Osseointegrated dental implants as alternative therapy to bridge construction or orthodontics in young patients: seven years of clinical experience

Philippe D. Ledermann, DDS Thomas M. Hassell, DDS, PhD Arthur F. Hefti, DDS, PD

Abstract

Young patients often require fixed bridgework or orthodontic therapy in cases of traumatic tooth loss or congenitally missing teeth. Dental implants represent an alternative to the more conventional treatment methods. We report positive experience over a seven-year period with 42 titanium Ha-Ti implants in 34 patients aged 9 to 18 years. Fourteen implants were placed into prepared tooth sockets immediately after traumatic luxation of anterior teeth in 12 patients aged 9 to 18 years (median age 16). An additional 22 patients (median age 15.5, range 11 to 18) also received implants (N = 28), but these were placed only after healing of extraction sites, or as substitutes for congenitally missing teeth. Implants remained in situ for an average of 7.7 months before loading. During the healing period, three implants were lost due to additional trauma and one became infected. The 38 remaining implants osseointegrated and since have been loaded for five to 79 months in successful function. There was no difference between immediate and delayed implants in clinical success. These experiences demonstrate that appropriate, versatile, osseointegrated implants can provide a successful treatment method for young patients, without damaging adjacent teeth. (Pediatr Dent 15:327–33, 1993)

Introduction

Edentulous spaces often exist in children and adolescents due to trauma and congenital absence of permanent teeth. Traditional therapeutic approaches have included removable partial dentures, fixed prostheses with minimal tooth preparation (e.g., the "Maryland bridge"), and orthodontic movement of teeth to close spaces. All of these treatment modalities have distinct disadvantages; most are temporary solutions at best and costs can be substantial. In recent years, tremendous success in tooth replacement has been achieved in adults using root-form titanium dental implants. This success is due in major part to pioneering clinical studies in Scandinavia (for review see Brånemark, 1983[1]).

There has been a reluctance to employ implant therapy in children and adolescents whose jaw growth is incomplete. Early attempts to replace teeth in very young patients using vitreous carbon and ceramic implants were plagued by very poor success.[2,3] These are the likely reasons why the dental literature contains meager information about implantology in pediatric dentistry and why implant therapy as an alternative to fixed prosthetics or orthodontics in young patients has not been advocated.

The premise for the present clinical report is that children and adolescents may be excellent candidates for tooth-replacement procedures incorporating the newer titanium root-form implants for several important reasons. For example, in the case of a single missing anterior tooth, when the adjacent teeth are caries free, an implant precludes the necessity to prepare the teeth to receive bridgework. A replacement tooth on an implant also precludes the mucosal inflammation that is almost inevitable with temporary acrylic-based partial dentures. In children, the teeth most frequently lost to trauma are the incisors. Orthodontic movement of canines mesially to close spaces is usually esthetically disappointing as well as costly and time consuming. Perhaps most important is that after a tooth is lost, an inescapable sequela is the rapid resorption of alveolar bone. Indeed, in most cases, only a very thin crestal bony lamella remains after healing of the alveolus, with clinically obvious horizontal and orofacial depressions. In a child patient missing an incisor, the dentist may find implantation impracticable because of inadequate bone mass at the site if the dentist waits until jaw growth is complete. Inadequate bone also can seriously compromise the esthetic result achieved with conventional bridgework later. Implant placement as near to the time of tooth loss as possible could obviate these negative consequences.

This paper reports on titanium root-form implants in children and adolescents, addressing the question of subsequent alveolar bone growth and positional stability of immediate implants—an aspect of implantology about which little is known.

Methods and materials

Type of implant

The Ha-Ti titanium implant system (Mathys Corporation of North America, Charlotte, NC), introduced in 1985, was used in our patients. The Ha-Ti implant features a highly polished neck with the dimension of a natural tooth, and a step-screw implant shape analogous to a

Table 1. Site of and reason for Ha-Ti implant placement and success/failure statistic

Site	*Number of Implants*
Maxilla	
Right central (#8)	16
Left central (#9)	12
Right lateral (#7)	5
Left lateral (#10)	5
Right canine (#6)	1
Left canine (#11)	1
Mandible	
Right first premolar (#28)	1
Left first premolar (#21)	1
Total number of implants	42
Reasons for implant placement	
Tooth loss due to trauma	25
Congenital absence of permanent tooth	10
Root resorption, fracture, etc.	7
Total number of implants	42
Success/failure statistic	
Total number of implants placed	42
Implants lost due to trauma	3
Implants lost due to infection	1
Number of successful implants	38 (90%)

natural tooth root. All superstructure elements are high-precision prefabricated and are interchangeable. The Ha-Ti implant system has been described in detail as applied in adult patients.[4,5]

Placement of implants

From May 1985 through May 1992, 42 Ha-Ti implants were placed in 34 subjects, aged 9 to 18 years. The risks of the procedure and alternative treatment options were fully explained to the patients and the patients' parents, who acknowledged informed consent in writing by signing the final treatment plan. Thirty-eight of the implants were used to replace maxillary central and lateral incisors. Other sites were canines and premolars (Table 1). Whenever possible, an attempt was made to place the implant only after the pubertal growth spurt had concluded, as determined from the age graphs of Björk & Skieller.[6-9] This is reflected in the average age of the patients at time of implant placement (Table 2).

The decision to implant immediately after tooth loss or to wait a certain period of time was made case-by-case by the surgeon on the following basis:

1. Immediate implants were placed:
   - In patients with traumatic tooth loss, if they were treated within 72 hr after the incident; or
   - If teeth were extracted for reasons not involving osseous alveolar pathology (e.g., pulpitis, nontreatable tooth fracture); or
   - In cases of iatrogenic tooth loss, e.g., failed endodontic therapy not associated with infection.
2. Delayed implants were placed:
   - In cases of congenitally missing teeth if the overlying retained primary tooth was mobile, immediately after removing the primary tooth; or
   - In edentulous spaces in which a primary tooth had been missing for more than one year and the permanent tooth was congenitally absent; or
   - If a tooth had to be extracted and there was clinical or radiographic evidence of pathology of the alveolus. Placement of the implant was delayed in such cases until the site healed, normally 2–3 months.

The alveolar ridge was examined clinically and radiographically for sufficient alveolar width. Guided tissue regeneration procedures[10,11] were used to enhance osseous support in two cases that exhibited bony dehiscence after the implant was completely inserted. The procedure involved placing individually trimmed pieces of Gortex® (W.L. Gore and Associates, Tucson, AR) or Vicryl® (Johnson & Johnson, New Brunswick, NJ) membrane over the portion of the implant that was exposed due to bony dehiscence, overlapping compact bone on both sides of the defect. Membranes were affixed using resorbable sutures, then the mucosa was sutured to place over the membrane and the implant healing cap. We attempted to obtain primary closure of the mucosa over each implant. However, in some cases the implant healing cap became exposed during the postoperative course. All patients received an antibiotic postsurgically: Rovamycine® (Spiramycin, Spezia, Switzerland, 250 mg, 2 tid, for four days) and a nonsteroidal analgesic (mefenamic acid, Ponstel®, Parke Davis, 250 mg, 2 tid, two to four days prn). Suture removal was performed 8–10 days postsurgically, at which time the wound was carefully inspected and cleansed with an aqueous 0.2% chlorhexidine solution.

Implants in the maxilla were permitted to remain

Table 2. Age of patients at time of implant placement by gender

Gender	*Implants/Patients*	*Mean ± SD (Years)*	*Median (Years)*	*Range (Years)*
Female	24/18	14.2 ± 2.4*	14	9 – 18
Male	18/16	16.1 1.6*	16	13 – 18
Both	42/34	15.1 ± 2.2	16	9 – 18

* $P = 0.021$.

Table 3. Age of patients at time of implant placement by type of implant

Implant Type	*Implants/Patients*	*Mean ± SD (Years)*	*Median (Years)*	*Range (Years)*
Delayed	28/22	15.1 ± 2.0*	15.5	11 – 18
Immediate	14/12	15.1 2.7*	16	9 – 18
Both	42/34	15.1 ± 2.2	16	9 – 18

* $P = 0.993$.

Table 4. Length of healing period by gender

Gender	*Implants*	*Mean ± SD (Months)*	*Median (Months)*	*Range (Months)*
Female	22	7.1 ± 2.1*	7	5 – 15
Male	16	8.4 4.8*	6	5 – 20
Both	38	7.7 ± 3.5	6.5	5 – 20

* $P = 0.819$.

covered and not loaded for a minimum of six months after placement, mandibular implants for five months. These healing times were based on the well-known differences in osseous trabecular structure between the maxilla and the mandible, as well as on the clinical observation of hundreds of Ha-Ti implants placed in adult patients over a 5 1/2-year period.[5]

After complete healing, a special tissue punch was used to expose the implant. The punch (Mathys Corporation of North America, Charlotte, NC) is a low-profile trephine that is used in a low-speed handpiece; the punch is size matched to the implant diameter, so it excises exactly the appropriate mass of gingiva overlying the implant healing cap. No sutures are required at the uncovering appointment. The implants then were examined for osseointegration (stability, immobility, and lack of cratering around the implant neck). After removing the healing cap, an impression post was screwed to place and the impression made using elastomeric material. Loading the implants occurred 10 days later when definitive superstructures were seated. All of the implants were restored using precision-milled, porcelain-fused-to-gold single crowns, affixed without cement by means of a transversal screw, as previously described.[4] After seating the definitive crowns, all implants were followed on a six-month recall interval.

Documentation

Each implant case was documented using clinical intraoral photography. In addition, radiographic surveys were made including: a panoramic film, appropriate periapical films, and lateral cephalometric radiographs if indicated (e.g., if overlaps occurred in other films, or if patients experienced symptoms). Photographs and radiographs were made at appropriate intervals (see Results).

*Osseointegration was assessed at each recall appoint*ment using percussion and the Periotest® (Siemens, Bensheim, Germany) instrument.[12] Each implant was tested three times in succession, and the mean Periotest value recorded. Peri-implant tissue health was evaluated and quantified at the mesial, distal, and buccal aspects of the implant by measuring the sulcus fluid flow rate as described by Rüdin et al.[13] Standard filter paper strips with a notch near the tip were placed at the entrance of the gingival sulcus and allowed to remain in situ for 3 min. The amount of fluid was measured linearly, and recorded to the nearest 0.1 mm as the average value of three strips per implant. Patients were reinstructed in oral hygiene procedures and remotivated at each recall appointment.

The results presented in this paper are reported as mean values ± S.D. and ranges based on the number of implants placed, rather than the number of patients treated. The data were further broken down by gender since girls traverse their pubertal growth spurt earlier than boys.[9] The frequency distributions for the variables age, length of healing period, and length of followup after loading were markedly skewed because of the longitudinal nature of these clinical observations, so medians also were tabulated. The nonparametric Mann-Whitney U rank-sum test was applied when the requirements for *t*-testing were not fulfilled.

Results

To date (October 1992), the minimum postloading follow-up period has been five months; the maximum period 79 months. As shown in Table 1, a total of 42 implants were placed in 34 patients. The reasons for implant placement were traumatic tooth loss or congenital absence of permanent teeth in 35 cases. Twenty-four implants were placed in 18 female patients, and 16 male patients received 18 implants (Table 2). Female patients were statistically significantly younger ($P = 0.021$) than male patients. In 28 situations, implant placement was performed after an appropriate wound healing period (delayed implant). Fourteen implants were placed immediately after traumatic tooth loss (Table 3). After a total study period of seven years, 38 implants remained in situ, loaded and fully functional; this is approximately a 90% success rate. The 10% failure rate is misleading in this context, and is discussed below (see Discussion).

The healing period was slightly longer for males as compared to females (Table 4), but the difference was not statistically significant ($P = 0.819$). Table 5 reveals that there was no statistically significant difference between the healing time given for delayed implants as compared

Table 5. Length of healing period by implant type

Implant Type	*Number*	*Mean ± SD (Months)*	*Median (Months)*	*Range (Months)*
Delayed	25	8.0 ± 4.2*	6	5 – 20
Immediate	13	7.0 1.4*	7	5 – 10
Both	38	7.7 ± 3.5	6.5	5 – 20

* $P = 0.691$.

Table 6. Length of followup after loading by gender

Gender	*Implants*	*Mean ± SD (Months)*	*Median (Months)*	*Range (Months)*
Female	22	41.4 ± 20.1*	39	14 – 79
Male	16	27.4 20.9*	18.5	5 – 73
Both	38	35.5 ± 21.3	34	5 – 79

* $P = 0.019$.

Table 7. Length of followup after loading by implant type

Implant	*Number*	*Mean ± SD (Months)*	*Median (Months)*	*Range (Months)*
Delayed	25	36.4 ± 24.0*	34	5 – 79
Immediate	13	33.8 15.8*	34	14 – 59
Both	38	35.5 ± 21.3	34	5 – 79

* $P = 0.853$.

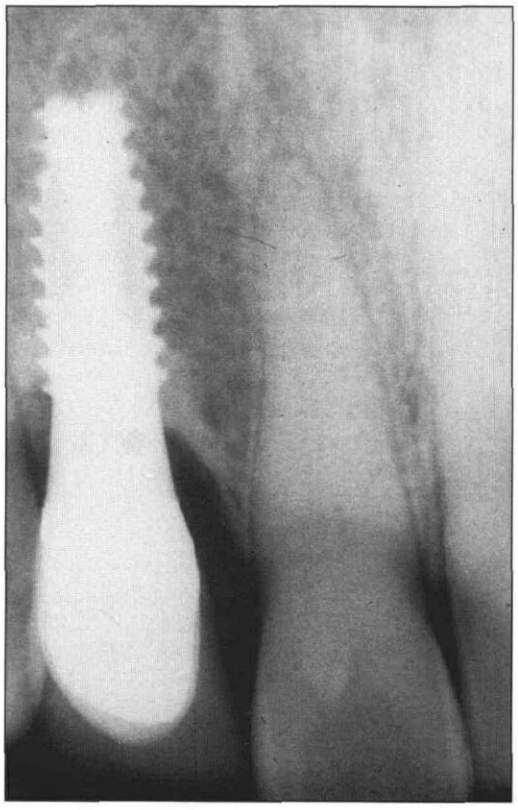

Fig 1. The radiographic situation seven years after placing Ha-Ti implants. Note the excellent osseous adaptation of the implant and the lack of radiolucent areas, indicating persisting osseointegration.

to immediate implants. The length of the unloaded healing period for the 38 implants ranged from five to 20 months. The mean healing period of the study sample was 7.7 months. After loading by placement of the definitive restoration, the implants have been followed between five and 79 months (Tables 6 & 7). The mean overall follow-up period for the total sample after loading has been 35.5 months (median = 34 months).

Figures 1–6, illustrate esthetic restorations of the implants, most of which were in the anterior segment. Clinically, the soft tissue response to the subgingivally located interface between the implant and the prefabricated superstructure crown was favorable. Neither gingival recession nor gingival hyperplastic responses were encountered. An interesting observation in those cases followed over longer periods of time was an apparent shortening of the implant-born crowns (Figs 5 & 6). This was a *trompe-l'oeil*, however, resulting from continued growth of the alveolar bone in the adolescent patients and continued eruption of the adjacent natural teeth into their final positions. This phenomenon, observed so far on a subset of only 38 loaded implants, may eventually be a universal observation, since almost all of the young patients are still growing.

Sulcus fluid flow rates (SFFR) and Periotest® measurements were documented on a subset of 32 implants selected on the basis of patient cooperation and accessibility of the implants for the tests. All SFFR measurements were within a narrow range of values (0–1.2 mm), comparing favorably to SFFR around healthy natural teeth[13]—suggesting that the patients' oral hygiene efforts were generally adequate—and that the Ha-Ti crown margins were compatible with gingival health. The Periotest values were between -5.0 and -1.5 units, indicating virtual immobility of the implants[12] and suggesting successful osseointegration at the time of measurement.

The radiographic findings were unremarkable, exhibiting no evidence of bone loss around any of the remaining 38 implants during the follow-up period of 79 months.

Discussion

This report presents information concerning 42 Ha-Ti implants placed in 34 children and adolescents over a seven-year period. The results support the use of dental

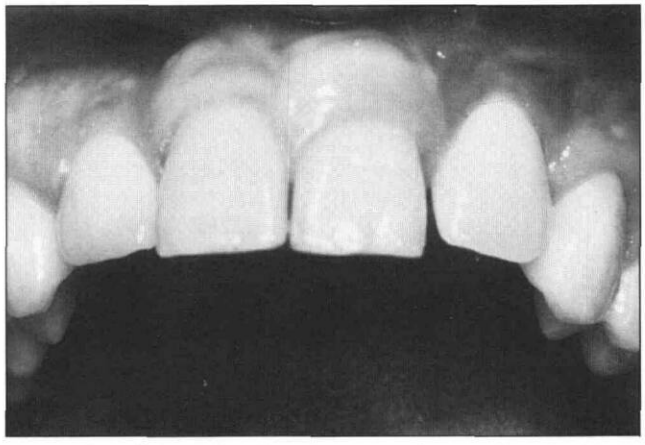

Fig 2. The clinical situation six years after seating the Ha–Ti crowns.

implants as an alternative to fixed prostheses or orthodontics in young individuals, especially those who are nearing or have already achieved complete alveolar bone growth.

Factors favoring the placement of implants in these young patients would include the excellent local blood supply, positive immunobiologic resistance, as well as the generally uncomplicated osseous healing. A possible complicating factor for dental implantation in children is incomplete jaw growth and incomplete eruption of permanent teeth adjacent to the implant site. Whenever possible, dental implants should not be placed in males before age 13 or in females before age 11.[9, 14, 15] One factor that may favor early implant placement, even in young patients, is anticipated osseous atrophy. Good evidence[16] supports alveolar resorption after tooth loss. Such a resorbed area,

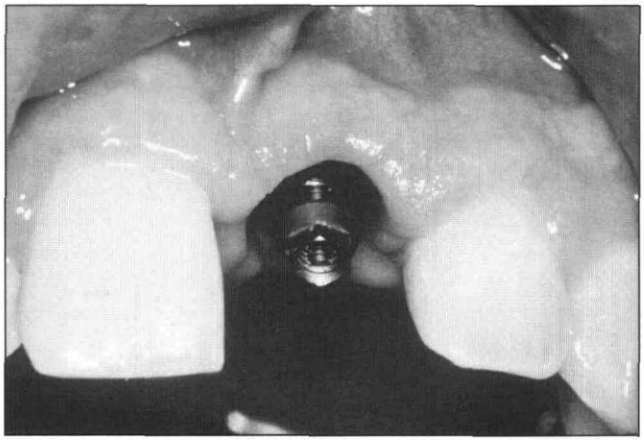

Fig 3. The single tooth abutment, which is seated on a 14-mm Ha-Ti implant with a 6-mm-diameter neck. The implant had been placed six months previously in this 14-year-old girl (April 1989).

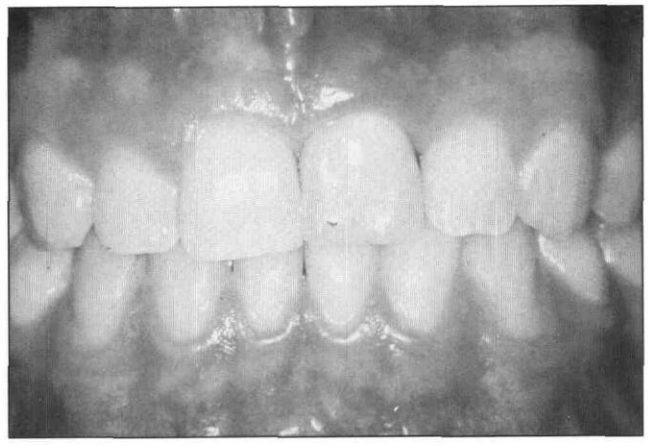

Fig 4. Clinical view one month later with individual Ha-Ti porcelain-fused-to-metal crown replacing tooth 21.

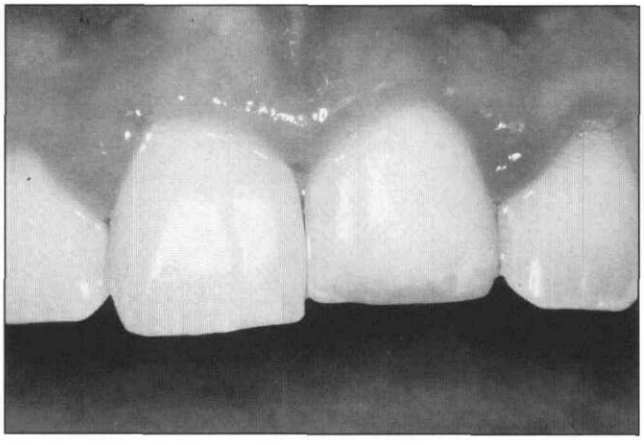

Fig 5. Clinical picture three years after crown placement (March 1992). Note that the Ha-Ti crown appears too short incisally; this is due to continued growth of the facial skeleton over the three-year period.

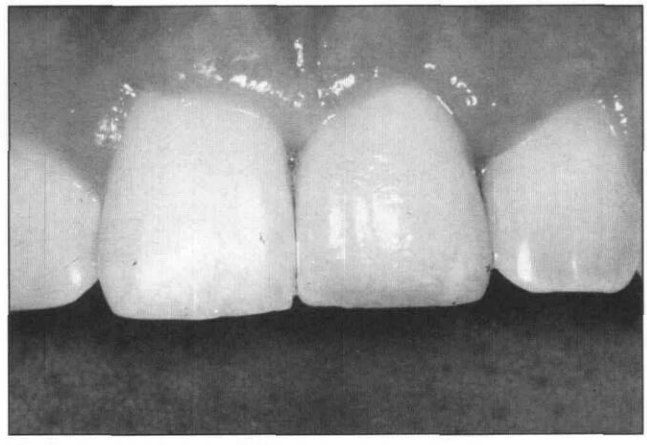

Fig 6. Because the Ha-Ti implant system provides a transverse screw rather than cement to secure the crown, it was possible to remove the crown and add additional porcelain to the incisal edge, and then to reseat the crown using a new transverse screw. As shown in this figure, the original Ha-Ti crown has successfully been adapted to this patient's changed intraoral relationships.

especially when the resorption occurs in the buccolingual dimension, often makes successful placement of an implant difficult or even impossible, and also compromises conventional bridge construction. Clinical experience has demonstrated that when a root-form implant is placed into an alveolus immediately after tooth loss, the degree of resorption can be minimized. Even when narrow bone dimension results in a dehiscence after implantation, guided tissue regeneration can induce new bone formation around implants[11, 17, 18]—especially around implants that were placed immediately in extraction sockets and after destructive (traumatic) tooth luxation. This was corroborated in this report, in which guided tissue regeneration using membranes was successfully applied for alveolar ridge augmentation in two patients exhibiting dehiscences after implant placement due to insufficient alveolar bone width.

The clinical and radiographic information provided in this report demonstrates that dental implants remain stable in position and orientation despite additional growth of the alveolar bone and facial skeleton.

The superstructure crown in the Ha-Ti system is never cemented onto the implant base, or onto any type of coping. Rather, the crown is affixed with a titanium transverse screw which, when torqued to place, presses the precision prefabricated margin of the crown onto the implant. The microscopic gap between the crown and the implant is only 2–4 μm in expanse; by comparison, the marginal gap of conventional cast crowns is normally 50–300 μm. An additional obvious advantage is that Ha-Ti crowns can be removed easily at any time by simply taking out the transverse screw. If adjacent teeth continue to erupt and the crown appears too short, additional porcelain can be added to the incisal edge. The same is true in the case of fracture of porcelain due to trauma.

Dental implants in children have been attempted by several other authors using other implant types with less than favorable results. For example, Scholz & d'Hoedt[2] used the Tübinger implant in 8- to 11-year-olds and experienced a failure rate of 46% over two years. In their patients older than 12 years, however, the failure rate was only 18%.

Frisch and coworkers[3] placed ceramic implants in children, permitted them to heal uncovered and unloaded for three months, and experienced a failure rate of 67% over two years. When they used the same type of implant but with a closed procedure, the authors claimed a success rate of 83%; however, the deep incorporation in the bone of the ceramic implants was associated with esthetic problems, and implant fractures occurred frequently. This had been described also by Markwalder.[19] In sum, the earlier clinical studies of implants in young patients by Frisch et al.,[3] Fritzmeier et al.,[20] Mairgünther et al.,[21] and Scholz & d'Hoedt[2] suggest that the relatively high failure rates that have been reported could not be traced to the fact that the patients were young but rather to failures of the implant systems themselves.

This report of seven years' experience placing and restoring Ha-Ti dental implants in children and adolescents for replacement of congenitally missing teeth and in post-traumatic cases supports using implants as an alternative to conventional prosthetic solutions. Followup on 42 implants placed in 34 patients for an average of 35.5 months (range = 5 to 79 months) has been associated with a success rate of 90%. An important contrast between this report and previous attempts in pediatric dental implantology is that our failures (4 implants = 10%) were not related to implant failure or the fact that the patients were children. Three of the failures occurred because of subsequent traumatic facial injuries incurred by the children during the healing phase, and one implant failed because the surgeon placed an implant into an alveolus that showed clinical signs of infection.

Despite our success, each dentist must exercise caution in child patients in whom additional significant alveolar bone growth is anticipated (i.e., children who have not traversed the pubertal growth spurt). Decisions to implant in young patients also need to be tempered by the desire to prevent bone resorption and the attendant alveolar deformity.

This study was supported by a Dr. Robert Mathys Research Foundation grant #FGRM03A.

Dr. Ledermann is in private practice, Bern, Switzerland. Dr. Hassell is a professor and chairman, Department of Periodontology, University of Florida, Gainesville, Florida. Dr. Hefti is a professor, Department of Periodontology, University of Florida, Gainesville. Reprint requests should be sent to: Dr. Philippe Ledermann, Nydeggstalden 2, CH-3011 Bern, Switzerland.

1. Brånemark PI: Osseointegration and its experimental background. J Prosthet Dent 50:399–410, 1983.
2. Scholz F, d'Hoedt B: Der Frontzahnverlust im jugendlichen Gebiss - Therapiemöglichkeiten durch Implantate. Dtsch Zahnärztl Z 39:416–24, 1984.
3. Frisch E, Pehrsson K, Engelke W, Sennhenn S, Jacobs HG: Beitrag zur Problematik der Implantation im Oberkiefer-Frontzahnbereich. Z Zahnärztl Implantol 6:108–10, 1990.
4. Ledermann PD, Mathys R, Frischherz R: Ein neues Implantationskonzept für den Einzelzahnersatz: Das Ha-Ti Schraubenimplantat. Schweiz Monatsschr Zahnmed 98:40–50, 1988.
5. Ledermann PD, Markwalder TH, Frischherz R: Das Ha-Ti Implantat. Fünfeinhalb Jahre klinische Erfahrung. Schweiz Monatsschr Zahnmed 101:610–20, 1991.
6. Björk A: Variations in the growth pattern of the human mandible: longitudinal radiographic study by the implant method. J Dent Res 42:400–11, 1963.
7. Björk A: Sutural growth of the upper face studied by the implant method. Acta Odontol Scand 24:109–27, 1966.
8. Björk A, Helm S: Prediction of the age of maximum pubertal growth in body height. Angle Orthod 37:134–43, 1967.
9. Björk A, Skieller V: Facial development and tooth eruption: an implant study at the age of puberty. Am J Orthod 62:339–83, 1972.
10. Gottlow J, Nyman S, Karring T, Lindhe J: New attachment formation as a result of controlled tissue regeneration. J Clin Periodontol 11:494–503, 1984.
11. Becker W, Becker BE: Guided tissue regeneration for implants placed into extraction sockets and for implant dehiscences: Surgical techniques and case report. Int J Periodontics Restorative Dent 10:376–91, 1990.

12. Schulte W, d'Hoedt B, Lukas D, Maunz M, Steppeler M: Periotest for measuring periodontal characteristics—Correlation with periodontal bone loss. J Periodontal Res 27:184–190, 1992.
13. Rüdin HJ, Overdiek HF, Rateitschak KH: Correlation between sulcus fluid rate and clinical and histological inflammation of the marginal gingiva. Helv Odontol Acta 14:21–26, 1970.
14. Pyle SI, Waterhouse AM, Greulich WW: A radiographic standard of reference for the growing hand and wrist. Chicago: Press of Case Western Reserve University, 1971.
15. Tanner JM: Growth at adolescence. 2nd Ed. Oxford: Blackwell Scientific, 1962.
16. Atwood DA: The problem of reduction of residual ridges, In Essentials of Complete Denture Prosthodontics, Winkler S, ED. Philadelphia: WB Saunders Co, 1979.
17. Nyman S, Lang NP, Buser D, Brägger K: Bone regeneration adjacent to titanium dental implants using guided tissue regeneration: A report of two cases. Int J Oral Maxillofac Implants 5:9–14, 1990.
18. Buser D, Hirt H-P, Dula K, Berthold H: Membrantechnik/Orale Implantologie. Schweiz Monatsschr Zahnmed 102:1490–1505, 1992.
19. Markwalder TH: Über zehnjährige klinische Erfahrungen mit verschiedenen Implantatsystemen am Zahnärztlichen Institut der Universität Basel. Medical thesis, University of Basel (Switzerland), 1991.
20. Fritzemeier CU, Lentrodt J, Höltje W, Osborn JF: Bisherige Erfahrungen mit dem Tübinger Sofortimplantat aus Aluminium-Oxydkeramik. Dtsch Zahnärztl Z 36:579–84, 1981.
21. Mairgünther R, Nentwig GH, Schneider M: Das Frialit-Implantat Typ München. Ergebnisse nach über 5-jähriger klinischer Anwendung. Z Zahnärztl Implantol 6:115–19, 1990.

Updated HIV early care guidelines released

AMA emphasizes greater role for primary care doctors

Primary care physicians can do as much for patients with early-stage HIV as specialists, according to updated treatment guidelines released by the American Medical Association at its media briefing on AIDS in Berlin in June.

"The message of the guidelines for physicians and patients is that all primary care physicians can provide appropriate medical care to patients in the early stages of HIV infection," said Paul Volberding, MD, Professor of Medicine, University of California, San Francisco, and chairman of the AMA Advisory Group on HIV Early Care Guidelines.

Volberding said *HIV Early Intervention: AMA Physician Guidelines*, second edition, provide primary care physicians necessary information to diagnose and treat patients with early-stage HIV infection.

"There is the perception that advances in HIV care are occurring too rapidly for the average physician to keep current," Volberding said. "But the rapid changes are happening more in the treatment of opportunistic infections which occur in a patient in the end stages of AIDS; care recommendations for patients in the early stages of HIV infection are relatively stable."

He continues: "These guidelines will give physicians the knowledge and reassurance they need to treat all facets of HIV care in its early stages," he said. "Physicians should also know the assistance of AIDS specialists is necessary."

The guidelines detail how a physician should go about the initial work-up of a HIV-positive patient. This should include identifying the stage of the disease, taking a patient's history (including questions about blood transfusions and donations, immunizations, medications, and social and sexual history). Physicians should also be alert for conditions that might presage HIV infection and those that occur in conjunction with it, including tuberculosis.

The guidelines pay particular attention to the medical and psychosocial concerns of women, more of whom are becoming infected. In addition to discussing gynecological exams and the exacerbated nature of concomitant diseases (other sexually transmitted diseases, yeast infections), the guidelines emphasize physician sensitivity to a woman's reproductive concerns and her traditional role as family caregiver.

The guidelines also discuss recent study results suggesting early monotherapy with zidovudine (AZT) may need to be supplemented or replaced over time to continue the clinical and immunological benefits of antiviral drugs.