Charles Kelman, MD, developed his phaco technique in the secluded OR No. 4 at the Manhattan Eye, Ear, and Throat Hospital in New York. By the time I arrived in 1978 to begin my training, Dr. Kelman had already moved to Lydia E. Hall Hospital, but he left behind his scrub and machine technicians, Louise and Lloyd. At that time, Manhattan Eye and Ear was mostly an intracapsular hospital, and I begged to operate with the few attendings who could perform phacoemulsification. When those surgeons were not available, I leaned on Louise and Lloyd. Tucked in that same OR No. 4, I performed my first phaco cases, assisted by Dr. Kelman’s team.

**MACHINE AND TECHNIQUE**

I never used the original silver phaco machine; that device was before my time. Instead, I performed my first phaco cases on the Cavitron 7007, the blue box. Louise assembled the handpiece by sliding each O-ring into position, and then, we tuned the handpiece manually. I activated the power by depressing the pedal into foot position 3, and Lloyd turned a dial. We watched a needle jump back and forth on a meter, and the handpiece was tuned when the needle was at its peak. The machine had one level for power and two settings for aspiration. I/A Min was used with the large-bore phaco handpiece, and I/A Max was used with the small-bore I/A handpiece.

I created a Christmas-tree capsulotomy by putting a blunt cystotome on the lens and tearing off the capsule. I watched the capsulotomy widen as it approached the incision. I made...
had to be dismantled in between cases. As they became automatically tuned, dials and the meters disappeared. I/A Min and I/A Max were abandoned in favor of linear control. After the development of linear vacuum came linear power, and finally, dual-linear controls allowed ophthalmologists to finesse vacuum and power in real time during surgery. Manufacturers experimented with various pumps. Some machines still used the peristaltic pump. Others used a diaphragm, Venturi, or rotary vane pump. Engineers programmed software to allow surgeons to use pulses, micropulses, ascending and descending waves of power, and more options than most people could master in a lifetime.

Surgical technique had to keep pace with the versatility of the phaco machines. It evolved from anterior chamber phacoemulsification to one-handed posterior and then to two-handed posterior chamber phacoemulsification. Howard Gimbel, MD, taught me that bowling out the nucleus facilitated making segments of the rim, and John Shepherd, MD, showed me that grooving two long trenches might make it even easier.3,4 Kunihiro Nagahara, MD, taught me that chopping was more efficient than separating.5 Every possible combination of dissecting, grooving, bowling, chopping, flipping, and rotating has been tried, and they all contributed to the same end result—manual fragmentation of the cataract so that the machine did not have to work as hard. Small pieces are more gently removed than large ones.

CONCLUSION

Today, phacoemulsification is a magnificent and popular operation that is now challenged by laser cataract surgery. The extraordinary adventure continues.  

REFINEMENTS AND BREAKTHROUGHS

Phaco machines became more refined to keep up with surgeons’ technical improvements. Handpieces came packaged, assembled, and sealed for sterilization and no longer

5. Nagahara K. Phaco chop. Video presented at: The American Society of Cataract and Refractive Surgery; May 8-12, 1993; Seattle, WA.

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