

TABLE 4-1. OPHTHALMIC VISCOSURGICAL DEVICE CHARACTERISTICS

	COHESIVE	DISPERSIVE	VISCOADAPTIVE
Ability to displace and stabilize tissues with no shear	Excellent	Fair	Good
Protection of endothelium during irrigant flow	Fair	Excellent	Good
Clarity	Excellent	Good	Excellent
Ease of removal	Excellent	Poor	Good

Note: The molecular weight of a viscoelastic predicts how it is going to perform. Long molecular chain lengths with higher molecular weights tend to behave as cohesive OVDs, while products with shorter chain lengths and lower weights behave as dispersive OVDs.

TABLE 4-2. OPHTHALMIC VISCOSURGICAL DEVICES IN CATARACT SURGERY

STEP	OVD FUNCTION	NEEDED OVD PROPERTIES	PREFERRED OVD
Capsulorrhexis	Maintain deep anterior chamber, flatten capsule	High viscosity at low shear rates	Cohesive
Nuclear removal	Protect corneal endothelium, stay in the eye to coat tissues	Low MW, low surface tension	Dispersive
Remove cortical material	Protect corneal endothelium	Low surface tension	Dispersive
Inflate capsular bag, insert IOL	Maintain space	High viscosity at low shear rates, elasticity	Cohesive
OVD removal	Exits the eye completely and quickly	High MW, high surface tension	Cohesive
Posterior capsular tear	Tamponade vitreous, less IOP spike if retained	Low surface tension	Dispersive
Floppy iris, iris prolapse	Compartmentalizes the AC, weighs down on iris	Both cohesive and dispersive	Either two agents (cohesive and dispersive) or viscoadaptive

intraocular pressure. Cohesive OVDs have less coating ability (than dispersive OVDs) and therefore afford less tissue protection (eg, corneal endothelium) during surgery.

Dispersive OVDs, such as Healon EndoCoat and Viscoat, are short-chain, low-MW, lower-viscosity substances with low surface tension that act like “macaroni.” These properties produce excellent coating and protection at high shear rates (unlike “spaghetti,” “macaroni” will not tangle and therefore spreads out); however, they are more difficult to remove from the eye since they do not stick together and are aspirated in short fragments (the “macaroni” does not tangle). If retained in the eye, dispersive OVDs can cause increased intraocular pressure, however, generally less than retained cohesive OVDs.

Viscoadaptive OVDs attempt to combine the benefits of both cohesive and dispersive OVDs. Healon 5 is a long fragile chain, high-MW, superviscous substance. It acts

like cohesive OVDs at low flow and partially like dispersive OVDs at high flow conditions. When retained in the eye, Healon 5 has the tendency to cause intraocular pressure spikes. DisCoVisc, a compromise viscous dispersive agent, is moderately effective for stabilizing tissue, maintaining space at high shear rates, and coating the cornea.

OPHTHALMIC VISCOSURGICAL DEVICES IN SURGERY

As one can gather, OVDs have potential roles in nearly all intraocular ophthalmic procedures. Cataract surgery is the most common procedure performed by most ophthalmologists. OVD use in cataract surgery can be summarized in Table 4-2.