One patient, one doctor:
30 years of implant innovation

By Jack A. Hahn, DDS

Since placing my first dental implant 45 years ago, many implant systems have come and gone, several of which I designed myself. If there’s one thing I’ve learned from the thousands of implant cases I’ve completed during the course of my career, it’s that regardless of the implant system chosen, long-term success depends on following the basic principles of treatment planning, surgery and prosthetic design.

Innovations in implant design have streamlined and simplified treatment, making it easier to produce ideal outcomes. Key advancements, such as the screw-shaped implant body, the internal prosthetic connection and the tapered body design, have been crucial in making implantology the essential mode of tooth replacement it is today.

The following case illustrates more than three decades of implant evolution within the mouth of a single patient. Each implant this patient received throughout the years represents a small but significant step forward, culminating in the placement of the Hahn™ Tapered Implant (Gladewell Direct; Irvine, Calif.), which I designed in order to make treatment simpler, more predictable and as accessible to as many patients as possible.

The patient, whom I’ve been treating for more than 30 years, has received implant therapy several times to treat tooth loss from fracture or decay. Because this treatment occurred episodically throughout many years, I’ve utilized several different implant systems to replace the patient’s teeth. As a result, the patient has implants with internal as well as external hex connections, ranging from an outdated bladeform design to the very latest tapered implant. The experience I’ve had both designing and placing these implants for this patient and thousands of others has given me the unique opportunity to observe my results and determine what designs and protocols work and what can be improved, as I’ve strived to advance implant design throughout the years.

The implants

- JAH 2000 Blade Implant (Fig. 3): I first placed an implant for this patient in 1988. It was the JAH 2000, which I designed as a flat, two-piece implant with wings. The blade implant was indicated for thin ridges where a root-form implant could not be placed without bone grafting. Blade implants were typically connected to other implants or teeth, and could be cut, shortened and shaped to align with the anatomy of the bone, which was commonly required when placing blade-form implants at the time. For this patient, two teeth anterior to the implant were prepared, an incision was made, a trough was drilled in the patient’s very narrow ridge, the implant was placed and a five-unit bridge was delivered to replace three teeth in the posterior maxillae. Notice that I adjusted the distal inferior portion of the implant so as not to impinge on the mandibular nerve.

- The JAH 2000 was a significant improvement over what was on the market at that time. I designed the neck to extend lower than the tops of the wings, allowing more bone to integrate around the neck of the implant. Decades after implant placement, this blade design continues to serve many of my patients well.

- Steri-Oss HL (Fig. 4): The Steri-Oss HL implant in the area of tooth 26 is HA-coated and was placed immediately following extractions. The implant was similar to that of the parallel-walled Steri-Oss implant, but I wanted to have a variant of aggressiveness in the pitch of the thread so it came up to the apex. I knew that another company was coming out with four different implants for the different qualities of bone, and I wanted to beat them to the punch. So I said, “Let’s put four different thread patterns in one implant,” which really helped with the degree of taper and cutting into denser bone.

- The tapered shape of the Replace Select was ideal for two-stage treatment, but the thread design wasn’t aggressive enough to provide the stability I needed for single-stage surgery. This left me wanting a thread design that was more sharp-edged — but not too aggressive — which was one of the formative ideas behind the Hahn Tapered Implant.

- Hahn Tapered implant (Fig. 6): Like several of the implants I’ve placed for this patient, the two Hahn Tapered Implants shown in the panoramic radiograph (Fig. 2) were placed immediately following extractions. The patient is active socially and has always wanted an immediate temporary after having a tooth extracted. In both cases, I extracted the tooth, prepared the site and placed the implant.
The patient’s root-canal-treated mandibular canine needed to be separated from the posterior bridge connected to the patient’s JAH 2000 blade implant. Because both of the Hahn Tapered Implants achieved excellent initial stability, immediate provisional crowns were delivered. The patient’s other implants have performed well, but required more work to get the outcome I wanted. With the Hahn Tapered Implant, there are fewer steps.

The Hahn Tapered Implant’s ability to remain engaged with the palatal bone and attain maximum primary stability is the result of its deep, sharp bone and fits within tight anatomical spaces. The Hahn Tapered Implant includes a 1 mm machined collar. Because both hard and soft tissue is stable around a machined collar, this design affords doctors the flexibility in crestal positioning they need to meet theesthetic demands of each case. We designed the implant with a conical connection to ensure a strong, stable seal.

The prosthetic connection also facilitates platform switching, which has been shown in numerous studies to preserve bone and gingival tissue around the implant-abutment interface. To ensure an optimal restorative outcome, the Hahn Tapered Implant System features contoured healing abutments and matching transfer copings.

Since we launched the Hahn Tapered Implant in 2015 and began working with experienced practitioners, we’ve received nothing but positive feedback. The comment that I hear repeatedly is “Jack, I love your implant.” Looking back at this patient’s radiograph, I know that we’ve come a long way with implant design.

Conclusion
The various implants I’ve designed and placed in this patient throughout the years demonstrate that success is highly predictable as long as we adhere to the proper diagnostic, surgical and restorative principles. At the same time, advancements in implant design have simplified surgery and made it easier to establish the implant positioning and stability needed to achieve the best outcome possible. I’m proud to have contributed to this evolution and look forward to the innovations to come.

References available upon request from the publisher.

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Dubai, covering 1500 students aged 4-6 years old. The implementation of the program required cooperation between the Ministry of Health and Prevention, the Knowledge and Human Development Authority, School health and Educational Institute Unit, the private companies and Dental Services Department, Dubai Health Authority.

- School children were provided with free toothbrushes appropriate for their age, fluoridated toothpaste and customized tooth brushing charts to record their daily tooth brushing.
- A training workshop was conducted for the oral health coordinators (school nurses) that were assigned to supervise the daily tooth brushing after meals and provide guidance and support to the students.
- Guidelines for tooth brushing in schools and infection control measures were adapted from the MyStride program (Scotland) and copies provided to the oral health coordinators.
- The program involved two forms of tooth brushing based on the facilities in school.

**Dry tooth brushing**

Schools that did not have the facility for children to go to washrooms to brush their teeth and spit excess toothpaste were given instructions to brush in their classrooms using appropriate amount of toothpaste and spit in cups or paper towels and were disposed of appropriately.

**Wet tooth brushing**

Schools that had enough washrooms placed in the student’s medical file and enables the use of one tooth paste tube to be used for more than one student.

- Toothpaste was placed on paper plates to help in infection control and enables the use of one toothpaste tube to be used for more than one student.

- A dental team of two dentists and two dental hygienists visited each school and conducted dental check-ups using the visible plaque index (VPI) in a mobile dental van. Main concentration was to measure the plaque accumulation on the teeth surfaces for the students aged 4-6 years, as they were the age group with the highest caries prevalence based on the previous screening conducted in Dubai.

- Results were recorded for each student on oral hygiene forms and were placed in the student’s medical file in the school with the supervision of the school nurse.

- Follow up from the dental team with oral health coordinator was done on a weekly and monthly basis.

- At the end of the three-month activity, a second dental checkup conducted on the students to record the dental plaque accumulation and compared with the previous results. An extensive interview was done with the oral health coordinator (school nurse) and the feedback questionnaire from the parents were collected.

- An additional activity that encouraged children to be more involved with oral health was a drawing contest of healthy smiles, winners were given one year supply of tooth brushes and tooth paste to take home.
Interviews with school nurses (oral health coordinators) involved a half-hour interview with open-ended questionnaire. The questions were related to:
- Commitment and support of the school administration in allowing students to do the tooth brushing at the assigned time on a daily basis.
- If the activity had fulfilled the learning objectives of the training, they had completed before the activity took place.

Another question was about their professional opinion if this activity contributed to children’s acceptance for daily brushing and interest in oral health.

A set of questions were asked about the mechanism of the activity and the reactions of school staff in having students brush their teeth daily in the school.

Any barriers that effect implementation of the tooth brushing activity.

In regards to the commitment of schools, 72% of the oral health coordinators responded that if the school administration enforced the activity, the compliance was high both from the teachers and students, others informed that allowing students to take a ten minute break to brush their teeth and return back to the class was considered as a disruption to the students daily schedule.

A high response was to the questions about students’ reaction to brushing in school because they considered it as an enjoyable task and made the students interested in brushing their teeth more often, even in schools that did not enforce daily tooth brushing students requested from their teachers to be given permission to brush their teeth.

Many of the Oral health coordinators (96%) agreed that the main barrier students had brushing as a daily activity in the schools was:
- Storage facility of the toothbrushes in the classrooms and maintaining infection control standards.
- Allowing students to leave the class to brush their teeth.
- The cooperation of the class teachers and the head administration to continue with the tooth brushing activity for a long period.

Parents Questionnaires
Parents received a questionnaire to give feedback on their children experience with the tooth brushing scheme. The questions asked about:
1. Did you receive information on the tooth brushing challenge from your child to wards tooth brushing at home?
2. Would you consider tooth brushing in school for your child as a good way for her/him to establish good oral hygiene habits?
3. Have you noticed any positive behavior change from your child towards tooth brushing at home?
4. How can the oral health team support you to enhance and encourage your children to maintain their good oral health habits.

Parents oral health lectures in school
- Continue tooth brushing for children in school
- Any other suggestions

Parent’s feedback
Response rates for the feedback questionnaire was 95%. There was a high response rate for the positive behavior change towards tooth brushing (86%). Many parents answered that the idea of their children brushing daily in school would help to establish a good oral hygiene routine (91%). They had increase interest to have more parents’ oral health sessions (72%). Most of the parents wanted their children to continue to brush at school (79%). There were 21% of parents who were concerned with infection control issues in regards to the storage of toothbrushes in schools.

Conclusion
The school-based oral disease prevention program (supervised toothbrushing in schools) was effective in imparting oral health knowledge and establishing good oral hygiene habits in school children and in improving their oral hygiene status and the attitudes of their parents. With these positive findings, it is recommended that similar programs be supported and implemented with a larger sample size to determine the long-term effect of such programs and to improve the poor oral health situation among school children. Furthermore policies for such preventive methods should be placed to emphasize the importance of its effect and govern their implementation.

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References