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Review Article

Facial asymmetry revisited: Part I- diagnosis and treatment planning

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ABSTRACT

Facial asymmetry is an individualized characteristic and is commonly observed sub clinically in overall population. However, clinically significant facial asymmetry with associated morphologic, esthetic and stomatognathic problems warrant investigation of the underlying etiology and comprehensive clinical examination in conjunction with imaging studies for diagnosis, localization of asymmetry and treatment planning. The principal aim of this article is to present an invaluable insight into etiopathogenesis, myriad classifications and various systematic diagnostic approaches indispensable for formulation of treatment plan and appropriate management of facial asymmetry.

Contents

1. Introduction

There is no perfect bilateral body symmetry existing in living organisms in real sense. Any two congruent but mirror type images existing in nature usually exhibit right-left variations. Humans frequently exhibit functional and morphological asymmetries, in form of right and left handedness as well as preference for one eye or one leg.1

Human facial symmetry is a key determinant for assessing facial attractiveness and expressions in psychology and anthropology.2 Facial asymmetry is defined as the presence of a clinically significant variation between the two halves of the face that the patient [or parents, in the instance of most congenital asymmetries] is concerned about and that can be quantified by the clinician.3

Slight nonpathologic asymmetry is usually indiscernible and often considered normal, but owing to the subjectivity of facial esthetics, the threshold of its clinical significance cannot be easily determined; and thus the acceptability probably depends on the region of asymmetry, clinician's sense of balance and the patient's perception of imbalance.1,4

Esthetic and functional problems associated with significant facial asymmetry may adversely affect the patient's orofacial, nutritional and psychosocial development. Critical evaluation and more precise treatment planning is required as anything short of an optimal result will often precipitate dissatisfaction with the result.3. This article intends to provide an insight into the key aspects to be taken into consideration while accomplishing an accurate diagnosis and formulation of rational integrated orthodontic-surgical treatment plan that considers correction of all aspects of the asymmetry.

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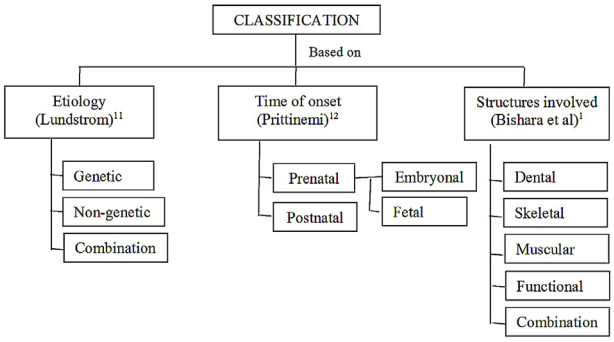
2. Epidemiological considerations

With respect to skeletal growth pattern, more frequent association of facial asymmetry with skeletal class III malocclusions and less frequent association with skeletal Class II malocclusions have been reported in the studies of Good et al,[5] and, Severt and Proffit[6] respectively. Greater deviation was observed in lower part of the face when compared to upper and midface. Laterality of chin to the left was also discernible in 90% of the cases.[6] Haraguchi et al[7] reported equal prevalence of facial asymmetry among skeletal Class I, II and III patients. Due to greater occurrence of Class III malocclusions in Asians than in Caucasians, facial asymmetry is more prevalent among the normal population in Asia than in Western countries.[8]

3. Etiopathogenesis and classifications

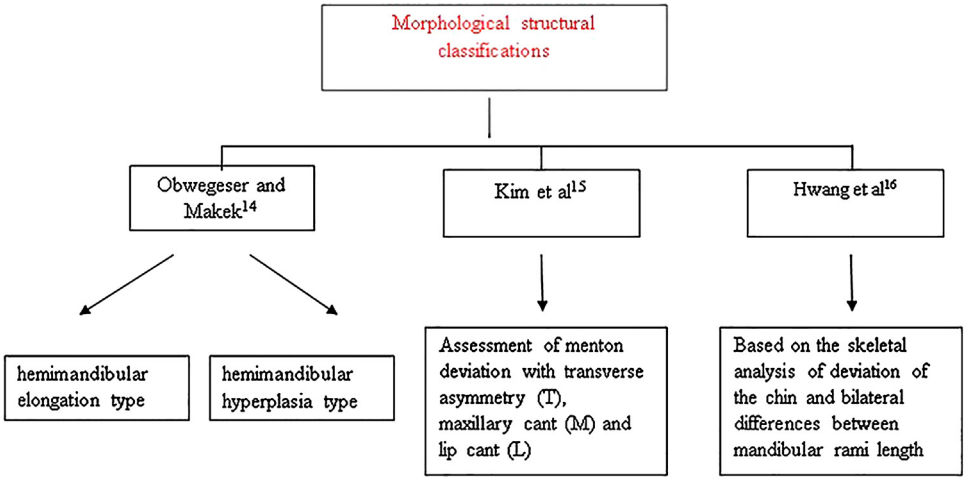
Understanding the etiology of facial asymmetry is critical with regards to treatment planning, management and long-term stability. Facial asymmetry may have different origins, namely i) congenital, originating prenatally, ii) developmental, originating during growth with inconspicuous etiology, and iii) acquired, resulting from functional mandibular displacements, traumatic injury or any pathology. Congenital asymmetries include orofacial clefts, hemifacial microsomia, neurofibromatosis, congenital muscular torticollis, unilateral coronal craniosynostosis and malformations, such as syndromes, hypoplasias and hyperplasias with varied etiologic presentations.

A flowchart depicting different documented classifications of facial asymmetry is as follows:



Cohen[13] coined the term 'hemi-asymmetries' to classify asymmetries of craniofacial skeleton in four categories, namely hemi-hyperplasia (hemifacial hypertrophy), hemi-hypoplasia (hemifacial microsomia), hemi-atrophy (Romberg syndrome) and other miscellaneous entities (Bencze syndrome, hemimaxillofacial dysplasia).

Flowchart depicting morphological structural classifications is as follows:



positional plagiocephaly, among others. Acquired states of asymmetry include facial trauma, fractures, temporomandibular joint (TMJ) infection and arthritis, TMJ ankyloses, facial pathologies and tumours, Parry-Romberg syndrome and unilateral condylar hyperplasia or hypoplasia, among others.[8]

Based on the environmental and genetic influences on bilateral symmetry in humans, Van Valen[9] classified asymmetry as being directional, antisymmetry and fluctuating type. Directional asymmetries and antisymmetry are considered developmentally normal. However, fluctuating asymmetry reflects the inability of the individual to develop identical bilaterally homologous structures. Presence of fluctuating asymmetry has been reported in craniofacies, and in deciduous and permanent dentitions.

The terms 'laterocclusion' and 'laterognathism' are used to distinguish between a class of "apparent facial asymmetries" and a class of "true asymmetries", respectively.[10] Genesis of apparent facial asymmetries is attributable to mandibular deviation caused by occlusal anomalies; whereas true asymmetries include skeletal

Another classification proposed by Wolford[17] involves 4 categories of asymmetry, as demonstrated in Table 1.

3.1. Clinical considerations

Facial asymmetries more commonly manifest in mandible (and chin) as it forms the skeletal support for soft tissues of the lower face and has longer periods of growth. On the contrary, smaller secondary role of maxilla in asymmetry is attributed to rigid attachment of maxilla to the stable region of synchondroses at the cranial base and minimal soft tissue support provided by it.

From a clinical perspective, determination of the extent of skeletal, dental, functional and soft tissue involvement of craniofacial structures is deemed necessary (Table 2).[1] Photographs representing varied clinical presentations of facial and dental asymmetry are depicted in Figs. 1 a–e and 2 respectively.

During the examination, three important factors requiring special attention are the location of the asymmetry, the tissues

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