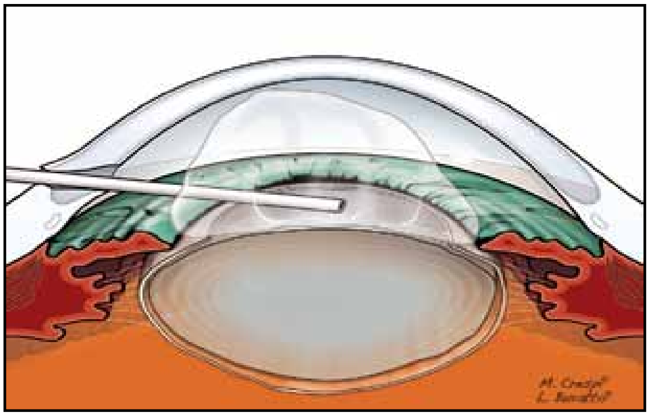

Figure 15-4. Soft shell technique. Injection of dispersive VES that will spread over the endothelial surface.

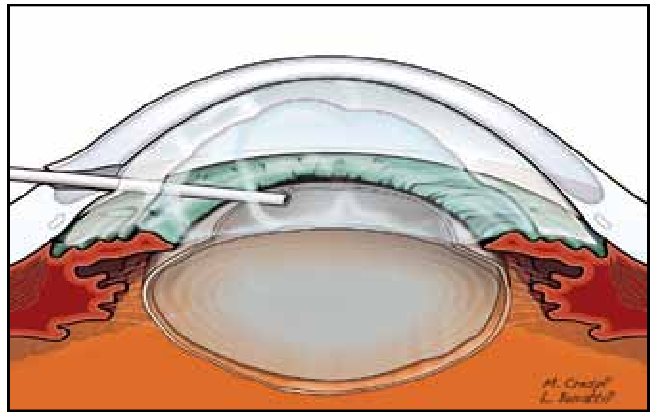

Figure 15-5. The surgeon injects a cohesive VES in the portion that is in contact with the anterior capsule of the crystalline to deepen the chamber, flatten the anterior capsule, and push the dispersive VES underneath the corneal endothelium.

that coats the endothelial surface and then a second injection of a cohesive VES in contact with the anterior capsule of the lens to distend and deepen the chamber, flatten the anterior capsule, and push the dispersive VES against the corneal endothelium. This will increase endothelial protection particularly in patients with Fuchs' endothelial dystrophy, and will result in more rapid postoperative recovery.[6]

Viscoelastic substances have a pH that varies between 7.0 and 7.5 with an osmolarity that ranges between 285 and 325 mOsm/L, the limit to prevent inflammation and toxic phenomena that may damage the corneal endothelium specifically, and more generally, all of the ocular structures. In addition to dispersive and cohesive VES, there is an additional category of VES called *viscodispersive* VES. One example of a viscodispersive VES is DisCoVisc.

It is a monophasic VES that can be used both in the early part of surgery (eg, during the rhexis and phaco) and in the final phases of IOL implantation. Like Viscoat, this VES contains HA and CDS (HA 1.65%, CDS 4%). Similar to the other VES containing CDS, the presence of the dual negative charge, in addition to the HA content, makes a contribution to increasing adhesion to corneal endothelium, improving protective qualities during phacoemulsification.

Finally, there is a fourth category of VES called the *adaptive VES*. The adaptive VES consist of long-chain molecules; thus, they are very dense and highly cohesive and can be split by a water flow. They have the same properties as a dispersive VES under certain situations such as a high cut rate, for example, when movements in the anterior chamber are at a high frequency (eg, during phaco); they demonstrate the properties of a cohesive VES in phases using low cut rates (eg, during insertion of the IOL). If these substances are not removed completely at the end of surgery, they can lead to significant increases in IOP.

Healon 5 is one example of an adaptive VES.[7]

The Role of Viscoelastic Substance During Cataract Surgery

During cataract surgery, VES has the following roles:

- Inflating and maintaining anterior chamber depth, particularly during rhexis.
- Flattening the anterior surface of the lens, particularly when the lens is intumescent, to reduce expulsion, that may lead to extension or escape of the rhexis.
- Covering the corneal endothelium and protecting it from the turbulence created by the irrigation fluids or floating lens fragments.
- Pushing the iris back from the entrance of the ultrasound probe; stabilizing the iris so that its movements are minimized during the turbulence.
- Buffering the friction caused when surgical instruments are introduced through small incisions.
- Temporarily tamponading a posterior capsular rupture until phacoemulsification has been completed or until the surgeon converts to a manual extracapsular technique.
- Creating space inside the anterior chamber and inside the capsular bag for IOL implantation (Tables 15-3 and 15-4).

References

1. Poyer JF, Chan KY, Arshinoff SA. New method to measure the retention of viscoelastic agents on a rabbit corneal endothelial cell line after irrigation and aspiration. *J Cataract Refract Surg*. 1998;24:84-90.