Assessment of clinical success of mini-screw implants for orthodontic treatment

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ABSTRACT

Background: The present study was conducted for assessing the clinical outcome of mini-screw implants for orthodontic treatment.

Materials & methods: A total of 20 patients scheduled to undergo orthodontic treatment were enrolled. Complete demographic details of all the patients were obtained. Clinical evaluation of all the was done. Treatment planning was done. Baseline hemodynamic variables were evaluated in all the patients. Mini-screw dental implants were placed in all the patients. Prognosis of mini-screw implants was evaluated in all the patients by assessing the radiographs.

Results: Out of 20 patients, radiographic and clinical success of dental mini-screw implants was seen in 19 patients. Only one case showed failure with infection.

Conclusion: Orthodontic mini-screw dental implants are associated with excellent prognosis.

Key words: Mini-screw, Orthodontic

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INTRODUCTION

Adequate anchorage is considered fundamental for successful orthodontic regulation and is defined as the resistance to unwanted tooth movement. Extraoral fixation and traction can be provided by means of the occipital and cervical headgear, but they demand exceptional patient's cooperation and compliance is often difficult to achieve. Dental implants were introduced in the 1980s to provide intraoral rigid fixation of orthodontic appliances. They are practical when the patient cannot wear the extraoral devices ideally because they hamper aesthetics or social function, or when noncompliance is likely.[1-3]Osseointegrated dental implants are useful as rigidly connected osseous anchorage units because they lack a periodontal ligament and they do not move when forces are applied. If properly planned, they can be incorporated in fixed prosthetic rehabilitations once the orthodontic tooth regulation is finished. The need for further restoration can be an unwanted side effect because it prolongs the overall treatment time and involves higher financial costs. To overcome these disadvantages, implants were inserted in the anterior region of the palate. This is a rather simple surgical procedure accomplished with a flapless procedure. An alternative treatment is the installation of a titanium mini-plate fixed with three mini-screws on the interior border of the zygomatico-maxillary buttress between the first and second molars.[4-6]Hence; the present study was conducted for assessing the clinical outcome of mini-screw implants for orthodontic treatment.

MATERIALS & METHODS

The present study was conducted for assessing the clinical outcome of mini-screw implants for orthodontic treatment. A total of 20 patients scheduled to undergo orthodontic treatment were enrolled. Complete demographic details of all the patients were obtained. Clinical evaluation of all the was done. Treatment planning was done. Baseline hemodynamic variables were evaluated in all the patients. Mini-screw dental implants were placed in all the patients. Prognosis of mini-screw implants was evaluated in all the patients by assessing the radiographs. All the results were recorded and analysed by SPSS software.

RESULTS

Mean age of the patients was 19.2 years. Majority proportion of patients of the present study were males. Radiographic evaluation of all the patients was done. Out of 20 patients, radiographic and clinical success of dental mini-screw implants was seen in 19 patients. Only one case showed failure with infection.

Table 1: Prognosis

Prognosis	Number	Percentage
Success	19	95
Failure	1	5
Total	20	100

DISCUSSION

The resistance to undesirable maxillary mesial molar movement while closing maxillary arch spaces after extraction of the first or second premolars is a key element of anchorage control and is obviously crucial for optimal treatment results. Successful treatment of an adult with a full Class II malocclusion and maxillary dentoalveolar protrusion necessitating closure of the extraction spaces entirely from the front (by retraction of anterior teeth only) requires maximum anchorage achievable with various methods. Extraoral appliances, although efficient in anchorage control, highly depend on the patient's compliance and are therefore considered a fallible form of anchorage control with variable levels of outcome. Moreover, they have been associated with isolated cases of facial injury. On the other hand, the effectiveness of intraoral appliances—eg, a Nance holding arch or transpalatal bar—has been questioned with prospective research alluding to limited benefits during active appliance therapy. [6- 9] Hence; the present study was conducted for assessing the clinical outcome of mini-screw implants for orthodontic treatment.

Mean age of the patients was 19.2 years. Majority proportion of patients of the present study were males. Radiographic evaluation of all the patients was done. Justens E et al evaluated clinical success and longevity of mini-screws during orthodontic treatment and to assess the patient's opinion. Fifty mini-screws were inserted in the mandible and maxilla of 21 patients with a flapless technique under local anesthesia. The patients were recalled after 2 weeks and from then on every other 2 months, and periodontal parameters and stability of the screws were evaluated at regular intervals. Patients received a questionnaire to assess their opinion regarding the treatment. Thirty-three mini-screws (64%) remained stable sufficiently long to obtain the effect during the orthodontic movement. The survival was comparable in mandible or maxilla, and not related to the orthodontic forces applied or time of activation of the load. The results do suggest that a waiting period of 1 week before loading improves success, and mini-screws inserted into the anterior region score better also compared to the posterior region. Initial periodontal parameters, which are very important in prognosis of orthodontic treatment, are not influencing the success rate in the examined group. Patients complained in 40-50% of the cases of pain during or after surgery, but this did not negatively affect the final general satisfaction with the treatment. The mini-screw implant is an easy and an inexpensive method for temporary anchorage of orthodontic appliances.[11]

Out of 20 patients, radiographic and clinical success of dental mini-screw implants was seen in 19 patients. Only one case showed failure with infection. Papadopoulos MA et al examined the clinical effectiveness of miniscrew implants (MI) used for anchorage reinforcement compared with that of conventional orthodontic means, as well as to assess the success rates of MIs and the possible risk factors affecting their clinical effectiveness. Literature searches were conducted, and, using specific inclusion and exclusion criteria, two independent investigators performed data extraction and analysis. Overall pooled estimates with 95% confidence intervals (CI) were obtained with the random-effects model. Eight out of 3183 original papers met the inclusion criteria. The mean difference of anchorage loss between the MI and conventional anchorage group was -2.4 mm (95% CI = -2.9 mm to -1.8 mm, p = 0). MIs significantly decreased or negated loss of anchorage. Anchorage loss seemed to be less in the mandible, when the MIs were inserted between the second premolar and the first molar, when 2 MIs were inserted per patient jaw, when they were directly connected, as well as when treatment lasted more than 12 months. MIs presented a success rate of 87.7%, with no significant differences between the various subgroups.[12]

CONCLUSION

Orthodontic mini-screw dental implants are associated with excellent prognosis. However; further studies are recommended.

REFERENCES

1. Albrektsson T, Zarb G, Worthington P, Eriksson A. The long-term efficacy used dental implants: a review and proposed criteria of success. Int J Oral Maxillofac Implants 1986; 1:11–25.
2. Kitai N, Yasuda Y, Takada K. A stent fabricated on a selectively colored stereolithographic model for placement of orthodontic mini-implants. Int J Adult OrthodonOrthognathSurg 2002; 17:264–266.
3. Wherbein H, Merz BR, Diedrich P. Palatal bone support for orthodontic implant anchorage–aclinical and radiological study. Eur J Orthod 1999; 21:65–70.

4. Tosun T, Keles A, Erverdi N. Method for the placement of palatal implants. Int J Oral Maxillofac Implants 2002; 17:95– 100.
5. Declerck H, Geerinckx V, Siciliano S. The zygoma anchorage system. J ClinOrthodont 2002; 36:455–459.
6. Weitz ML, Mukamal EO, Jurim A. An orthodontic device to capitalize on the rigid fixation of osseointegrated implants. Int J Periodontics Restorative Dent 1998; 18:241–247.
7. Kyung HM, Park HS, Bae SM, Sung JH, Kim IB. Development of orthodontic micro-implants for intra-oral anchorage. J ClinOrthod 2003; 37:321–328.
8. Huja S, Lisky A, Beck F, Johnson K, Larsen P. Pull-out strength of monocortical screws placed in the maxillae and mandibles of dogs. Am J OrthodDentofacialOrthop 2005; 127:307–313.
9. Kanomi R. Mini-implant for orthodontic anchorage. J ClinOrthod 1997; 31:763–767.
10. Motoyoshi M, Yano S, Tsuruoka T, Shimizu N. Biomechanical effect of abutment on stability of orthodontic miniimplant. A finite element analysis. Clin Oral Implants Res 2005; 16:480–485
11. Justens E, De Bruyn H. Clinical outcome of mini-screws used as orthodontic anchorage. Clin Implant Dent Relat Res. 2008 Sep;10(3):174-80.
12. Papadopoulos MA, Papageorgiou SN, Zogakis IP. Clinical effectiveness of orthodontic miniscrew implants: a meta-analysis. J Dent Res. 2011 Aug;90(8):969-76