Table 16-1A.

The Classification of Ophthalmic Viscosurgical Devices Prior to 2005 (Arshinoff 1989-2000)

Year of Class Appearance	OVD Class	Zero Shear Viscosity (mPa.s)	
		Range	Approximation
1998	Viscoadaptives	7-24 x 10^6	10 Millions
1992	Higher-viscosity cohesives		
	• Super viscous cohesives	1-5 x 10^6	Millions
	• Viscous cohesives	10^5 – 10^6	100 Thousands
1980 to 1987	Lower-viscosity dispersives		
	• Medium-viscosity dispersives	10^4 – 10^5	10 Thousands
	• Very low viscosity dispersives	10^3 – 10^4	Thousands

mPa.s = milliPascal seconds.

Note that the primary parameter used for classification is zero-shear viscosity.

Table 16-1B.

Optimal Uses of Cohesive and Dispersive Ophthalmic Viscosurgical Devices (Viscoadaptives Designed to Do All)

Higher-Viscosity Cohesives	Lower-Viscosity Dispersives
Create space	Prolonged retention
Induce and sustain pressure	Partition spaces

Soft Shell and Ultimate Soft Shell Technique

A dilemma existed before the development of viscoadaptives. The surgeon needed to choose, before the intended procedure, between OVD groups, each of which was inadequate alone for all steps in a cataract procedure. This dilemma provided impetus to the development of the "viscoelastic dispersive–cohesive soft shell technique" (SST).[8] Subsequently, when viscoadaptives were found to have their own different restrictions, the "ultimate soft shell technique" (USST) was devised to overcome those by pairing extremely viscous viscoadaptives with the ultimate low viscosity aqueous-based fluid, water, or balanced salt solution (BSS) (Figure 16-2).[9] Both soft shell techniques recognize that more physical effects can be achieved with two fluids of disparate properties than can be achieved with any single fluid, and thus enable the enhancement of the behavior of any OVD, by using it in a logical combination with another, different, OVD. Attempts continue to be made to design a single OVD that can replace multiple OVD techniques (eg, DisCoVisc), but, despite the success these efforts have achieved for routine cataract cases, a single OVD can never replace SST abilities to create rheologically different adjacent physical spaces that do not mix, thus providing a much better environment in which to deal with more complex cases. Consequently, OVD techniques designed to deal with complications are usually variations of the SST and USST. A few are presented next.

Managing Difficult Cases

Fuchs' Endothelial Dystrophy

Fuchs' endothelial dystrophy cases are best handled with a variation of SST. The idea is to first place a dispersive OVD on the lenticular surface and then pressurize it up against the corneal endothelium by injecting a cohesive OVD below it. During phaco, the cohesive OVD will likely be aspirated. At the end of the case, residual cohesive is removed, while the dispersive is left in the eye, as a thin layer coating the endothelium, to protect it. The eye is best treated with a cholinergic ocular hypotensive agent, either intracameral carbachol (for glaucoma patients—Miostat, Alcon Laboratories) or topical carbachol (I use 0.2% topically made in our pharmacy) to prevent postoperative intraocular pressure (IOP) spikes. If needed (patients with