A dilemma existed before the development of viscoadap-
tives. 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 “vis-
coelastic dispersive–cohesive soft shell technique” (SST).8
Subsequently, when viscoadaptives were found to have their
own different restrictions, the “ultimate soft shell tech-
nique” (USST) was devised to overcome those by pairing
extremely viscous viscoadaptives with the ultimate low vis-
cosity 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 adja-
cent 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% topi-
cally made in our pharmacy) to prevent postoperative
intraocular pressure (IOP) spikes. If needed (patients with

<table>
<thead>
<tr>
<th>Year of Class Appearance</th>
<th>OVD Class</th>
<th>Zero Shear Viscosity (mPa.s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>Viscoadaptives</td>
<td>7-24 x 10⁶</td>
</tr>
<tr>
<td>1992</td>
<td>Higher-viscosity cohesives</td>
<td>1-5 x 10⁶</td>
</tr>
<tr>
<td>1980 to 1987</td>
<td>Lower-viscosity dispersives</td>
<td>10⁴ – 10⁵</td>
</tr>
</tbody>
</table>

mPa.s = milliPascal seconds.
Note that the primary parameter used for classification is zero-shear viscosity.

**Soft Shell and Ultimate Soft Shell Technique**