

THE MINI-SCREW FOR SKELETAL ANCHORAGE IN PRE-PROSTHETIC ORTHODONTICS

Davide Spadoni, DDS, MD

The mini-screw is an effective skeletal anchorage system for different types of tooth movement, especially in clinical situations involving incomplete dental arches and limited cooperation such as many typical adult orthodontic cases.

Mini-screw implants, often referred to as temporary anchorage devices (TADs), have become an accepted component of orthodontic treatment. The stability of the anchorage unit plays a very important role in orthodontic control.

Controlled orthodontic movements such as retraction and/or protraction of teeth, and intrusion of overerupted teeth are very difficult to achieve without patient cooperation, and without causing undesirable reciprocal movement in the anchorage unit.

The comparatively simple technique for the placement of these mini-screws is described with emphasis on the importance of correct site selection, as well as an understanding of the possible complications that may arise.

While the technique is of primary relevance to orthodontists, the use of mini-screws as an aid for pre-prosthetic tooth movement is also of relevance to prosthodontists. From the examples here, extrapolations can be made by individual clinicians to situations relevant to their particular treatment plans.

Introduction

Orthodontic movements such as canine and incisor retraction, molar protraction and intrusion of overerupted teeth require a suitable anchorage system to avoid undesirable anchorage loss.¹⁻³

Intrusion of molars is particularly difficult to achieve and unpredictable because these teeth have the largest periodontal support in the mouth⁴ and are located on the terminal part of the archwire, which is less efficient than the intermediate zone. The ability to control anchorage and patient compliance are critical factors that can influence the final outcome of treatment. The use of mini-screws as a component of pre-prosthetic tooth movement needs to be further explored, and in the context of multidisciplinary treatment plans, prosthodontists need to be made aware of this comparatively new tool available to orthodontists. From some of the examples described in this article, it is hoped that prosthodontists can extrapolate aspects relevant to their treatment protocols.⁵⁻⁸

With clinical examples, I will illustrate how both vertical and sagittal movements of the teeth can be achieved without patient cooperation and in “extreme” clinical situations.

Clinical case

A 68-year-old male presented with some missing teeth and wanted to replace them with implants, particularly in quadrant 2. Both upper first and second premolar left were missing, and the first molar left was tipped mesially. The patient refused the complete orthodontics

treatment and so I used a miniscrew between the canine and first molar to distalize the molar, and I blocked the canine to create the correct space to drill two implants. Proper anchorage was provided by insertion of a Spider Screw in the buccal space between the maxillary left canine and left first molar. A .016" x .022" stainless-steel archwire was inserted, with one 200 grams (Figs. 1 & 2).

A Sentalloy open coil was compressed between the canine and first molars to upright the molar and reopen the space. A .012 metal ligature extending from the Spider Screw to the upper left canine provided stability of the Class I canine relationship against the compressed open-coil reaction force. In four months I obtained the correct space so the surgeon could

drill the two implants (Fig. 3). After two months I could load the implants with Zirconia crowns (Figs. 4-7).

Conclusion

The mini-screw is an effective skeletal anchorage system for different types of tooth movement, especially in clinical situations involving incomplete dental arches and limited cooperation, such as with many typical adult orthodontic cases. Their utilization involves a simple biomechanical principle combined with the utilization of minimum orthodontic mechanotherapy. Because of the screw's immediate loading capability, we can achieve a significant reduction of treatment time and patient satisfaction as well. Surgical placement and removal of the

screws are easy to perform, and the use of the most appropriate screw in relation to the anatomy of different sites of insertion minimizes the risk of possible failures.

References

1. Weinstein S, Haak DC, Morris LY, Snyder BB, Attaway HE. One equilibrium theory of tooth position. *Angle Orthod* 1963;33:1-26.
2. Pilon JJ, Kuijpers-Jagtman AM, Maltha JC. Magnitude of orthodontic forces and rate of bodily tooth movement. An experimental study. *Am J Orthod Dentofacial Orthop* 1996 Jun;110(1):16-23.
3. Fogel MS. A cephalometric assessment of prepared mandibular anchorage. *Am J Orthod* 1957;43:511-36.
4. Unemori M, Sugawara J, Mitani H, Nagasaka H, Kawamura H. Skeletal anchorage system for open-bite correction. *Am J Orthod Dentofacial Orthop* 1999 Feb;115(2):166-74.
5. Roberts WE, Nelson CL, Goodacre CJ. Rigid implant anchorage to close a mandibular first molar extraction site. *J Clin Orthod* 1994 Dec;28(12):693-704.
6. Kanomi R. Mini-implant for orthodontic anchorage. *J Clin Orthod* 1997 Nov;31(11):763-7.
7. Melsen B, Verna C. A rational approach to orthodontic anchorage. *Prog in Orthod* 2000 Fall;1(10):10-22.
8. Higuchi KW, Slack JM. The use of titanium fixtures for intra-oral anchorage to facilitate orthodontic tooth movement. *Int J Oral Maxillofac Implants* 1991 Fall;6(3):388-44.



Initial orthodontic treatment



Miniscrew and 0.16 X 0.22 archwire with open-coil spring



Insertion of two implants and Rx checking.



Insertion of abutments



Two zirconia crowns



Two zirconia crowns



Two zirconia crowns

Author Bio



Davide Spadoni graduates in dentistry in 2003 at University of Parma and specialist in orthodontics at University of Cagliari in 2012. I attended Cozzani's office for 10 years and did research in University of Parma from 2002 at 2012 about miniscrews. I spoke regularly to international audiences about miniscrews and digital models. My private practice is in Italy at La Spezia and Parma and deal only orthodontics.