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Fixed Mandibular Growth Modification Appliance Treatment: A 3-D Analysis of the Hard Tissues Changes

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Introduction

Fixed Lingual Mandibular Growth Modification Appliance (FLMGMA) is a novel Class II functional appliance, designed by Dr. Al-ali and its effects are presented in the case report by 3D cone beam CT data.

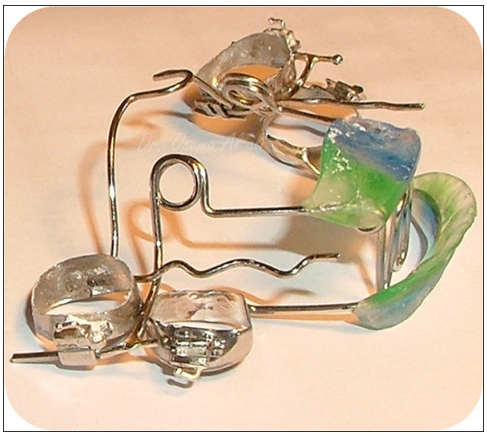

Fig. 1: FLMGMA

Case Details

A 12.7 year old female presented with a Cl II skeletal pattern with a mildly increased vertical relationship (Table 1). The patient was in the "MP3cap" maturation stage.[1] The treatment aim was to stimulate mandibular forward growth to correct the underlying skeletal discrepancy. This would be followed by fixed appliance treatment on a non-extraction basis.

Fig. 2a: Initial

Fig. 2b: Initial

Fig. 2c: Initial

Fig. 2d: Initial

Fig. 2e: Initial

Fig. 3a: Beginning

Fig. 3b: Beginning

Fig. 3c: Beginning

Fig. 3d: Beginning

Fig. 3e: Beginning

Fig. 4a: After 8 Months

Fig. 4b: After 8 Months

Fig. 4c: After 8 Months

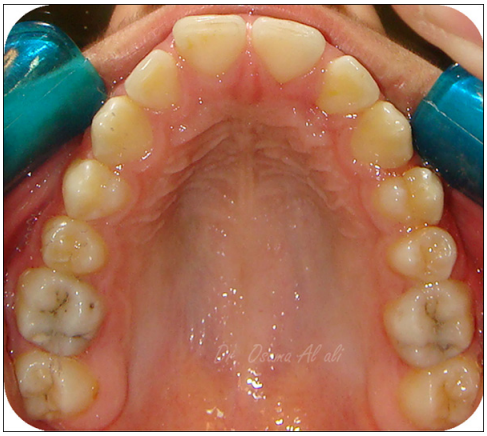

Fig. 4d: After 8 Months

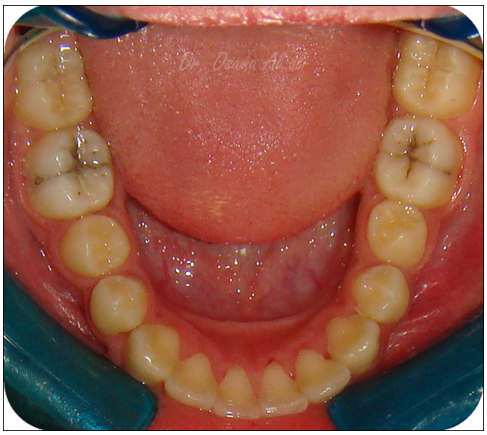

Fig. 4e: After 8 Months

Observation

The FLMGMA in this single patient encouraged forward mandibular growth (SNB), increased total mandibular length and distal movement of the upper dentition in the A-P direction. There was a negligible change in the vertical dimension both skeletally and dentally, (Table 1). 3D Images and Analysis were created using InVivo 5 Dental software (trademark of Anatomage Inc., 111 N. Market St. #800, San Jose, Calif, CA 95113).

Fig. 5a: Initial

Fig. 5b: Initial

Fig. 5c: Initial

Fig. 5d: Initial

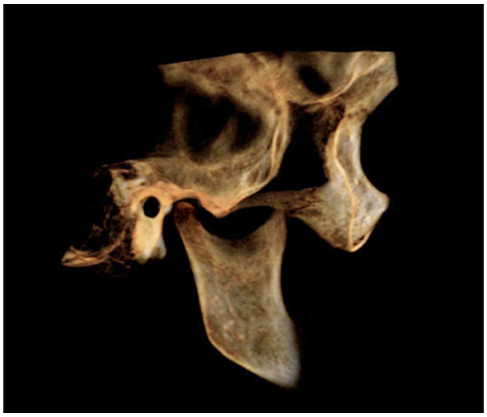

Fig. 5e: Initial

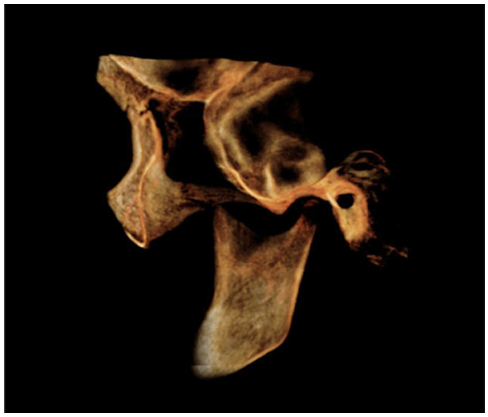

Fig. 5f: Initial

Fig. 6a: After 8 Months

Fig. 6b: After 8 Months

Fig. 6c: After 8 Months

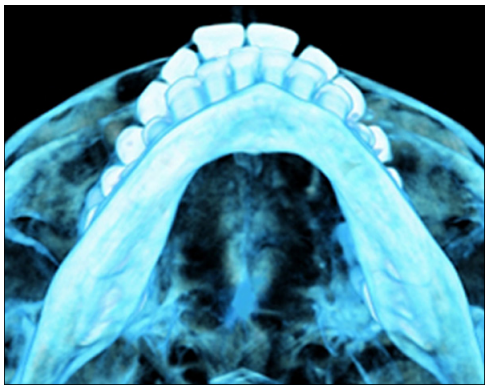

Fig. 6d: After 8 Months

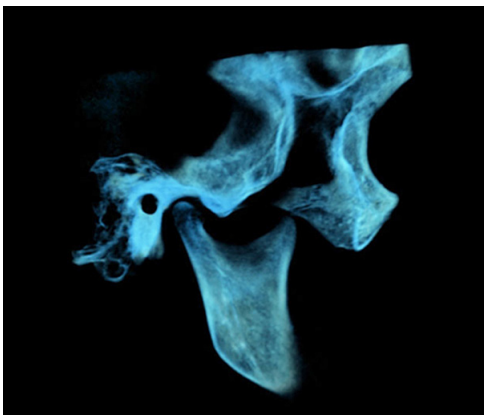

Fig. 6e: After 8 Months

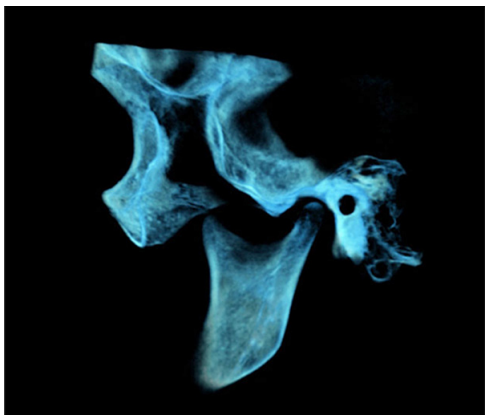

Fig. 6f: After 8 Months

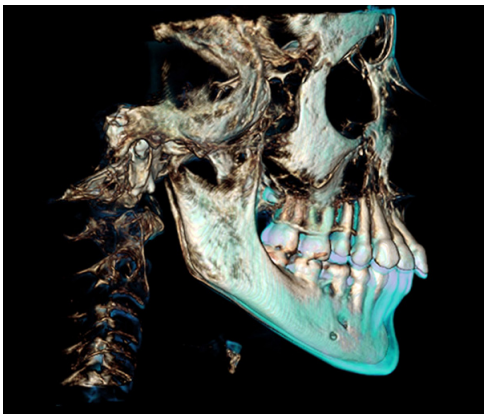

Fig. 7a: 3D Superimposition

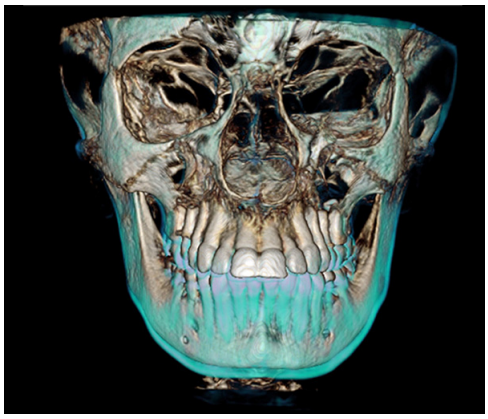

Fig. 7b: 3D Superimposition

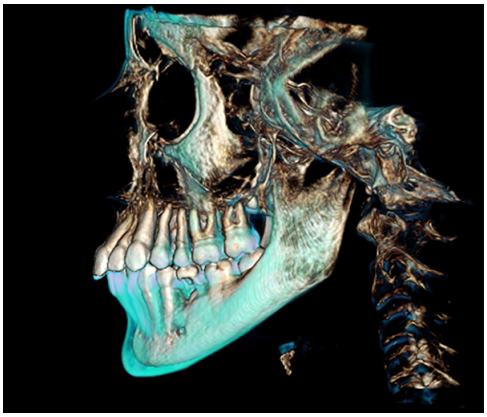

Fig. 7c: 3D Superimposition

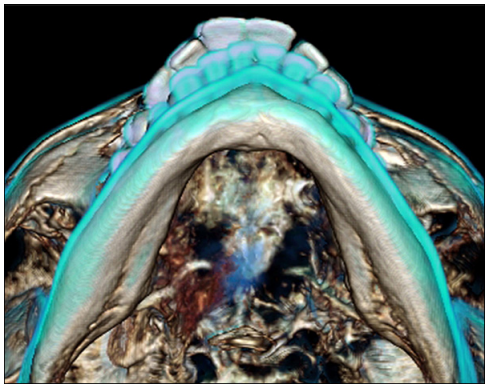

Fig. 7d: 3D Superimposition

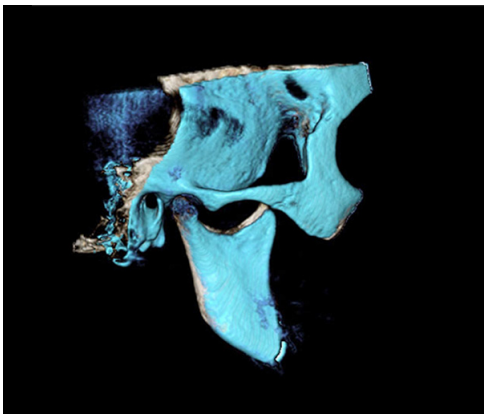

Fig. 7e: 3D Superimposition

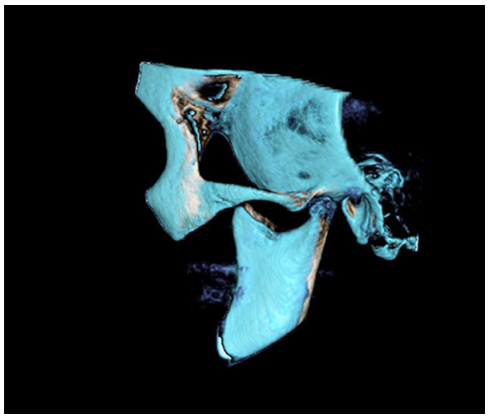

Fig. 7f: 3D Superimposition

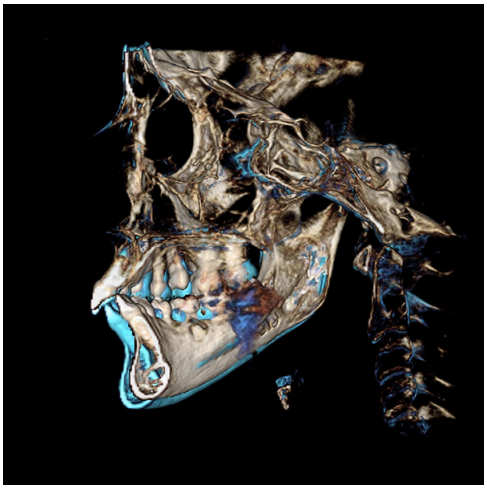

Fig. 8a: 3-D Cephalometric Superimposition / Cutaway view

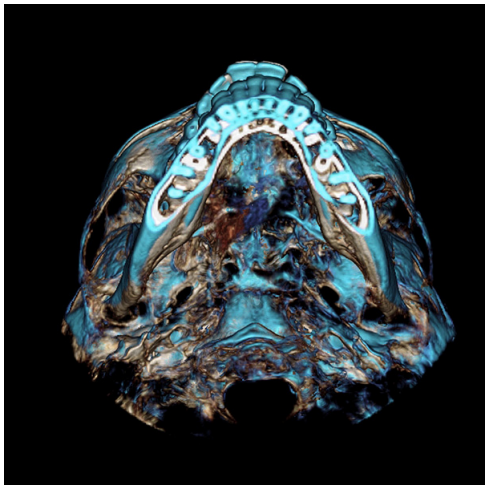

Fig. 8b: 3-D Cephalometric Superimposition / Cutaway view

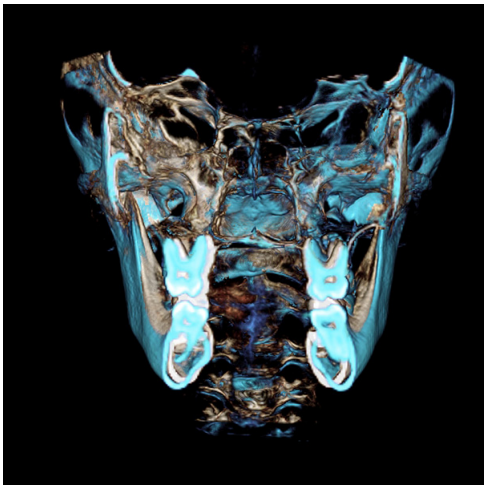

Fig. 8c: 3-D Cephalometric Superimposition / Cutaway view

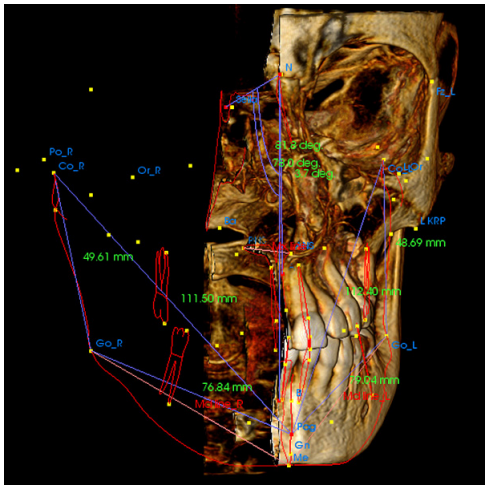

Fig. 9: 3-D Cephalometric Tracing

Anteroposterior Analysis

Skeletal		**before**	**after**
SNA	(°)	82,5	81,8
SNB	(°)	75,8	78,0
ANB	(°)	6,7	3,8
Wits appraisal	(mm)	5,2	1,0
Mx Length	(mm)	54,2	54,0
R Md Total Length	(mm)	109,2	111,5
L Md Total Length	(mm)	108,3	112,4
R Md Body Length	(mm)	76,7	76,8
L Md Body Length	(mm)	78,1	78,5
Dental		**before**	**after**
Overjet	(mm)	8,6	4,2
U1 Sagit Inclination	(°)	117,9	115,4
L1 Sagit Inclination	(°)	99,6	95,9
U6 Sagit Inclination	(°)	83,4	74,2
U6 Sagit Position	(mm)	0,2	2,5
L6 Sagit Inclination	(°)	77,2	76,3
L6 Sagit Position	(mm)	36,3	34,3
Vertical Analysis			
Skeletal		**before**	**after**
Mx Sagit Line Ang	(°)	7,6	9,9
R Md Sag Line Ang	(°)	36,3	38,0
L Md Sag Line Ang	(°)	37,0	39,3
R Gonial Ang	(°)	131,8	134,7
L Gonial Ang	(°)	131,5	133,9
Me(z)	(mm)	102,3	105,8
R Go(z)	(mm)	75,5	78,3
L Go(z)	(mm)	73,9	76,1
R Md Ramal Height	(mm)	47,5	49,6
L Md Ramal Height	(mm)	45,4	49,2
Low Fac Height	(mm)	59,0	60,2
Dental		**before**	**after**
Overbite	(mm)	4,2	2,7
U1 Ver Develop	(mm)	25,7	26,1
U6 Ver Develop	(mm)	20,2	19,1
L1 Ver Develop	(mm)	35,7	35,6
L6 Ver Develop	(mm)	23,3	23,2
Transversal Analysis			
Skeletal		**before**	**after**
Cranial Base Width	(mm)	92,0	94,0
Mx Base Width	(mm)	69,6	69,6
Md Base Width	(mm)	81,3	82,2
Dental		**before**	**after**
Mx 3-3 Crown Width	(mm)	37,0	38,4
Mx 3-3 Root Width	(mm)	23,6	24,8
Md 3-3 Crown Width	(mm)	29,8	28,6
Md 3-3 Root Width	(mm)	20,4	22,9
Mx 6-6 Crown Width	(mm)	52,0	55,0
Mx 6-6 Root Width	(mm)	52,0	55,2
Md 6-6 Crown Width	(mm)	46,8	47,3
Md 6-6 Root Width	(mm)	55,3	56,9

Tab. 1: Three Dimensional Cephalometric Analysis (According to Cho, 2009)[2]

Conclusion

The FLMGMA is aesthetic, cost effective to produce and clinically easy to handle. It is efficient, 8 months treatment time in this patient, and may produce favorable skeletal and dental changes. The FLMGMA needs further clinical evaluation to provide robust clinical evidence for its routine use including the use of a control group.

Literature

1. Uysal T, Ramoglu S I, Basciftci F A, Sari Z. Chronologic age and skeletal maturation of the cervical vertebrae and hand-wrist: Is there a relationship? Am J Orthod Dentofacial Orthop 2006;130:622-8
2. Cho H J. A Three-Dimensional Cephalometric Analysis. J Clin Orthod 2009;43(4):235-252.

Abbreviations

FLMGMA: Fixed Lingual Mandibular Growth Modification Appliance
3D: three dimensional
"MP3cap": Skeletal maturation stage, evaluated on hand X-ray radiographs according to the method of Björk, and Grave and Brown.[1]
A-P direction: anterio-posterior direction
Cone Beam CT: Cone Beam Computed Tomography

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Poster Faksimile: