

Anterior Open Bite Closure using Ortodontic Mini-Implants

Camelia Szuhaneck^{1*}, Adelina Popa¹

1. Faculty Of Dental Medicine, University Of Medicine And Pharmacy "Victor Babeş" Timișoara, România, Piața Eftimie Murgu nr. 2, Timișoara, România

Abstract

This case report describes the treatment of a dento-alveolar protrusion with anterior open bite. The 21-year old patient had a convex profile , class I dental malocclusion , anterior open bite of 4 mm and presented tongue thrust. The treatment plan was to insert two mini-implants for premolar intrusion along with the straight –wire fixed appliances. Tongue therapy was performed by myofunctional exercises. Using the absolute anchorage we were able to achieve our goals in a predictable manner without the use of orthognathic surgery or patient compliance . After the tongue thrust habit was removed we are confident that this is a stable result .

Corresponding Authors: Camelia Szuhaneck, Faculty Of Dental Medicine, University Of Medicine And Pharmacy "Victor Babeş" Timișoara, România, Piața Eftimie Murgu nr. 2, Timișoara, România,
Email: cameliaszuhaneck@umft.ro

Key words : mini-implants, absolute anchorage, open bite.

Received Oct 09, 2016;

Accepted Nov 02, 2016;

Published Nov 10, 2016;

Introduction

Orthodontic mini-implants are now widely used to provide absolute anchorage because of their versatility, minimal invasiveness and low cost.[1]

Difficult orthodontic cases, like molar intrusion, molar uprighting, anterior open bite treatment with molar intrusion, anterior deep bite treatment with incisal intrusion, leveling of transverse tipping of the occlusal plane, asymmetric expansion, space closure are corrected without the need of extraction, orthognathic surgery or patient compliance[3].

New mechanics based on absolute anchorage have expanded the variety of ortho-mecanotherapy. [4] The most important change is that it becomes possible to intrude posterior teeth bilaterally with mechanotherapy alone[5].

Diagnosis and Etiology

The patient, a 21-year old woman, had a convex profile, class I dental malocclusion, anterior open bite of 4 mm. She was a mouth breather and presented tongue thrust. Her chief complain was the anterior open bite.(Figure 1)



Figure 1. Pretreatment intraoral photography

The cephalometric analysis indicated that she had a skeletal class II profile, proclination of the maxillary central incisor, high mandibular plane angle that contributed to the class II skeletal relationship and increased lower facial height.



Figure 2. Pretreatment cephalometric film

The panoramic radiograph showed bilateral mandibular third molars. The level of alveolar bone crest was within the normal range. (Figure 3)

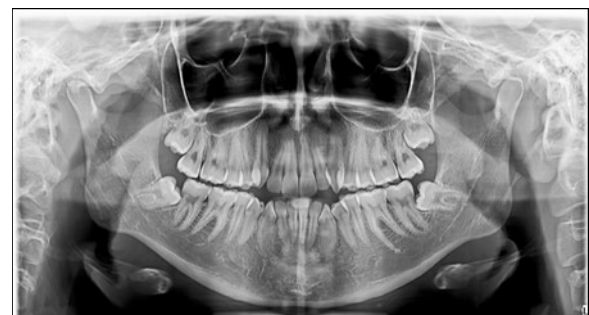


Figure 3. Pretreatment panoramic X-ray

Theories to explain the cause of anterior open bite: digital habits, airway obstruction, tongue posture, unfavourable growth, tongue thrust.[2]

The patient presented tongue thrust and mouth breathing. She was referred for myofunctional exercises for tongue thrusting before orthodontic mechanics began.

Treatment objectives

- To maintain class I molar and canine relationship with ideal overjet and overbite while maintaining facial esthetics
- Avoid extrusion of the molars and clockwise rotation of the mandible during treatment

- Close the anterior open bite

Treatment Options

Anterior open-bite treatment alternative:

1. Extrusion or eruption of anterior teeth. Several authors reported the side-effects of this orthodontic movement: root resorption, less stability and esthetics [7]
2. Intrusion of the lateral teeth- Studies reported different methods to intrude the posterior teeth (posterior bite blocks, high-pull headgear, mini-implants) [8]
3. Orthognathic surgical impaction of the posterior maxilla to allow the mandible to autorotate counter clockwise and close the bite.
4. Extraction of the first premolars in order to close the bite and reduce the overjet.
5. Surgical removal of all third molars was indicated before appliance removal.

The patient refused orthognathic surgery and premolar extractions and elected the less invasive orthodontic treatment.

After obtaining the informed consent the orthodontic treatment began and 0,22 Roth straight-wire fixed appliances were bonded. After leveling and aligning, during upper arch expansion, we took impressions and made intermediate study models. We noticed that palatal cusps of the upper premolars could not be intruded by classic mechanics. We decided to intrude first and second bicuspid to resolve the open bite. Skeletal anchorage was indicated and two orthodontic mini-implants were inserted on the palatal side between the premolars.

Procedure to Insert the Mini-Implants

Anesthesia of the implant site. Root parallelism and position was checked on the panoramic x-ray. The implant site was marked with a periodontal probe. The screw had 1,6 mm diameter and 8 mm length. Contra-

angle screw driver and the self-tapping method was used.

Anatomic Considerations

In the palatal area the soft tissue is thicker than in other areas [12]. It is important to measure the soft tissue thickness to determine the ideal length of the mini-implant.

Complications

Mini-implant failure arises from the possible complications: root/periodontal damage, damage to neurovascular tissues, mini-implant fracture, soft tissue problems, biomechanical side-effects. [14-17].

In this case the patient had no complications

Treatment

The optimal force for intrusion reported by several authors are: 20 g of force for the anterior teeth-Burstone [9], Gianelly and Goldman 15-50 g force [10]. For the molar intrusion, the initial force recommended by Umemori et al is 500 g [11], Melson and Fiorelly used 50 g buccolingually to intrude maxillary molars. [13]. Reitan and Rygh [6] reported that intrusion is more stable than extrusion

In this case the implants were loaded after one week with a 100-150 force using an elastic chain.

The intrusion rate obtained was 0,5-1 mm per month without root resorption or vitality problems.

Tongue therapy was performed.

Before the finishing stage, a panoramic x-ray was taken. The third molars were removed. (Figure 6)

Results

After treatment the patient had a normal overbite and overjet and a stable occlusion, a class I canine and molar relationship.



Figure 4. Intraoral photography at the start of the treatment.



Figure 5. Intraoral photography after the mini-implant activation



Figure 6. Panoramic X-ray before the removal of the third molars.

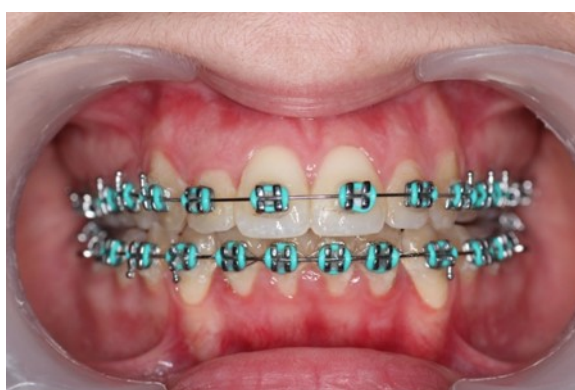


Figure 7. Clinical situation after intrusion with orthodontic implants.

Conclusion

Open bites can be closed without orthognathic surgery by using mini-implants as skeletal anchorage to intrude posterior teeth.

Good stability is expected with the intrusion of the lateral teeth and no extrusion of the anterior .

References

1. Costa, A.; Raffaini, M.; and Melsen, B.: Miniscrews as orthodontic anchorage: A preliminary report, *Int. J. Adult Orthod. Orthog. Surg.* 13:201-209, 1998.
2. Charles D. Alexander : Open bite, dental alveolar protrusion, Class I malocclusion: A successful treatment result ,*AJO-DO*. Vol116,Issue 5 , 494-500,1998
3. Young-Chel Park, Seung-Yeon Lee, Doo-Hyung Kim, Sung-Hoon Jee, Intrusion of posterior teeth using mini-screw implants, *AJO-DO*, vol 123 , Issue 6 , 690-694,2003
4. Keith H. Sherwood, James G. Burch, DDS, William J. Thompson, Closing anterior open bites by intruding molars with titanium miniplate anchorage, *AJO-DO*, vol 122,Issue 6, 593-600
5. Michael Edward Hiller, Nonsurgical correction of Class III open bite malocclusion in an adult patient , *AJO-DO* , vol 122, Issue 2, 210-216, 2002
6. Reitan K, Rygh P. Biomechanical principles and reactions. In:Graber TM, Vanarsdall RL, editors. *Orthodontics—current principles and techniques*. 2nd ed. St Louis: Mosby; 1994. p. 168-9.
7. Graber TM. *Orthodontics principles and practice*. 3rd ed. Philadelphia:W. B. Saunders; 1972. p. 448-527.
8. Iscan HN, Sarisoy L. Comparison of the effects of passive posterior bite-blocks with different construction bites on the craniofacial and dentoalveolar structures. *Am J OrthodDentofacialOrthop* 1997;112;171-8.
9. Burstone CR. Deep overbite correction by intrusion. *Am JOrthod* 1977;72:1-22.
10. Gianelly AA, Goldman HM. *Biologic basis of orthodontics*. Philadelphia: Lea and Febiger; 1971
11. Umemori M, Sugawara J, Mitani H, Nagasaka H, Kawamura H. Skeletal anchorage system for open-bite correction. *Am J OrthodDentofacialOrthop* 1999;115:166-74.
12. Popa A., Szuhaneck C., Brad S. - Accurate Determination for Orthodontic Mini-implant Placement Using Acrylic Resin Surgical Guide and CBCT. *Revista Materiale plastice*, vol. 53, nr. 2, 2016, Bucuresti. ISSN 0025-5289.
13. Melsen B, Fiorelli G. Upper molar intrusion. *J ClinOrthod* 1996;30:91-6.
14. Young-Chel Park, Seung-Yeon Lee, Doo-HyungKim,and Sung-HoonJee, Intrusion of posterior teeth using mini-screw implants*AJO-DO*, Vol. 123, Issue 6, p690–694 June 2003
15. Roberto Carrillo, Peter H. Buschang, Lynne A. Opperman, Pedro F. Franco, P. Emile RossouwSegmental intrusion with mini-screw implant anchorage: A radiographic evaluation.*AJO-DO*, Vol. 132, Issue 5, p576.e1–576.e6, 2007
16. Roberto Carrillo, P. Emile Rossouw, Pedro F. Franco, Lynne A. Opperman, Peter H. Buschang.Intrusion of multiradicular teeth and related root resorption with mini-screw implant anchorage: A radiographic evaluation. *AJO-DO*, Vol. 132, Issue 5, p647–655, 2007.
17. MuhsinÇifter, MüyesserSaraç, Maxillary posterior

intrusion mechanics with mini-implant anchorage
evaluated with the finite element method. AJO-DO,
Vol. 140, Issue 5, e233–e241, 2011