

Acceptance rate of palatal implants: A questionnaire study

Elif Gündüz, DDS, MSD,^a Thorsten T. Schneider-Del Savio, DDS, MSD,^b Gerhard Kucher, MD, DDS,^c Barbara Schneider, PhD,^d and Hans Peter Bantleon, MD, DDS, MS, PhD^e

Vienna and Klagenfurt, Austria

Implants have gained popularity in orthodontics because they facilitate maximum anchorage with minimum patient cooperation. However, some orthodontists avoid using implants because psychological aspects of the anchorage systems have not been fully reported. In this study, 85 patients who received orthodontic treatment with palatal implants in 2 clinics in Austria completed questionnaires. The results show that most patients got used to their implants in about 2 weeks; 95% were satisfied with the treatment, and 86% would recommend the treatment to other patients. In addition, 75% of the patients found the orthodontic construction between the anchor teeth and the palatal implant less comfortable than the implant itself, whereas 7% found the palatal implant less comfortable. Approximately 24 months of treatment with the palatal implant is tolerable for patients; this is the average orthodontic treatment time. (*Am J Orthod Dentofacial Orthop* 2004;126:623-6)

The use of endosseous implants as orthodontic anchorage units has grown in popularity because they can provide anchorage in challenging situations. Implants can be used either as direct anchorage units, when clinical forces are applied to the implant,¹⁻¹⁰ or as indirect anchorage units, when the forces are applied to dental units that are stabilized by the implants.¹¹⁻²⁶

Temporary implants can be placed midsagittally^{17,18, 21-23} or in the paramedian region^{19,20,26} of the hard palate of maxilla, in the cortical¹³ or alveolar^{4,12,14} bone of the mandibular molar area, bicortically in the premolar and molar area,¹⁵ and in zygomatic bone^{8,9} for both orthodontic and orthopedic corrections.

Bone height and anatomic structures in the implant region determine the shape, length, and thickness of temporary implants. Different sizes of endosseous implants, screws, and subperiosteal^{16,22} and bioresorbable^{24,25} implants are available. Despite recent improvements, the palatal implant (PI) is still not commonly used in most university clinics. In addition

to the laboratory and surgical expenses, a reason for the restraint might be apprehension about patient acceptance and tolerance of a PI. We could not find any articles in the literature reporting on the psychological aspects of such treatment.

This study had 3 major objectives: (1) to determine the physiological and psychological responses of the patients to PI, (2) to inform clinicians and future patients about treatment, and (3) to help in developing improved PIs.

MATERIAL AND METHODS

Eighty-five patients who had received orthodontic treatment with PIs at either of 2 clinics in Austria completed a questionnaire before the end of treatment. The mean age of the sample was 28 years (range, 10-59 years). Because an aim of the study was to determine the patients' psychological responses and their tolerance time to the PIs, all eligible patients in the clinics were included in the sample, irrespective of malocclusion type, biomechanics, operation technique, and type of PI. The only criterion used was that the PI had to be placed and loaded.

The questionnaire is given in the Figure. Response rates are in parentheses.

The data were analyzed with SPSS 9.0 for Windows (SPSS, Chicago, Ill). Frequencies for each answer to questions 1 through 11 were calculated for the number of subjects responding to each variable for the whole sample size. Ranges, standard deviations, means, and median values were calculated for questions 12 and 13.

^aResearcher, Department of Orthodontics, University of Vienna, Vienna, Austria.

^bPrivate practice, Kaiserslautern, Germany, and guest researcher, Department of Orthodontics, University of Vienna, Vienna, Austria.

^cPrivate practice, Klagenfurt, Austria.

^dProfessor, Institute for Statistics, University of Vienna, Vienna, Austria.

^eHead, Department of Orthodontics, University of Vienna, Vienna, Austria. Reprint requests to: Elif Gündüz, DDS, MSD, Department of Orthodontics, Vienna University, Waehringer Strasse 25a, A-1090 Vienna, Austria; e-mail, elifgunduz@web.de

Submitted, December 2003; revised and accepted, June 2004.

0889-5406/\$30.00

Copyright © 2004 by the American Association of Orthodontists.

doi:10.1016/j.ajodo.2004.06.031

1. What was your reaction when your orthodontist recommended a palatal implant?

- I was concerned and asked the advice of friends and family (16.40%)
 I contacted my general dentist (9.41%)
 I wanted to talk to the oral surgeon who would operate me (20%)
 I consented immediately, because I have full confidence in my orthodontist (60%)

2. Which questions did you ask your orthodontist when your PI treatment was recommended?

- What are the advantages of a PI in orthodontic treatment? (80.95%)
 How long will the operation take and how is the implant placed? (59.53%)
 How long will the PI remain in the palate? (57.14%)
 How large is the PI? (46.43%)

3. Would you like to see photos of PI and the operation before you consented?

- Yes (75.41%) No (24.59%)

4. Would you like to talk to other patients who already had a PI?

- Yes (73.91%) No (26.09%)

5. Would you like to talk to the surgeon who will operate on you, together with your orthodontist?

- Yes (60.87%) No (39.13%)

6. What was unpleasant for you during the operation?

- the injection (50.59%) the anaesthesia (8.24%) the pressure (14.12%)
 boring (23.81%) screwing the implant (8.24%) suturing the implant (2.35%)

7. Did the palatal implant have side effects?

- Injury of the tongue (12.94%) Difficulty in speaking (17.65%) Difficulty in chewing (11.76%)
 Difficulty in swallowing (8.24%) Difficulty in eating (12.94%) Psychological discomfort (7.06%)

8. Which made you feel more uncomfortable?

- the palatal implant (7.41%)
 the orthodontic construction between teeth and the implant (75.31%)
 neither (17.28%)

9. What was your sensation when an orthodontic strain was put on the palatal implant?

- pressure at the implant (25.30%)
 pain in the jawbone (1%)
 pain within the soft tissue around the implant (8.43%)
 slackening of the implant (8.43%)

10. Are you satisfied with the treatment so far?

- Yes (94.81%) No (5.19%)

11. Would you recommend it to other patients?

- Yes (86.08%) No (13.92%)

12. On which day did you get used to the PI?*

- | | |
|--|---|
| <input type="checkbox"/> Day 1 (3 patients) | <input type="checkbox"/> Day 14 (22 patients) |
| <input type="checkbox"/> Day 2 (3 patients) | <input type="checkbox"/> Day 15 (1 patients) |
| <input type="checkbox"/> Day 3 (8 patients) | <input type="checkbox"/> Day 21 (3 patients) |
| <input type="checkbox"/> Day 4 (6 patients) | <input type="checkbox"/> Day 30 (10 patients) |
| <input type="checkbox"/> Day 5 (2 patients) | <input type="checkbox"/> Day 60 (4 patients) |
| <input type="checkbox"/> Day 7 (12 patients) | <input type="checkbox"/> Day 90 (2 patients) |
| <input type="checkbox"/> Day 10 (6 patients) | <input type="checkbox"/> No response (3 patients) |

13. Which period do you think is acceptable for PI treatment?*

- | | |
|--|--|
| <input type="checkbox"/> 1 month (1 patient) | <input type="checkbox"/> 24 months (15 patients) |
| <input type="checkbox"/> 2 months (1 patient) | <input type="checkbox"/> 30 months (1 patient) |
| <input type="checkbox"/> 4 months (1 patient) | <input type="checkbox"/> 36 months (15 patients) |
| <input type="checkbox"/> 6 months (5 patients) | <input type="checkbox"/> 42 months (1 patient) |
| <input type="checkbox"/> 12 months (13 patients) | <input type="checkbox"/> 48 months (8 patients) |
| <input type="checkbox"/> 15 months (1 patient) | <input type="checkbox"/> 60 months (2 patients) |
| <input type="checkbox"/> 18 months (3 patients) | <input type="checkbox"/> 72 months (1 patient) |
| <input type="checkbox"/> 20 months (1 patient) | <input type="checkbox"/> 120 months (1 patient) |
| <input type="checkbox"/> 23 months (1 patient) | <input type="checkbox"/> No response (14 patients) |

Fig. Questionnaire (and response rate). Mean age of sample was 28 years; n = 85. *(n = 82; range, 1-90 days; SD, 17.8; mean, 16; median, 14). **(n=71; range, 1-120 months; SD, 19; mean, 27.7; median, 24).

RESULTS

Although 60% of the patients had full confidence in their orthodontists and accepted the recommendations for PI treatment, many wanted more information. About 75% of the respondents wanted to talk to others who already had PIs or see photos of the PI and the operation. Less than 50% were interested in the size of the PI. The patients preferred to talk with the oral and maxillofacial surgeon in the presence of their orthodontists.

Discomfort in speaking, chewing, swallowing, and eating was minimal. Most subjects found the orthodontic construction between the anchor teeth and the PI less comfortable than the PI itself.

After loading, pressure at the implant was sensed by 25% of the sample. Nearly all patients (95%) were satisfied with the treatment, and 86% would recommend it to others. Approximately 2 weeks was required to get used to the PI, and patients indicated they would tolerate PI treatment for approximately 2 years.

DISCUSSION

This questionnaire showed that 60% of the subjects were confident enough in their orthodontists to immediately agree to PI treatment, but family and friends still play an important role in decision making. When surgery is combined with orthodontic treatment, we should expect patients to have some concerns. Many patients need time to discuss their concerns with their families and oral surgeons. Patients prefer to talk to the oral surgeon in the presence of the orthodontist. Although this can be easily arranged at a university clinic, it might be more difficult to schedule in private practice. Creating a team, working with the same oral and maxillofacial surgeon, and having a specific consultation day can be useful. The treatment plan should be discussed with the surgeon before the orthodontist explains it to the patient.

During the first consultation, most patients wanted to know the advantages of the PI in orthodontic treatment, and they were interested in the surgical technique and how long the PI would remain in the palate; the size of the PI was not a primary concern.

Patients need about 2 weeks to 3 months to get used to the PI in the palate. Because an average of 3 months without loading is needed for osseointegration, clinicians need not rush to load the implant. Surgery can be performed before appliances are bonded. Segmented or full arches can be leveled during the healing period without using the maximum anchorage of the PI.

The common opinion is that clinical and laboratory procedures for a PI are complicated, and that PIs are

more expensive and less comfortable than alternate treatment methods. However, in some cases, PIs or other temporarily placed implants can eliminate the need for maxillofacial surgery. In addition, PIs are placed under local anesthesia, and the operation takes 15-20 minutes. This is not comparable with single-jaw surgery under general anesthesia.

More attention in the literature is given to implant size and the length of the implant in the palate for biomechanical, anatomic, and surgical reasons, but implant size was not a major concern of the patients. Patients can sense only the supramucosal parts (cap base and cap) and the construction wires between the implant and the teeth. The PI itself does not create discomfort because it does not narrow the movement area of the tongue in the oral cavity. However, the PI with the construction wire bilaterally bonded to the anchor teeth limits movement of the tongue by narrowing its space. This indicates that the clinician should keep the treatment time with the loaded PI short and remove the construction wire as soon as possible after reaching the targeted goal. The clinician should prepare comfortable, gentle constructions and leave the implant with the healing cap in place until the end of treatment in case of a future need. Breaks between 2 different treatment phases with different constructions can also be given. In optimizing the shape and size of the PIs, we suggest minimizing the supramucosal parts for patient comfort.

Discomfort in chewing, eating, speaking, and swallowing seemed comparable with the discomfort caused by transpalatal bars. Transpalatal bars are easier to use because of the posterior localization above the palate.

If 24 months is accepted as the average orthodontic treatment time, patients can be expected to tolerate the whole orthodontic treatment with PI. Sixteen percent of the sample could not judge how long they would tolerate the implant. Examining the same patients after removal of the PI at the end of the treatment will provide more significant results. The causes of complaints about the constructions and their comparison with the transpalatal bars can be examined in future studies by considering the implant location, anchored teeth (anterior/posterior), and the construction design.

CONCLUSIONS

Based on the patients' responses to the questionnaire, we can conclude that:

- 95% of the patients were satisfied with PI treatment.
- The most unpleasant stage of the operation was the injection of the anesthetics. Pressure was also felt

during actual placement of the implant, but it was not as unpleasant as the injection.

- Two weeks were required to get used to the PI.
- After orthodontic force was applied to the PI, some patients sensed pressure at the implant, but most felt little or no pain in the jaw bone. A few patients felt pain in the soft tissue around the implant and slackening of the implant.
- Patients tolerated approximately 24 months of PI treatment; this is the average orthodontic treatment time.

REFERENCES

1. Kokich VG. Managing complex orthodontic problems: the use of implants for anchorage. *Semin Orthod* 1996;2:1-8.
2. Herrero DB. Implants as anchorage in orthodontics: a clinical case report. *J Oral Implantol* 1998;24:5-10.
3. Harnick DJ. Case Report CT: a multidisciplinary approach to treatment, including orthognathic surgery, endodontics, periodontics, and implants for anchorage and restoration. *Angle Orthod* 1996;66:327-31.
4. Shellhart WC, Moawad M, Lake P. Case report: implants as anchorage for molar uprighting and intrusion. *Angle Orthod* 1996;66:169-72.
5. Haanaes HR, Stenvik A, Beyer-Olsen ES, Tryti T, Faehn O. The efficiency of two-stage titanium implants as orthodontic anchorage in preprosthodontic correction of third molars in adults—a case report of three cases. *Eur J Orthod* 1991;13:287-92.
6. Ödman J, Lekholm U, Jemt T, Thilander B. Osseointegrated implants as orthodontic anchorage in the treatment of partially edentulous adult patients. *Eur J Orthod* 1994;16:187-201.
7. Prosterman B, Prosterman L, Fischer R, Gornitsky M. The use of implants for orthodontic correction of an open bite. *Am J Orthod Dentofacial Orthop* 1995;107:245-50.
8. Singer SL, Henry PJ, Rosenberg I. Osseointegrated implants as an adjunct to facemask therapy: a case report. *Angle Orthod* 2000;70:253-62.
9. Smalley WM, Shapiro PA, Hohl TH, Kokich VG, Branemark PI. Osseointegrated titanium implants for maxillofacial protraction in monkeys. *Am J Orthod Dentofacial Orthop* 1988;94:285-95.
10. Gray JB, Smith R. Transitional implants for orthodontic anchorage. *J Clin Orthod* 2000;34:659-66.
11. Roberts WE, Arbuckle GR, Analoui M. Rate of mesial translation of mandibular molars using implant-anchored mechanics. *Angle Orthod* 1996;66:331-8.
12. Higuchi KW, Slack JM. The use of titanium fixtures for intraoral anchorage to facilitate orthodontic tooth movement. *Int J Oral Maxillofac Implants* 1991;6:338-44.
13. 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.
14. Kanomi R. Mini-implant for orthodontic anchorage. *J Clin Orthod* 1997;31:763-7.
15. Freundenthaler JW, Haas R, Bantleon H-P. Bicortical titanium screws for critical orthodontic anchorage in the mandible: a preliminary report on clinical applications. *Clin Oral Impl Res* 2001;12:358-63.
16. Block MS, Hoffman DR. A new device for absolute anchorage for orthodontics. *Am J Orthod Dentofacial Orthop* 1995;107:251-8.
17. Wehrbein H, Merz BR, Diedrich P, Glatzmeier J. The use of palatal implants for orthodontic anchorage. Design and clinical application of the orthosystem. *Clin Oral Impl Res* 1996;7:410-6.
18. Wehrbein H, Merz BR, Diedrich P. Palatal bone support for orthodontic implant anchorage—a clinical and radiological study. *Eur J Orthod* 1999;21:65-70.
19. Tosun T, Keles A, Erverdi N. Method for the placement of palatal implants. *Int J Oral Maxillofac Implants* 2002;17:95-100.
20. Bernhart T, Freundenthaler J, Dörtbudak O, Bantleon H-P, Watzek G. Short epithetic implants for orthodontic anchorage in the paramedian region of the palate. A clinical study. *Clin Oral Impl Res* 2001;12:624-31.
21. Abels N, Schiel HJ, Hery-Langer G, Neugebauer J, Engel M. Bone condensing in the placement of endosteal palatal implants: a case report. *Int J Oral Maxillofac Implants* 1999;14:849-52.
22. Celenza F, Hochman MN. Absolute anchorage in orthodontics: direct and indirect implant-assisted modalities. *J Clin Orthod* 2000;34:397-402.
23. Mänchen R. A new supraconstruction for palatal orthodontic implants. *J Clin Orthod* 1999;33:373-82.
24. Glatzmeier J, Wehrbein H, Diedrich P. The development of a resorbable implant system for orthodontic anchorage. The BIOS implant system. Bioresorbable implant anchor for orthodontic systems. *Fortschr Kieferorthop* 1995;56:175-81.
25. Glatzmeier J, Wehrbein H, Diedrich P. Biodegradable implants for orthodontic anchorage. A preliminary biomechanical study. *Eur J Orthod* 1996;18:465-9.
26. Bernhart T., Vollgruber A, Gahleitner A, Dörtbudak O, Haas R. Alternative to the median region of the palate for placement of an orthodontic implant. *Clin Oral Impl Res* 2000;11:595-601.

RECEIVE THE JOURNAL'S TABLE OF CONTENTS EACH MONTH BY E-MAIL

To receive the tables of contents by e-mail, send an e-mail message to

majordomo@mosby.com

Leave the subject line blank and type the following as the body of your message:

Subscribe ajodo_toc

You may sign up through our website at <http://www.mosby.com/ajodo>.

You will receive an e-mail message confirming that you have been added to the mailing list. Note that TOC e-mails will be sent when a new issue is posted to the website.