



Four miniscrews placement in the palate by a 3D surgical guide for maxillary expansion

A. Carlucci, L. Lombardo, G. Maino, E. Paoletto, G. Siciliani

Introduction

Numerous studies have shown the effectiveness of the use of miniplates placed in different locations within the maxilla in the clinical treatment of class III patients¹. The aim of this study was to describe the case report of a 23 years old woman with class III malocclusion and bilateral cross bite (Fig.1) treated with a maxillary rapid expander with four miniscrews positioned with the aid of a digitally designed template.



Figure 1

Materials and Methods

CBCT and intraoral scan of dental arches has been performed (Fig.2,3). The STL file obtained with the scan has been superimposed on the CBCT (fig.4,5). The thickness of the palate were measured and four virtual miniscrews were positioned in the ideal position. A three-dimensional template was designed with a precise cylindrical guide for any screw allowing its suitable location and the correct direction of insertion. The template was 3D-printed and used for the miniscrews placement (Two 11 mm miniscrews and two 9 mm miniscrews, 1.9 mm diameter body, Spider screw, Regular plus, Hdc). Then, a PVS impression of the upper arch was used for the creation of the expander (Fig.6). The protocol included two activations a day: one in the morning and one in the evening^{2,3} for 47 total activations (Fig.7).

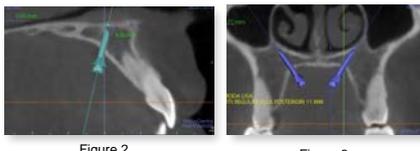


Figure 2

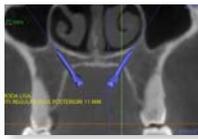


Figure 3

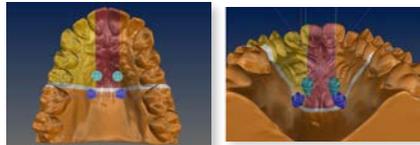


Figure 4

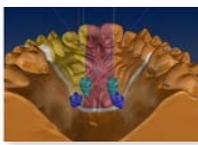


Figure 5

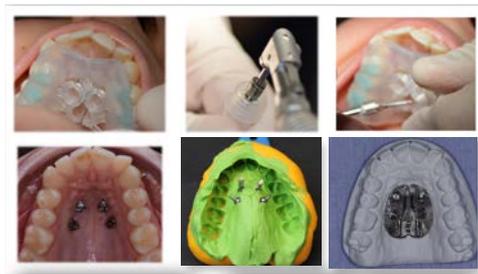


Figure 6



Figure 7

Results

The adult patient achieved a correction of the maxillary contraction in 24 days and bilaterally correction of the cross bite. (Fig.8)

Inter canine, premolar and inter molar width were digitally measured before and after the expansion using the superimpositions of the .stl maxillary arches. (Fig.9) Frontal cuts of the .stl files of the maxillary arches showed how the maxilla expansion occurred. No dental tipping and a little alveolar bending were observed. (Fig. 10)



Figure 8

Discussion

In the recent years Moon, Farret and Benitez⁶ reported positive results in non surgical adult maxillary expansion micro implants assisted. Our results were similar than the others reported by the authors.

Conclusions

Maxillary expander with skeletal anchorage designed with three-dimensional template has allowed a safe and precise insertion of the miniscrews improving the maxillary contraction in a young adult patient without the use of any invasive surgical techniques.

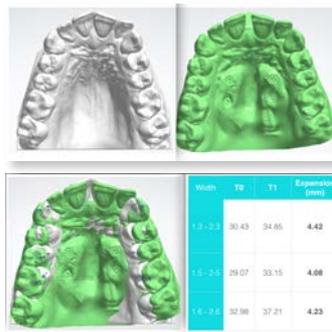


Figure 9

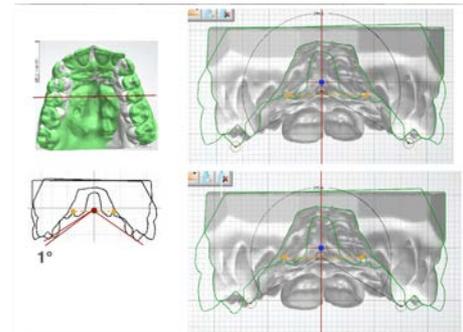


Figure 10

Bibliography

1 Kim KY, Bayome M, Park JH, Kim KB, Mo SS, Kook YA, et al. Displacement and stress distribution of the maxillofacial complex during maxillary protraction with buccal versus palatal plates: finite element analysis. Eur J Orthod. 2014. doi:10.1093/ejo/cju039.2 Liou EJ. Tooth borne maxillary protraction in Class III patients. J Clin Orthod. 2005;39:68-75.3 Liou EJ. Opening of Circumaxillary Sutures by Alternate Rapid Maxillary Expansions and Constrictions. Angle Orthodontist, Vol 79, No 2, 2009 4 Lombardo L, Gracco A, Zampini F, Stefanoni F, Mollica F. Optimal palatal configuration for miniscrew applications. Angle Orthod. 2010 Jan;80(1):145-52. 5 Gracco A, Lombardo L, Cozzani M, Siciliani G. Quantitative cone-beam computed tomography evaluation of palatal bone thickness for orthodontic miniscrew placement. Am J Orthod Dentofacial Orthop. 2008 Sep;134(3):361-9. 6 Farret MM, Benitez. Skeletal class III malocclusion treated using a non-surgical approach supplemented with mini-implants: a case report. J Orthod 2013;40:256-63.