the craniofacial complex. The asymmetry may also be limited to the overlying soft tissues.

Patients presenting with significant clinical asymmetry pose special diagnostic and treatment challenges to the orthodontists. This entails a thorough history, physical examination, and imaging studies. An orthodontic consultation is required if there are dental and occlusal problems. Skeletal, dental and soft tissue components contributing to facial asymmetry should be carefully evaluated.. A fundamental objective of orthodontic therapy is the improvement of facial and dentoalveolar esthetics.

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