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Assessment of Prognosis of Self-Drilling Orthodontic Mini-Implants: An Observational Study

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ABSTRACT

Background: Successful orthodontic therapy has always depended upon on intraoral anchorage with a great resistance to displacement. Hence; the present study was undertaken for assessing the prognosis of self-drilling orthodontic mini-implants.

Materials & methods: In the present study, 25 patients who underwent orthodontic treatment by orthodontic appliance in conjugation with orthodontic mini-screws were enrolled. Insertion of self-drilling mini-screws was done in all the patients (implant dimension: 1.6 mm X 8 mm). Only those cases of orthodontic implant were regarded as success when they provided a sound and ideal skeletal anchorage during the full phase of orthodontic treatment. Any implant showing signs of mobility during this phase were regarded as failure. All the results were recorded and assessed by SPSS software.

Results: In 84 percent of the cases, implant was placed in maxillary arch. In 56 percent of the cases, implant was placed on left side. In 52 percent of the cases, extrusion movement was type of orthodontic treatment. Success occurred in 84 percent of the cases.

Conclusion: Under the hands of skilled and experienced clinician, self-drilling orthodontic mini-implants had excellent prognosis.

Keywords: Orthodontic, Mini-implant.

INTRODUCTION

Successful orthodontic therapy has always depended upon on intraoral anchorage with a great resistance to displacement. The expanding demand for orthodontic therapy techniques that require minimal compliance and deliver maximal anchorage control, particularly for adults, has led to the expansion of implant technology in orthodontics.[1-3]

Osseointegrated implants are considered reliable sources of anchorage for orthodontists. However, the large size of these implants limits their usage. To overcome this problem, mini-implants were developed. Their advantages, in addition to size, include minimal anatomic limitations, minor surgery, increased patient comfort, immediate loading, and lower costs. Because these devices are used for specific time periods, mostly rely on mechanical retention, and do not always osseointegrate, other terms such as miniscrews, miniscrew implants, microscrews, and temporary

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anchorage devices have been used.[4- 6] Hence; the present study was undertaken for assessing the prognosis of self-drilling orthodontic mini-implants.

MATERIALS & METHODS

The present study was undertaken for assessing the prognosis of self-drilling orthodontic mini-implants. It was a retrospective analysis. In the present study, 25 patients who underwent orthodontic treatment by orthodontic appliance in conjugation with orthodontic mini-screws were enrolled. Insertion of self-drilling mini-screws was done in all the patients (implant dimension: 1.6 mm X 8 mm). Patients with positive history of diabetes, hypertension and smoking habit were enrolled. Only those cases of orthodontic implant were regarded as success when they provided a sound and ideal skeletal anchorage during the full phase of orthodontic treatment. Any implant showing signs of mobility during this phase were regarded as failure. Complete demographic and clinical data of all the patients was retrieved. Radiographs were also retrieved and radiographic examination was done. Pre-treatment, intra-treatment and post-treatment radiographs were analysed. All the results were recorded and assessed by SPSS software.

RESULTS

In the present study, a total of 25 patients were enrolled. Mean age of the patients was 22.8 years. There were 14 males and 11 females. In 84 percent of the cases, implant was placed in maxillary arch. In 56 percent of the cases, implant was placed on left side. In 52 percent of the cases, extrusion movement was type of orthodontic treatment. Success occurred in 84 percent of the cases.

Table 1: Demographic details

Parameter		Number of patients	Percentage of patients
Age group (years)	Less than 20	12	48
	More than 20	13	52
Gender	Males	14	56
	Females	11	44

Table 2: Clinical variables

Parameter		Number of patients	Percentage of patients
Screw location	Maxilla	21	84
	Mandible	4	16
Screw side	Left	14	56
	Right	11	44
Type of orthodontic treatment	Extrusion	13	52
	Intrusion	4	16
	Distalization	5	20
	Uprighting	3	12

Table 3: Prognosis

Prognosis	Number of patients	Percentage
Success	21	84
Failure	4	16

DISCUSSION

Many mini-implants are now available, and orthodontists are trying to incorporate them in various clinical situations. However, with the introduction of new techniques, questions normally arise. Clinicians desire information on actual success rates and possible adverse effects of mini-implants for orthodontic anchorage.[7] Primary stability is necessary for the miniscrews, because of immediate loading on them, and differs according to various patient, the design of the miniscrew, and clinical technique factors, also it is considered as clinical condition of mini-implant immobility and ability to resist loads in different directions.[8- 10]

To achieve initial stability, a certain level of maximum insertion torque is necessary. Studies with dental implants have shown that increases in peak insertion torque can reduce the amount of micromotion and improve their success. However, excessive stress to the bone can cause necrosis and local ischemia and might impede osseointegration and hence secondary stability. Such an association was also suggested in various clinical studies in the orthodontic literature. Animal studies have associated higher maximum insertion torque values and overtightening of orthodontic mini-implants with fractures of the cortical bone. The orthopedic

literature has shown that overtightening can damage and cause stripping of the bone, and this can lead to diminished holding strength with losses in pullout strength up to 40% to 50%. To control excessive stress during the insertion of orthodontic mini-implants, torque ratchets or torque sensors have been developed.[10- 12]

In the present study, a total of 25 patients were enrolled. Mean age of the patients was 22.8 years. There were 14 males and 11 females. In 84 percent of the cases, implant was placed in maxillary arch. Gurdan Z et al calculated the success and complication rates of orthodontic mini-implants. 59 orthodontic mini-implants were delivered during their orthodontic treatment in a 2-year period. The success rate of the orthodontic mini-implants was 89.8% in this study while the average loading period was 8.1 months. Soft-tissue infections varied between 6.3% and 33.3% of the cases while screw mobility varied between 3.1% and 20.8% of the cases regarding the anatomic localization. Screw mobility was significantly more frequent in the buccal fold than in the palate (P = 0.034). The overall success rate of mini-implants was found acceptable in their study, however, screw mobility in the buccal fold showed a high incidence, suggesting the thorough consideration of the immediate loading by buccal mini-implants.[11]

In the present study, in 56 percent of the cases, implant was placed on left side. In 52 percent of the cases, extrusion movement was type of orthodontic treatment. Success occurred in 84 percent of the cases. Garg KK et al evaluated the mobility of orthodontic miniscrews under orthodontic loading using computed tomography. Ten adult patients (7 females and 3 males with mean age of 19 years, 7 mm overjet) who required en masse retraction of upper and lower anterior teeth infirst premolar extraction spaces were included in this study. They concluded that to prevent hitting any vital organs because of miniscrew mobility, it is recommended that they can be placed in a nontooth-bearing area that has no foramen, major nerves, or blood vessel pathway, or in a tooth-bearing area allowing a 1.5 mm safety clearance between the miniscrew and dental root.[12]

CONCLUSION

Under the hands of skilled and experienced clinician, self-drilling orthodontic mini-implants had excellent prognosis.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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