

SUCCESS RATE AND PAIN PERCEPTION IN ORTHODONTIC PATIENTS RECEIVING BONE SCREWS FOR ANCHORAGE: A PILOT STUDY

¹AYESHA ANWAR, ²ULFAT BASHIR RAJA, ³SADIA NAUREEN

ABSTRACT

Anchorage enhancement through implants has received much consideration in the past decade. Recently small diameter orthodontic mini screws have been used to reinforce anchorage in orthodontic patients. Added discomfort may influence the patients decision to elect screws as alternatives to more conventional reinforcement systems. The purpose of this study was to evaluate the success rate, and pain anticipation before screw placement, and actual perception after placement based on a ten point Visual Analog Scale. 1.4mm diameter Biotech self tapping mini screws were placed in 11 patients selected for implants. Questionnaires were filled by patients on the first post operative appointment. Results showed that the success rate of mini screws was 86.36%. There was no significant difference between the level of pain anticipated and that actually perceived by patients. Conclusively, a large scale study may throw further light on the acceptability and success rate of Orthodontic mini screws.

Key words: Orthodontic mini screws, Dental Implants, Absolute anchorage.

INTRODUCTION

Traditionally, orthodontists have used teeth, intraoral and extra-oral appliances, to control anchorage — minimizing the movement of certain teeth, while completing the desired movements of other teeth. Based on Newton's third law of motion, anchorage units experience an equal and opposite force. Negation of this reactionary force has been the focus of biomechanical considerations in orthodontics. It is imperative to plan an anchorage modality before tooth movement is started lest, undesirable tooth movements render the orthodontic result a compromise.¹

Temporary anchorage devices (TADs) can be employed in cases where anchorage demand is high. TADs can either be biological like ankylosed or dilacerated tooth or biocompatible, like osseointegrated implants and mini screws.¹ One is not always fortunate to find the first category of TADs in a patient with such an indication. The second alternative is more practical.

Recently, great emphasis has been placed on the mini screw type of temporary anchorage device for orthodontic purposes and has been found to be adequate in most instances.² These devices are small, are implanted with a relatively simple surgical procedure,

and increase the potential for better orthodontic results.³

Orthodontic mini screws provide several benefits over the more conventional dental implants for anchorage in orthodontics. The commercially available in a range of sizes, are easy to place and remove, can be loaded immediately, are relatively inexpensive, unobtrusive and more acceptable to patients.¹

Procedural advances and miniaturization have led to a decrease in chair time and discomfort to the patient during mini screw placement. The procedure is done on an outpatient basis, under local anesthesia without sedation, usually taking no longer than ten minutes for placing one implant.

Although most patients do not find the added cost a problem, the prospect of added discomfort may alter their decision between an extra-oral appliance and mini screw for anchorage purposes.

Fear of pain is a problem because it contributes to patients' avoidance of orthodontic treatment.⁴ Most patients report pain and discomfort during orthodontic treatment.⁵⁻⁸ Because of the surgical procedure, many patients are also concerned about pain and discomfort after implantation. For patients, an appealing feature

¹ FCPS Part II Trainee, Orthodontics Department, Islamic International Dental Hospital, Islamabad, Pakistan

² Professor & Head of Orthodontics Department, Islamic International Dental Hospital, Islamabad, Pakistan

³ FCPS Part II Trainee, Orthodontics Department

Correspondence: Dr Ayesha Anwar, House 211, Aibak Road, Westridge 1, Rawalpindi. Email opal201@hotmail.com
Tel: 0345-5239683

of skeletal anchorage might be the minimal surgical invasion. However, there are few reports about postoperative pain and discomfort after implantation of orthodontic anchorage.

The aim of this study was to evaluate difference in pain expectation and the actual perception. This was a retrospective questionnaire based study.

METHODOLOGY

Our 11 subjects were orthodontic patients treated at the Islamic International Dental Hospital, June 2009 onwards. Of the 11, 8 were female and 3 boys. Their treatment plan called for absolute anchorage for various purposes. Only one patient required implants for intrusion of the buccal segments.

Prior to implantation all patients were explained the advantages, disadvantages and potential complications of the minor procedure, at their respective appointments. 10 of the 11 patients already had appliances in place.

We used Biotech 1.4mm diameter Self tapping mini screws. The screws were placed under local anesthesia, by various residents (trainees) under supervision. The location was determined radiographically using a metal stent and bite registration wax. No mucoperiosteal flap was raised and a pilot hole was drilled at the desired location with a 1 mm round bar and twist drill.

The 1.3 mm mini screws were then placed through the attached gingival under constant irrigation. The implants were driven 5-6 mm in bone, with 2mm of the implant head above the gingiva. Patients were requested to inform the operator, if any discomfort was felt during the procedure. Post surgically, implant position was verified through peri-apical radiographs. All implants were placed in the maxilla. (Fig 1)

The patients were called after 4 weeks for a routine visit, were requested to call in, if they experienced any discomfort. Two patients called in with complaints of minimal discomfort, which were managed through analgesics alone.

On the subsequent appointment the patients were given two sets of questionnaire with a ten point, 100m Visual Analog Scale. (Fig 1) Pain was rated from 0-10 anticipated before the procedure and the actual pain perceived during the procedure 0 being least and 10 the maximum pain felt.

Success rate was also evaluated based on absence of mobility, fracture or spontaneous dislodgement.

Descriptive statistics were calculated for age, gender and VAS at both T1 and T2. Paired-t test was

applied on the T1 and T2 scores for statistical significance, which was set at $p < 0.05$.

RESULTS

Of the 11 subjects 8(72.7%) were females and 3(27.3%) males. The mean age of the patients was 17.27 ± 3.5 years. The mean pre-insertion VA pain score at T1 was 5.18 ± 1.72 and at T2 were 5.4 ± 1.21 . Fig 2.

There was no significant difference between the anticipated and perceived pain rated according to the visual analog scale.

Two implants failed in the same patient, that were loaded on the day they were placed. The implants were replaced after a week at another location, mucosal swelling resulted and they were finally removed.

One implant fractured during placement. The fractured segment was retrieved and a new implant was inserted, healing was uneventful in this patient.

The total success rate of implants was thus 86.36%.

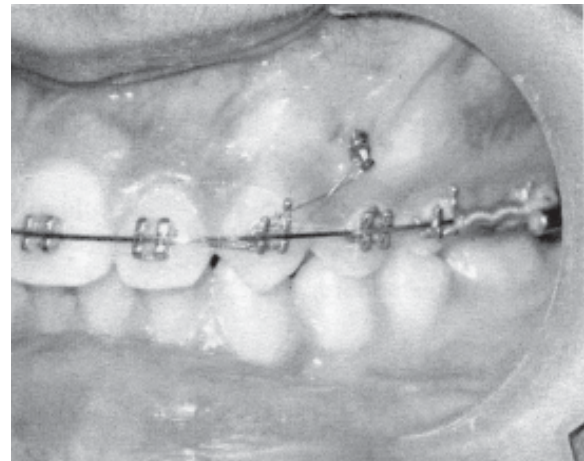


Fig 1: Self Tapping Screw in Place

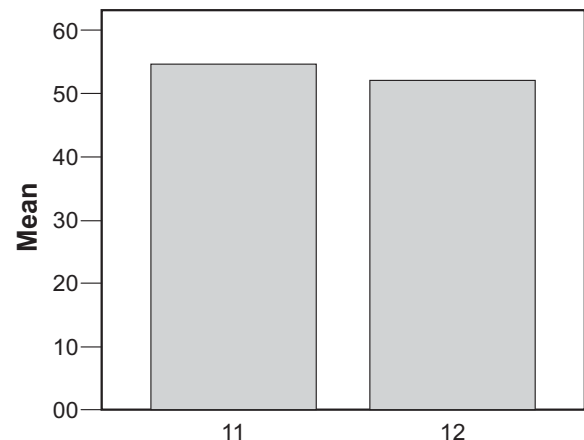


Fig 2: Mean VA Scores for T1 and T2

DISCUSSION

In this study biotech orthodontic mini screws with a diameter of 1.4mm and length ranging from 6-8mm were used. Our success rate with such implants was comparable to another study⁹ in which two types of anchorage systems, were used, one being 1.3 mm implants, their rate of success was 88.6%. The same author reported success rates of 85% when he used 1.5mm screws.

This success rate is comparable to that of mini-plates or longer large diameter screws. Small diameter screws can replace their larger counterparts for most orthodontics purposes, while taking less chair time, inventory and flap reflection is unnecessary.¹⁰

In the present study, we did not evaluate whether there could be a correlation between implant success and age, gender, region of implant placement, magnitude of force applied, the jaw that receives the implant or the length of the implant. These factors may be included in the larger scale study that we aim at.

Of the abovementioned factors, region of implant placement and jaw may be contributed factors in rates of success. Mandibular implants may show a higher rate of success owing to a greater bone implant contact than in maxilla. In the maxilla, palatally placed implants may survive better than buccal implants for the same reason.¹¹

As far as pain perception is concerned most patients anticipated and perceived moderate discomfort at the placement of orthodontic mini screws. Pain perception by a patient may be governed by multiple factors including past dental experiences.

Although statistically insignificant, patients felt less pain at the time of implant placement that they anticipated. Despite that fact, pain was graded more or less in the moderate category.

A higher anticipated pain score could be related to the fact that most patients were new to the concept of screws in orthodontic treatment. Fear of the unknown effect could have affected their anticipation of discomfort, despite the fact that enough time was spent to explain the procedure to the patients.

Few complications were encountered in this setup, however, the operator should be aware of some potential complications that can occur at every step. At insertion the screw may fail to reach primary stability due to poor bone contact or thick mucosa. Insertion into root may complicate the procedure and is revers-

ible, if the pulp is not damaged. During loading a frequent complication is loosening or mucosal hypertrophy. Loose screws should be replaced, whereas hypertrophy can be managed through oral hygiene measures, if infection is absent. During removal, failure of removal or fracture may occur. Surgical assistant may be of value in such cases.¹²

CONCLUSIONS

The preliminary pilot study suggests that orthodontic mini screws are a practical and reasonable alternative to more conventional anchorage enhancement techniques. Added discomfort is minimal and patient acceptance is good. There is a reasonable success rate, with few complications that are manageable in the orthodontic office. A large scale study will enable us to reach a statistically conclusive result.

REFERENCES

- 1 Cope JB. Temporary Anchorage Devices: A paradigm shift. *Semin Orthod* 2005; 11: 3-9.
- 2 Kuroda S, Katayama A, Takano-Yamamoto T. Severe anterior open-bite case treated using titanium screw anchorage. *Angle Orthod* 2004; 74: 558-67.
- 3 Park HS, Bae SM, Kyung HM, Sung JH. Micro-implant anchorage for treatment of skeletal Class I bialveolar protrusion. *J Clin Orthod* 2001; 35: 417-22.
- 4 Oliver RG, Knapman YM. Attitudes to orthodontic treatment. *Br J Orthod* 1985; 12: 179-88.
- 5 Bergius M, Berggren U, Kiliaridis S. Experience of pain during an orthodontic procedure. *Eur J Oral Sci* 2002; 110: 92-98.
- 6 Erdinc AM, Dincer B. Perception of pain during orthodontic treatment with fixed appliances. *Eur J Orthod* 2004; 26: 79-85.
- 7 Leavitt AH, King GJ, Ramsay DS, Jackson DL. A longitudinal evaluation of pulpal pain during orthodontic tooth movement. *Orthod Craniofac Res* 2002; 5: 29-37.
- 8 Firestone AR, Scheurer PA, Burgin WB. Patients' anticipation of pain and pain-related side effects, and their perception of pain as a result of orthodontic treatment with fixed appliances. *Eur J Orthod* 1999; 21: 387-96.
- 9 Kuroda S, Sugawara Y, Deguchi T, Kyung HM, Takano-Yamamoto T. Clinical use of mini screw implants as orthodontic anchorage: Success rates and postoperative discomfort. *Am J Orthod. Dentofacial Orthop* 2007; 131: 9-15.
- 10 Park HS, Bae SM, Kyung HM, Sung JH. Micro-implant anchorage for treatment of skeletal Class I bialveolar protrusion. *J Clin Orthod* 2001; 35: 417-22.
- 11 Deguchi T, Kanomi R, Garetto LP, Roberts WE, Takano-Yamamoto T. The use of miniature implants as orthodontic anchorage in dogs. *Orthod Waves* 2002; 61: 173-78.
- 12 Melsen B, Verna C. Mini screw Implant: The Aarhus Anchorages System. *Semin Orthod* 2005; 11: 24-31.