3

Air Pump, Gas-Forced Infusion, and Active Fluidics

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Across the globe, intraoperative surge is a challenging situation often faced by many cataract surgeons. In post-occlusion surge, as soon as the nuclear material is emulsified, the occlusion goes away very quickly, and suddenly there is a tremendous influx of fluid into the phaco tip (Figures 3-1 and 3-2). This sudden surge causes a fluctuation in the chamber and almost destabilizes the anterior chamber depth, causing the iris and posterior capsule to come toward the tip. The findings of reduced surge with the use of gas-forced infusion are consistent with the use of an external air pump, anterior vented gas-forced infusion, and a pressurized inflow system with active fluidics.[1-11] This deepens the anterior chamber, increasing the surgical space available for maneuvering, and thus prevents complications such as posterior capsular tears and corneal endothelial damage. The phenomenon of surge is neutralized by rapid inflow of fluid at the time of occlusion break. The recovery to steady-state intraocular pressure (IOP) is so prompt that no surge occurs, and this enables the surgeon to remain in foot position 3 through the occlusion break. High vacuum phacoemulsification/phakonit can be safely performed in hard brown cataracts using an air pump. Phacoemulsification or phakonit[1,2] under topical anesthesia can be safely done neutralizing the positive vitreous pressure occurring due to squeezing of the eyelids.

Air Pump

The concept of the air pump was conceived in 1999 by Sunita Agarwal with the basic principle to have a forced infusion in the eye that would prevent the anterior chamber collapse intraoperatively and also prevent any occlusion break surge. The active pumping of air into the infusion bottle generates higher irrigation flow rates that facilitate the phaco surgery.

Agarwal A, ed. *More Phaco Nightmares: Conquering Cataract Catastrophes* (pp 29-34).