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Management of Facial Asymmetry with Maxillomandibular Distraction Osteogenesis – A Case Report

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Abstract
Facial asymmetry may result as a consequence of congenital defects, as part of a spectrum of syndromes or may result due to progressive wasting disorders. Both hard and soft tissue deficits or overgrowth may produce significant facial asymmetry which warrants treatment after arriving at a diagnosis comprising of patient's chief complaint and clinicians quantification. Maxillo-mandibular distraction is an important modality for treating facial asymmetry by bringing out both bony and hard tissue alteration and can thus be used satisfactorily in cases with no occlusal derangements. Though orthognathic surgery, orthomorphic surgery and other augmentation procedures can also be used however patients with minimal occlusal derangement benefit best with distraction procedures.

Keywords*: Asymmetry, Distraction, Occlusion, Hemifacialmicrosomia*

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I. Introduction

Human facial symmetry is an important determinant for overall facial attractiveness and expressions in psychology and anthropology.**[1]**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.**[2]** While asymmetry can have both syndromic or non syndromic associations, they generally are not perceptible till clinically quantifiable with specific facial region involvement alongwith clinician's sense of balance and the patient's perception of deviation from the same**[3].**

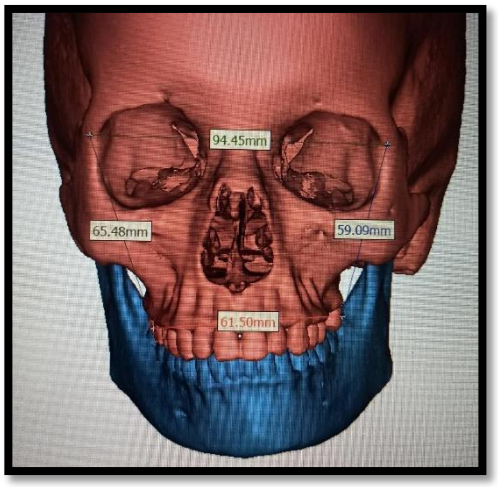
It may or may not be associated with occlusal derangement which is the guiding factor for the interventional modality to correct facial asymmetry. The present case report is a description of surgical correction of facial asymmetry secondary to HemifacialMicrosomia with stable occlusion

II. Case Report

A 25 year old female patient reported to the department of Oral and Maxillofacial Surgery which is a tertiary care maxillofacial facility at Army Dental Centre (R&R) with chief complaint of deviation of face towards left side. The patient did not have any contributory medical history,was well nourished, moderately built and oriented to time place and person. On specific maxillofacial examination of the patient, the frontal analysis was done using three reference planes i.e inter-pupillary line, inter lobular line and inter-tragal line which revealed progressive disharmony from upper, middle and lower third. The Mid sagittal reference was extended to the trichion which was deemed as the central reference. Perpendiculars dropped from the medial canthus to the canines bilaterally showed an occlusal canting of 6 degree. **[Figure-1]**

Fig- i)Pre-op frontal photograph with reference lines ,ii) Frontal photograph with cant

The intra-oral examinationrevealed Angle's Class-I molar relation on right side and missing 26.There were no abnormal hard and soft tissue findings. The patient was subjected to OPG and NCCT examination with axial, coronal and sagittal sections and 3D reconstruction.The DICOM data was fed into BLENDER 2.83 and MIMIC software for three dimensionalcephalometric analysis of underlying skeletal discrepancy.The data revealed a left maxillary hypoplasiaand differential length of left and right ramii(51mm and 58.7mm respectively).The patient was also evaluated by using GRUMMONS analysis, the inferred values of which were congruent with the software measured values as shown in figure 3 and table 1.



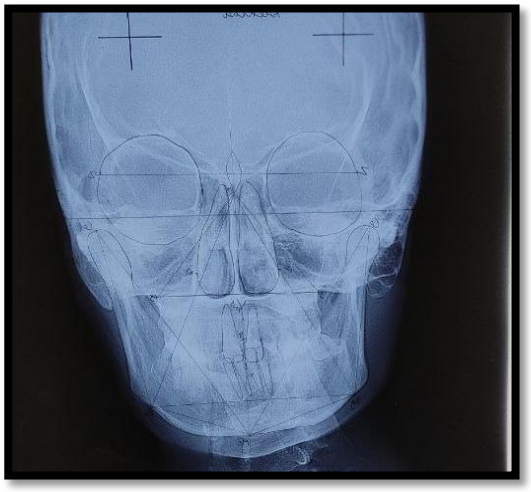


Fig -2-BLENDER software reconstruction Fig 3-Grummon's analysis

BLENDER SOFTWARE CEPHALOMETRIC VALUES		
S NO	**CEPHALOMETRIC REFERENCE**	**VALUE**
1	SNA	80 degree
2	SNB	77.5 degree
3	Mandibular plane angle(L)	41.8 degree
4	Mandibular plane angle(R)	44.4 degree
5	Anterior Lower facial height	52.8mm
6	Anterior upper facial height	52.5mm
7	VP-A	59.6mm
8	VP-B	51.1mm
9	VP-Me	42.6mm
10	VP-Pog	48.3mm
11	VP-Go(R)	7.7mm

12	S-GoR	84.5mm
13	S-GoL	80.5mm
14	Ramus length (L)	51mm
15	Ramus length(R)	58.7mm
16	Body length (R)	73.6mm
17	Body length (L)	73.8mm
18	FZ-Occlusal plane(R)	65.48mm
19	FZ-Occlusal plane(L)	59.09mm

Table-1 Cephalometric values on BLENDER 3D software

OMENS criterion **[4]**was applied for the purpose of ease of evaluation of various anatomic units.The midline deviation towards left was calculated to be 7mm from MSR(Mid sagittal reference) and cant of 6 degree.The maxillary discrepancy was 6.39mm with right side measuring 65.48mm and left side measuring 59.09mm.These calculations were inferred from the MIMIC software with reference points taken as bilateral Fronto-zygomatic suture and the maxillary occlusal plane. After calculation of the facial half asymmetry, the patient was diagnosed as a case of Left Hemifacialmicrosomia (Pruzansky type-I)and was planned for midline matching and cant correction without altering the occlusion by simultaneous maxilla-mandibular distraction as per Molina and Monasterio technique**[5].**The STL model was fabricated**[Figure-4]** and model surgery was performed to know the precise location of Le-fort I osteotomy and left horizontal mandibular ramus osteotomy cuts so as to facilitate precise distractor placement.

Fig 4-STL models for planning and mock surgery

The patient was taken up for Le-fort I osteotomy and maxilla was mobilized and hitched with 26 G SS wire on the right side so as to create a monobloc. Mandible was similarly exposed from intra-oral incision and horizontal osteotomy was performed and distractor placed**.[Figure-5]**

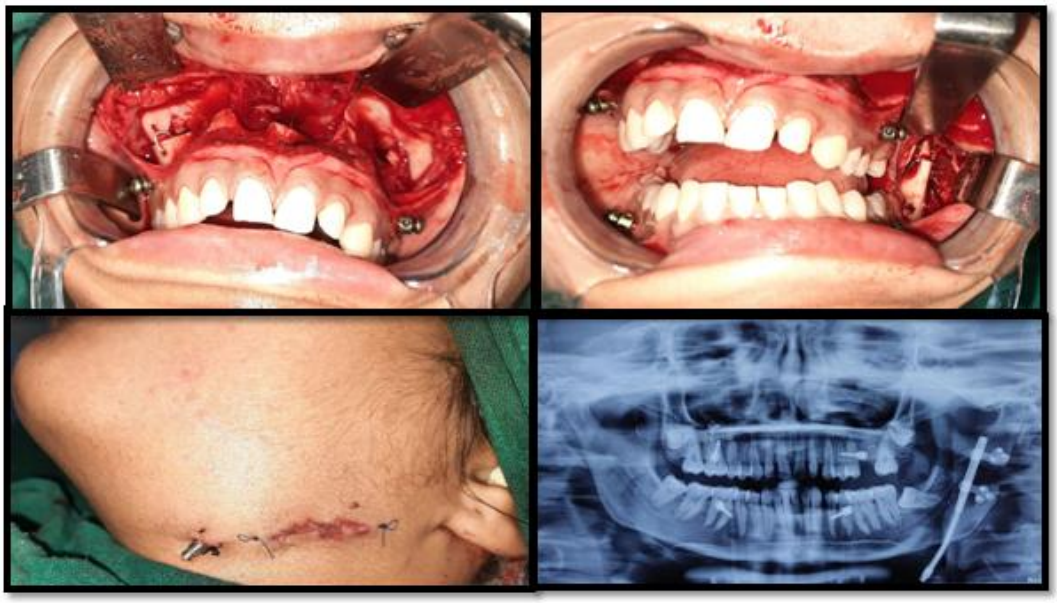


Fig-5- Intra-opphotographs showing osteotomy and distractor placement with post op OPG

After a latency period of 5 days the patient was taken up for distraction of 9mm inclusive of 2mm over-correction for relapse. Throughout the period of distraction the patient was kept in MMF and nutrition during the period of maxilla-mandibular fixation was maintainedthrough Ryle's tube. The post operative results with correction in values has been tabulated in table 2. Patient's frontal photograph comparison is shown in Figure-6

REFERENCE	PRE-OP	POST OP
Cant	6 degree	1 degree
Midline deviation	7mm to left	0mm
Occlusion	stable	stable
Ramus length (L)	51mm	58mm
Ramus length(R)	58.7mm	58.7mm
FZ-Occlusal plane(R)	65.48mm	65.48mm
FZ-Occlusal plane(L)	59.09mm	64mm

Table-2 Pre and post op comparison

Fig-6-i) Post op after completion of distraction,ii) Post op at 06 months with no cant

III. Discussion

Management of facial asymmetry often presents with a challenging clinical situations. Arriving at 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 inferred from the patient's chief complaint, extent of occlusal deformity and associated sagittal or vertical jaw imbalance and deviation from normal. Involvement of skeletal, dental and soft tissue components in the sagittal, vertical and transverse planes call for a comprehensiveortho-surgical intervention for attaining satisfactory results.**[6]**

Developing skeletal imbalances in growing individuals can be corrected by use oforthopaedic appliances alongwithorthodontic treatment but unpredictability of the results of growth modification treatment with functional appliances in pre-adolescent children warrants constant monitoring till completion of active growth phase.**[7]**

Severity and nature of the skeletal asymmetry is the deciding factor for partial or complete resolution of skeletal discrepancy through orthodontic treatment.In patients having mild skeletal problems with nonsurgical plan of treatment, it is necessary to maintain the compensations and asymmetry of the axial inclinations of the teeth to prevent the development of crossbite. However, skeletal asymmetries corrected by orthodontics alone approach cannot be completely eliminated and thus, the resulting sub-optimal outcome should be explained to the patient prior to initiation of treatment.**[8]**

Complex facial asymmetry is often faced with management and prognostic challenge due to the primary or secondary involvement of hard and/or soft tissues in any combination of transverse, horizontal and vertical dimensions. The correction of hard tissues deficits improves facial esthetics as soft tissues generally follow underlying skeleton; else, isolated soft tissue deformities seen in hemifacialmicrosomia are usually corrected during or after skeletal framework correction**[9]** The same is the guiding principle for asymmetry correction in patients with no occlusal discrepancy.

Hard tissue augmentation using the distraction osteogenesis results in associated histiogenesis while effecting in asymmetry correction. Distraction osteogenesis (DO) is a dynamic process facilitating the three-dimensional correction of asymmetric hypoplasticdentofacial deformities (hemifacialmicrosomia, mandibular hypoplasia, condylar hypoplasia).The beneficial effects of the distraction forces on the surrounding soft tissues (distraction histiogenesis) are visualized in the form of soft tissue redraping along the newly constructed and corrected facial skeleton base.**[10]**Accurate placement of an osteotomy, vector planning, distraction device selection and placement and consideration of the effects of the masticatory muscles and surrounding soft tissues that may deviate the tooth bearing segment toward an unexpected position are multiple factors influencing the precision and predictability of the results of the technique.Molina and monasteria advocated simultaneous maxillomandibular distraction to move the segment as a monobloc and has clinically satisfying results as was evident in our case.

IV. Conclusion

Meticulous and precise treatment planning considerations involving the surgeon and orthodontist are crucial factors that influence the predictability of the desired outcome. While a plethora of options like ortho-morphic surgery,alloplastic augmentation with onlays and simple surgical recontouring in overgrowth cases can be used, distraction osteogenesis provides promising results in cases with minimal to no occlusal discrepancy but with clinically quantifiable asymmetry.

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