When I entered the word phacoemulsification into the Google search engine the other day, it produced approximately 18,700 hits. I am amazed to think that, only 33 years ago, one of the first phacoemulsification devices premiered at the Pan-American Congress in Houston. In the exhibit hall, two representatives from the Cavitron Corporation, the manufacturer of the first phaco unit, were trying to sell the machines to anyone who would speak to them about the new, small-incision cataract operation.

David Paton, MD, then the new chairman of the Department of Ophthalmology at Baylor College of Medicine in Houston, took several ophthalmologists to New York for the phacoemulsification course given by Charles Kelman, M D. Dr. Paton cleverly elicited a donation of $40,000 for the purchase of a Cavitron/Kelman/Phaco-Emulsifier/Aspirator model 7001 (Figure 1). The first phacoemulsification procedure performed at Methodist Hospital in Houston took place in the summer of 1972. I operated the device.

THE FIRST CASE
Technical Training

Prior to the first phaco case, Cavitron representatives traveled from Irvine, California, to Houston in order to provide five nurses and technicians (including myself, the only Certified Ophthalmic Assistant of the group)
with three 8-hour in-service days. With the model 7001, a full-time operator had to guarantee the stability of the anterior chamber and the tuning of the ultrasonic handpiece. Setup was critical to maintaining sterility, because nonsterilized cooling water flowed to the ultrasonic handpiece.

Preliminary Trials

Our surgeons, including Donald Ford, MD; Guy Knolle, MD; Milton Boniuk, MD; and Jared Emery, MD, attempted to perform phacoemulsification using a Weck/Troutman microscope without coaxial light, but they could barely visualize the posterior capsule. Most difficult was moving the nucleus into the anterior chamber, where they performed phacoemulsification. The surgeons abandoned the procedure several times when they were unable to complete this maneuver successfully.

Operators of the model 7001, such as myself, monitored a flow meter to ensure that the level of vacuum did not exceed the amount of irrigation. Excessive flow caused a valve to open and the vacuum to stop. During phacoemulsification, the chamber frequently became shallow or collapsed completely due to the complexity of the device. Surgeons asked, begged, pleaded, screamed, “More fluid!” or “Turn down the suction!”

Drs. Ford, Knolle, and Emery performed the majority of cases at the hospital, and they asked that I operate the model 7001 for their cases. They apparently thought I had more luck than the other operators with the device. Dr. Emery and I spent many hours in the animal laboratory, where, together, we learned how to maintain the anterior chamber while minimizing the trampoline effect. Dr. Emery also surmised that he needed to enlarge the incision sufficiently to permit fluid to escape around the tip, thereby preventing its becoming too hot.

At this time, I had four other part-time jobs. One involved my working for Louis Girard, MD, who was attempting to design his own phacoemulsification device with the Sparta Company. Dr. Girard tried to emulsify the nucleus, and two assistants performed either irrigation or aspiration with 50-mL syringes. His device did not function well, however."

**“During phacoemulsification, the chamber frequently became shallow or collapsed completely due to the complexity of the device.”**

**TEACHING PHACOEMULSIFICATION**

In the summer of 1974, Robert Loftus, PhD, the national surgical consultant for the Cavitron Corporation, convinced Dr. Emery to teach phacoemulsification courses at Baylor College of Medicine. At this time, the Cavitron Corporation had just released a second-generation phacoemulsification unit, model 7007. The device was smaller and did not require a full-time operator, but someone had to assemble the unit and adjust the vent value to the patient’s eye level by modifying the table on which the device sat.

I was a clinical instructor who helped teach phacoemulsification in the animal laboratories. On Friday afternoons, the subjects were rabbits with soft lenses.

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**Figure 2. Models 7001, 7007, and 8000 featured magneto-strictive ultrasonic handpieces (A). The 8000 model also had a selection knob for U/S, I/A MIN, and I/A MAX (B).**
and, on Saturday afternoons, surgeons operated on cats with hard lenses. Dr. Emery always performed the live surgery, but Drs. Ford and Knolle operated several times as well. The surgery was broadcast into an auditorium because we had 40 participants. James Little, MD, flew down from Oklahoma City, Oklahoma, to teach on Sunday mornings after seeing patients for postoperative examinations on the previous day. On the several occasions when Dr. Little could not come, John Sheets, MD, would fly in from Midland, Texas, to act as a substitute.

THE COST

One of the most interesting aspects of early phacoemulsification devices was their price. A titanium phacoemulsification tip cost the Cavitron Corporation $500 wholesale, and UniPak tubing cost $100 per case. The company recalled the ultrasonic tips for inspection for defects after their first use. If the customer did not return a tip, he was fined $100, and the Cavitron Corporation lost $300. The tips were inspected and reused in a new pack.

THE EVOLUTION OF TECHNIQUE

The function of early phacoemulsification devices influenced the development of surgical technique. Because the ultrasonic power, aspiration flow rate, and vacuum were fixed, surgeons employed a tapping technique in which they shifted from foot position two to three in order to emulsify the nucleus. There was no BSS or viscoelastic, and, as mentioned, some microscopes lacked coaxial illumination. The first three phacoemulsification devices from the Cavitron Corporation (models 7001, 7007, and 8000) had magneto-strictive ultrasonic handpieces, which could be assembled with “O” rings to prevent the nonsterile water from mixing with the irrigation solution entering the eye (Figure 2A). If the technician did not properly tune the handpiece and phacoemulsification tip, the handpiece would not cut well. The first two phaco units pushed water from a reservoir to the posterior “O” ring. The 8000 model was the first device to aspirate the fluid and cool the stacks to which the tip attached. This model also featured a mode selection knob with the options U/S, I/A MIN, and I/A MAX (Figure 2B). The 9000 model was the first phaco device with a piezoelectric ultrasonic handpiece that did not require cooling water (Figure 3).

ENTERING THE SALES FORCE

In 1975, I accepted a sales job with the Cavitron Corporation, and my territory encompassed the entire southeastern US. The only device for sale at that time was model 7007A, priced at approximately $25,000. As part of my pitch, I would offer to teach buyers how to use the unit. After scrubbing in, I would use a Randoff irrigating cannula to point out where to place the ultrasonic tip as I irrigated the patient’s cornea.

The 8000 model debuted the following year, and it was a significant improvement on the 7007 model. As mentioned earlier, surgeons could more easily switch from I/A MIN to I/A MAX mode. Although they still had no linear control of ultrasonics or the aspiration flow rate, the pumping system with venting functioned better. At this point, many surgeons adopted the two-hand technique developed by Richard Kratz, MD.

CONCLUSION

According to the early studies performed by David Leaming, MD, on surgeon preferences, the watershed for phacoemulsification occurred in 1990. Whereas only 12% of surgeons expressed a preference for phacoemulsification versus planned extracapsular cataract extraction in 1985, approximately 50% preferred the former procedure by 1990.

The trend toward adopting phacoemulsification has swept over the world, and the AAO honored Dr. Kelman during a session at its 2003 annual meeting. I was one of the privileged few to tell a brief story there about my early days running the phaco device for him when he visited Baylor College of Medicine to perform surgery and teach his new technique. This man changed my life and led me to teach the procedure to many surgeons.

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