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with a rotating brush. For a precise correction by the laser, a clear corneal surface free of all epithelial debris must be obtained.

For the correction of myopia, more tissue has to be removed from the center of the cornea than the periphery (Figure 7-4). This is achieved by the diaphragm system that opens initially from the center and then increases the opening out to the periphery so that more laser light hits the center than the periphery of the cornea (Figure 7-5). The larger the diameter of the ablated area, the deeper the ablation has to be. For example, with a single zone treatment, if the surgeon were to choose a 3 mm optical zone to correct 10 D of myopia, the depth of the ablation in the center would be 30 μm . With a 6 mm optical zone, the central depth of the ablation would be 120 μm .

Poor night vision and other problems were found to be associated with small optical zones. At night, a patient's pupils are dilated beyond the zone of correction, so that the edges of the ablation are uncovered. Light coming into the eye is refracted from these edges, and halos are created around point sources of light, such as lamps. In addition, small optical zones are associated with regression of the surgical effect and hazy postoperative vision as the epithelium attempts to fill in the divot created by the laser.

Large optical zones have also been problematic. Current ophthalmic lasers are limited in their ability to produce homogenous beams over large diameters and, typically, there is a fall in the energy at the periphery. At the present state of development, the maximum ablation diameter of most commercial systems is 7.0 mm. Algorithms have been created for the commercially available laser systems to calculate the central depth of ablation given the intended refractive change and the ablation zone size.

There are three components to the stromal ablation procedure: pretreatment, astigmatism correction and refractive error correction. With some lasers, pretreatment is performed to prevent the development of "central islands" postoperatively. These are elevations in center of the cornea that remain after the rest of the treatment zone has been ablated, producing an uneven refracting surface. The cause of these islands is not known but it may be related to fluid in the center of the cornea pushed there by the shock waves from the

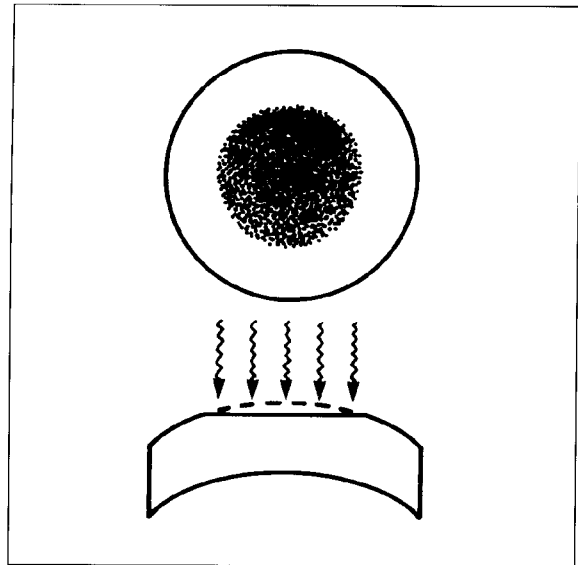


Figure 7-4. For the correction of myopia, more tissue is removed from the center of the cornea than the periphery.

laser ablation or, more probably, from a blocking effect as a result of the vortex plume. Pretreatment essentially consists of additional ablation in the 2.5 mm annulus of the cornea where central islands are more likely to occur.

With the VisX laser, the correction of astigmatism is achieved through the diaphragm system that first opens with a slit for the astigmatism correction phase. As the slit gradually opens, a refractive change occurs in the direction of the opening of the slit. For the correction of the refractive error of 6 D or less, a 6 mm treatment zone is usually ablated. Laser treatment of more than 7 D of myopia is not approved by the United States FDA, but is often performed in other parts of the world. For correction of these larger refractive errors, multiple zones with varied amounts of ablation are used.

The excimer laser we are most familiar with is the Chiron Vision Technolas Keracor 116 Excimer Laser System (Figure 7-6). It consists of an excimer laser, a beam delivery system with an operating microscope, an IBM-compatible PC, a patient bed and operating chair. The Keracor 117, the newest excimer laser system by Technolas, has a scanning spot delivery system substituted for the iris diaphragm.

Postoperative Course and Results with PRK

Postoperatively, topical antibiotic and corticosteroid medications are administered. The corticosteroid is continued for up to 6 months postopera-