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Review Article

Facial asymmetry revisited: Part II–Conceptualizing the management

Dhirendra Srivastava[a], Harpreet Singh[b,*], Sonal Mishra[a], Poonam Sharma[b], Pranav Kapoor[b], Lokesh Chandra[a]

[a] Department of Oral and Maxillofacial Surgery, ESIC Dental College and Hospital, Sector 15, Rohini, New Delhi 110085, India
[b] Department of Orthodontics and Dentofacial Orthopaedics, ESIC Dental College and Hospital, Sector 15, Rohini, New Delhi 110085, India

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ABSTRACT

Management of facial asymmetry is one of the arduous and challenging task to accomplish in disciplines of orthodontics and maxillofacial surgery. This article aims to describe various treatment modalities adopted conjointly by the orthodontist and maxillofacial surgeon, taking into consideration the realistic concerns and expectations of the patient. This would help improve treatment outcomes while ensuring overall well-being of the patient.

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1. Introduction

Management of facial asymmetry often presents with a challenging clinical scenario. Evolving and finalizing a treatment plan should be based on an accurate qualitative and quantitative diagnosis of the patient's particular facial asymmetry; and a list of esthetic treatment objectives as determined from the patient's chief complaint, extent of occlusal deformity and associated sagittal or vertical jaw imbalance. Involvement of skeletal, dental and soft tissue components in the sagittal, vertical and transverse planes usually warrant a combination of orthodontic treatment and orthognathic surgery.[1]

2. Treatment considerations

Developing skeletal imbalances in growing individuals can be corrected by use of hybrid orthopaedic appliances in conjunction with orthodontic treatment. However, unpredictability of the results of growth modification treatment with functional

* Corresponding author.
E-mail address: drhpreet_mamc04@yahoo.co.in (H. Singh).

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appliances in pre-adolescent children warrants constant monitoring till completion of active growth.[2]

Functional mandibular shifts (laterocclusions) in growing patients are amenable to correction by occlusal adjustments, aligning malposed teeth and maxillary expansion. In cases of unilateral posterior crossbite resulting from a true mandibular asymmetry (laterognathism), surgical correction is often deemed necessary.

In adults with functional shift and associated asymmetry, Joondeph[3] proposed the use of diagnostic splints to properly evaluate the presence and extent of functional shift by eliminating habitual posturing, thus allowing muscle memory 'deprogramming' to establish the centric relation position.

True dental arch asymmetries can usually be managed orthodontically at all ages by employing asymmetric tooth-extraction patterns including differential anchorage and asymmetric mechanics such as combination of diagonal and midline elastics.[4] Segmented arch mechanics rather than continuous arch wire mechanics should be preferred for correction of asymmetric dental malocclusions. Dental prosthesis and/or composite build-ups may be indicated for restoring missing, decayed and deformed teeth.

Botox injections, muscle relaxants, antiseizure medications, biofeedback therapy, muscle resection and bone recontouring are different treatment approaches adopted for asymmetries related to muscle hypertrophies.

Partial or complete resolution of skeletal discrepancy through orthodontic treatment alone is dependent on the severity and nature of the skeletal asymmetry.[4] In patients having mild skeletal problems with nonsurgical plan or preference of treatment, it is necessary to maintain the compensations and asymmetry of the axial inclinations of the teeth to prevent the production of crossbite. However, skeletal asymmetries corrected by orthodontics alone approach cannot be completely eliminated and thus, the resulting compromised outcome should be explained to the patient prior to initiation of treatment.[4,5]

Complex facial asymmetry is often confronted with management and prognostic challenge due to the primary or secondary involvement of hard and/or soft tissues in any combination of dimensions. The effective treatment of hard tissues brings about the dramatic improvement in facial esthetics as soft tissues generally follow underlying bones; else, isolated soft tissue deformities seen in hemifacial microsomia are usually corrected during or after skeletal correction.[6]

The classification of skeletal asymmetries (resulting from unilateral excessive mandibular growth), as either hemimandibular elongation type or hemimandibular hyperplasia type, is pertinent in determining the preoperative orthodontic tooth movements and type of orthognathic surgery required.[5,7] Since hemimandibular hyperplasia deformity (characterized by diffuse 3-dimensional enlargement of one half of the entire mandible) begins before puberty, develops slowly and commonly exhibits latent or continued growth, maxilla is usually involved secondary to mandible with extreme dentoalveolar compensations. Bimaxillary surgery is usually indicated in these patients. On the contrary, hemimandibular elongation caused by rapid horizontal elongation mainly of the mandibular body usually starts during puberty or shortly afterwards with minimal involvement of maxilla and slight dentoalveolar compensations due to rapid growth. However, both the deformities may occur in pure and mixed forms. Milder asymmetries can be treated with isolated mandibular surgery in conjunction with inferior border osteotomy.

The aspect of growth and development should be taken into consideration during treatment planning. Accordingly, the planning and extent of surgical correction should be customized, considering the need for secondary surgery at a later age. In cases of developmental facial asymmetry, surgical treatment is usually delayed until completion of facial growth, particularly if maxillary surgery is required.

2.1. Facial asymmetry and TMJ involvement

It has been reported that the presence of temporomandibular disorder(TMD) symptoms such as joint sounds, pain and articular disk displacement is higher in patients exhibiting skeletal Class III malocclusions due to mandibular prognathism with associated facial asymmetry.[8]

Nonsurgical TMJ treatment involving use of splints, physiotherapy, chiropratic treatment, orthodontics and medication helps in alleviation of TMJ symptoms, but without stabilization and elimination of TMJ pathologies. Hence, surgical management of TMJ pathology in facial asymmetries is mandatory to achieve predictable, stable, functional, esthetic and pain free treatment outcomes. However, stable and unchanging facial asymmetry with no evidence of TMJ pathology or symptoms is amenable to correction by orthognathic surgery without TMJ surgery.[9]

Differences in consensus do exist with regards to age-based treatment planning as condylar growth usually persist until 18–23 years of age. In cases of unilateral condylar hyperplasia, primary goal of treatment is rapid elimination of pathologically active unilateral condylar process as soon as possible in the treatment sequence to preclude worsening of the asymmetric dentofacial deformity. Unilateral high condylectomy and repositioning the articular disk using Mitek-anchor technique at 15 years of age in girls and 17 years in boys yield predictable results in arresting the hyperplastic condition on the condylar hyperplasia side.[9]

2.2. Hemifacial (Craniofacial) microsomia

Due to varied clinical presentations with different degrees of mandibular deformation on the affected side as observed in hemifacial microsomia, the type and timing of treatment depends on the degree of deformation and the philosophy of treatment. Provision of early treatment in hemifacial microsomia is aimed at optimizing facial growth and consequently minimizing secondary asymmetric development of maxilla and canting of occlusal plane. Different early treatment (at 5–7 years) modalities involve reconstruction of missing elements of the proximal parts of mandible using distraction osteogenesis(DO), reconstruction of the condyle by placement of costochondral rib graft to correct the vertical and anteroposterior dimensions, and use of asymmetric functional activator after surgery to simulate jaw function and soft tissue development, and minimize maxillary canting.[10] At later age (during adolescence and late teens), definitive orthognathic surgery and soft tissue augmentation surgery are performed as two-step procedures.

2.3. "Two-patient" concept in planning orthognathic surgery[11]

A versatile tool envisaging the concept of goal-oriented therapy involves two integral components: (1) feasibility model surgery performed in consistence with the planned surgical procedure, irrespective of the occlusion so reproduced, before initiation of orthodontic treatment, and (2) cephalometric prediction tracing done using template or tracing overlay method, demonstrating the effects of surgery prior to any orthodontic tooth movement. Both these records are viewed as a "second patient": one who manifests the results of indicated surgery prior to initiation of active orthodontic treatment. It can help determine the goals of presurgical orthodontic treatment, the orthodontic-surgical sequencing and need for adjunctive surgical procedures.

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