

# HP Metal Blades

A review of the ClearCut HP and DupliCut HP models.

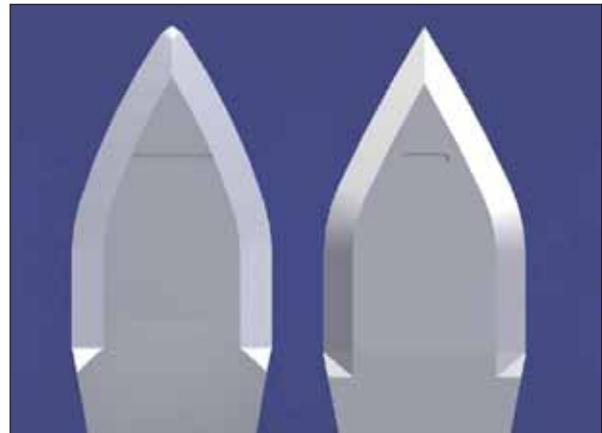
BY PETER MCGANNON, MD, AND JONATHAN B. RUBENSTEIN, MD

The majority of today's cataract surgeons prefer clear corneal incisions for creating the cataract wound. These incisions are popular because they allow a sutureless wound closure and promote efficient surgery. Several studies, however, have reported an increased incidence of endophthalmitis in cataract surgery using clear corneal versus scleral tunnel incisions. Taban et al, who reviewed data from thousands of cataract extractions from 1992 to 2003, found an incidence of endophthalmitis of 0.189% for clear corneal incisions compared with 0.074% for scleral incisions.<sup>1</sup> Nagaki et al reported a 4.6 times higher risk of endophthalmitis with the clear corneal approach.<sup>2</sup> Moreover, McDonnell et al, using optical coherence tomography to image the wound site, demonstrated prominent postoperative gaping of the wound in eyes with low IOPs.<sup>3</sup>

The association of clear corneal incisions and endophthalmitis is currently under intense scrutiny, because surgeons want to minimize the risk for their patients. Endophthalmitis prophylaxis is essential for any ocular surgery, but special consideration must be given to procedures involving sutureless clear corneal incisions. The reason is that all of these incisions are not the same. The careful construction of the wound and a meticulous surgical technique lead to proper wound architecture, which some believe to be the most important variable in minimizing the risk of postoperative endophthalmitis.<sup>4</sup>

Fine and Hoffman were the first to demonstrate the importance of an intact epithelial layer, which they found to be necessary for the corneal endothelium to generate the hydrostatic force needed to appose the roof and floor of the incision and ultimately prevent the wound's failure.<sup>5</sup> The evidence is clear; the risk of endophthalmitis can remain low with a properly created clear corneal incision.

Clear corneal incisions have also been shown to induce

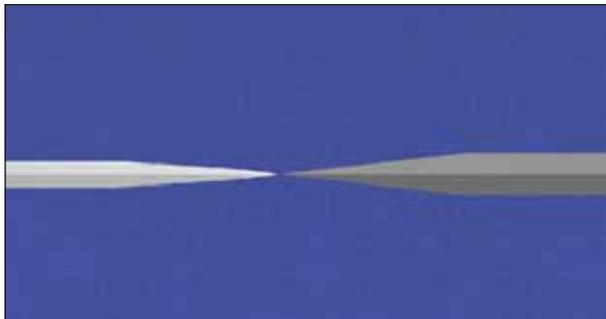


(All figures courtesy of Alcon Laboratories, Inc.)

Figure 1. The ClearCut HP blade (left) has a more convex tip than the ClearCut Dual-Bevel (right). The 2-mm reference marker is retained from the Dual-Bevel series.

astigmatism 90° from the site of the incision. A positive correlation between the size of the wound and the amount of induced astigmatism has been demonstrated in multiple studies.<sup>6,7</sup> Knowing the degree of induced astigmatism that is produced by one's corneal wound is important in planning the incision's size and location necessary to minimize postoperative astigmatism. With forethought, cataract surgeons can use strategically placed clear corneal incisions to reduce preexisting astigmatism.

A wide variety of surgical techniques necessitates many cataract blades. Today, two different materials dominate the market of knives for the clear corneal incision, diamond and metal. Diamond blades have the advantage of unparalleled strength and sharpness in a reusable format, but their cost can be prohibitive. The knives need to be sterilized between procedures, and, inevitably, some are damaged during the process. Metal blades have the advantage of being available in a cheaper, disposable for-



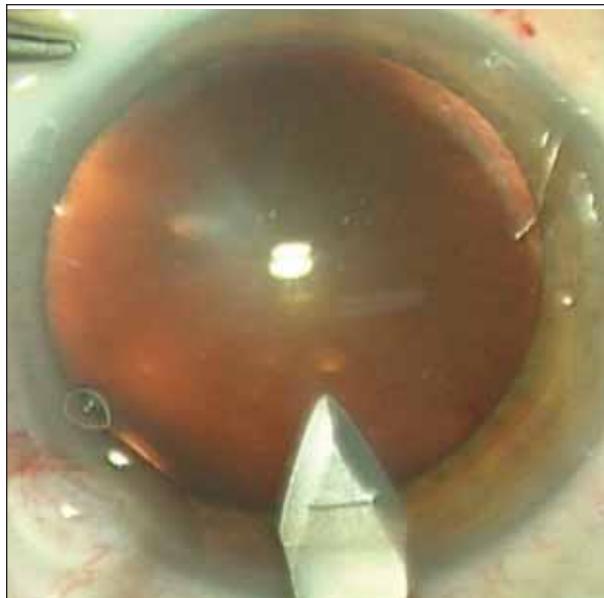
**Figure 2.** The ClearCut HP (left) is 50% thinner than the ClearCut Dual-Bevel (right).

mat. Bypassing the step of sterilization saves time, and a disposable blade eliminates the anxiety of damaging an expensive surgical instrument. Traditionally, the downfall of metal knives has been their lack of strength, resulting in a thicker, duller blade than with most diamond knives. Available since 2003, the ClearCut HP and DupliCut HP knives from Alcon Laboratories, Inc. (Fort Worth, TX), were designed to minimize these drawbacks.

“The HP series may require surgeons to make a small change in their technique for creating the incision and in their handling of the blade.”

## THE KNIVES

The ClearCut HP is a premium incisional blade that represents an expansion on the ClearCut Dual-Bevel blade (Alcon Laboratories, Inc.). The ClearCut HP maintains the dual-beveled technology, which allows the instrument to track exactly where the surgeon directs it. Parallel side cutting allows for continuous contact with ocular tissue as well as excellent control and efficiency. The stainless steel composition permits the surgeon some tactile feeling despite the blade’s sharpness, and the 2-mm depth mark provides a visual reference of the tunnel’s length. New to the ClearCut HP series is a more convex tip and less beveled angles to elicit less resistance from tissue and augment sharpness (Figure 1). The new blade also has a thinner profile but the same strength to promote better postoperative apposition of the incision’s edges. The ClearCut HP is 50% thinner than the Dual-Bevel blade, but their tips are equally strong (Figure 2). Alcon Laboratories, Inc., uses its EPX technology, a proprietary electropolishing process, on the HP blade to harden it and ensure a consistent edge with exquisite sharpness. According to the company, when incising a



**Figure 3.** The ClearCut HP incises clear cornea.

bovine eye during testing, the ClearCut Dual-Bevel blade required 70 g of force to penetrate the eye compared with 48 g of force for the ClearCut HP and 40 g of force for a traditional diamond blade. The DupliCut HP has all of the same features of the ClearCut HP discussed herein but without the parallel side-cutting option.

With the ClearCut HP, we can feel the “pop” as it passes through Descemet’s membrane. We have also found that the knife drags less in tissue and causes less distortion compared with other metal blades. Even after several uses, the ClearCut HP has produced repeatable results. These qualities facilitate the proper construction of the wound and help decrease the risk of endophthalmitis. Increased control of the blade also allows us to produce precise and repeatable astigmatic effects with our clear corneal incisions (Figure 3).

## TIPS FOR USE

Switching to the blades in the HP series may require surgeons to make a small change in their technique for creating the incision and in their handling of the blade. Users of the ClearCut Dual-Bevel series should notice an improvement with the HP series, but those who have been operating with the single-beveled slit knife will not transition directly to this blade as easily. The reason is that single bevel-up blades move slightly downward upon advancement. Thus, surgeons who have favored these knives are used to starting an incision with a metal bevel-up blade flat against the sclera. With dual-beveled blades, a steeper, more parallel approach is needed. These surgeons

*(Continued on page 92)*

## A SELECTION OF DIAMOND KNIVES

| Company   | Knife   | Blade's Size  | Blade's Characteristics   |
|---|---|---|---|
| Accutome, Inc.<br>Malvern, PA<br>(800) 979-2020<br>www.accutome.com                 | Simplicity Clear Cornea Diamond Keratome                              | Parallel sides: 2.50 through 3.20 mm. Trapezoid sides: 2.50/2.80 mm, 2.70/3.20 mm, 3.00/3.20 mm, 2.65/3.00 mm, 2.80/3.00 mm, 3.00/3.50 mm, 2.50/3.50 mm         | Natural diamond with unique top and bottom bevel designed to create a self-sealing incision with a single pass  |
|   | Rubenstein LRI Diamond Knife  | Preset to 0.50, 0.55, or 0.60 mm for precise incisional depth   | Natural diamond in a truncated Lancet or Lancet design for outstanding incisional quality   |
|   | Micro Incision (microcoaxial/bimanual)                                | 1.5-mm clear cornea. Trapezoid blades: 0.5/1.0 mm, 0.7/1.2 mm, 1.2/1.4 mm, 1.0/1.5 mm, 2.0 mm, 2.2 mm, and 2.4 mm   | Natural and CVD Black Diamonds (microincisional cataract surgery) designed for the modern microincisional techniques. Ideally suited for bimanual and microcoaxial                              |
| ASICO LLC<br>Westmont, IL<br>(800) 628-2879<br>www.asico.com                        | Akahoshi Ultra Diamond Knife (No. AE-8190)                            | 2.0 mm at the shoulder; 2.3 mm at the base  | Trapezoid blade with side-cutting edges   |
|   | Fukuyama LRI Diamond Knife (No. AE-8194)                              | Width: 1.00 mm. Depth: up to 2.00 mm in 0.01-mm increments  | Six-faceted blade with side-cutting edges and flat tip  |
|   | Zaldivar LRI Diamond Knife (No. AE-8147S)                             | Width: 1.00 mm. Depth: 0.60 mm  | Trifaceted blade with side-cutting edges  |
| Bausch & Lomb<br>Storz Instruments<br>(800) 338-2020<br>www.storz.com               | Nichamin Diamond LRI Knife (No. E0123)                                | 100 $\mu$ m   | Fine 15° blade has microflat tip to ensure blade's stability and smooth glide through corneal tissue  |
|   | Donnenfeld LRI Diamond Knife (No. E0124)                              | 0.6-mm fixed depth  | Trifaceted 20° is for incisions to the left or right and is angled 10° for better alignment and approach  |
|   | Brown Tri-Facet Diamond Knife (No. E0118)                             | 1.4 mm  | Tri-facet shaped diamond blade provides excellent control when used in a sweeping motion during scleral tunneling   |
| DGHKOI Inc.<br>Shermans Dale, PA<br>www.dghkoi.com<br>(800) 344-9674                | Keratome: Clear Cornea  | Trapezoid sides: 2.5/3.0 mm, 2.7/3.2 mm. Customized widths available. Parallel sides: any width 2.5 to 3.5 mm. Self glide. Large bevel up: any customized width | Natural diamond. Parallel and trap configurations. The Stealth DBO provides a truly straight incision penetrating through Bowman's and Descemet's membranes without inducing corneal distortion |
|   | Excel Series: Groove/LRI  | Lance 1 mm. Single edge 30°, 45°, and trifacet  | Excellent, affordable option for paracentesis, limbal relaxing incision, and groove   |
|   | KMT Series: Custom Micro Incision                                     | 2.2, 2.4 mm. All customized sizes and configurations available  | Natural diamond. All KOI blades are honed in house. Microblades are tailored to meet the customer's small-incisional needs  |
| Duckworth & Kent<br>USA Ltd.<br>St. Louis, MO<br>(314) 849-7773<br>www.dandkusa.com | Wallace LRI Diamond Knife (No. 4-620)                                 | 1.0 mm  | 0.2 mm, flat at tip   |
|   | Barrett Lance Blade (No. 5-825)                                       | 1.0 mm  | Lance   |
|   | Thornton Triple Edge Arcuate (No. 5-360-1)                            | 1.0 mm  | 100- $\mu$ m blade thickness with three cutting edges to cut deeply and evenly  |
| Katena Products, Inc.<br>Denville, NJ<br>(973) 989-1600<br>www.katena.com           | Diamond LRI Step Knife (No. K2-6518)                                  | Precalibrated to 600 $\mu$ m; 0.6-mm depth  | Gem-quality clear diamond featuring a double-beveled six-faceted edge for bidirectional cutting   |
|   | Diamond LRI Step Knife (No. K2-6519)                                  | Precalibrated to 500, 550, and 600 $\mu$ m; three depths  | Gem-quality clear diamond featuring a double-beveled six-faceted edge for bidirectional cutting   |
|   | Diamond LRI Micrometer Knife (No. K2-6522)                            | Depth settings from 0 to 1.5 mm in 10- $\mu$ m increments   | Gem-quality clear diamond featuring a double-beveled six-faceted edge for bidirectional cutting   |
| Mastel<br>Rapid City, SD<br>(800) 657-8057<br>www.mastel.com                        | Gimbel SuperStealth Knife   | 1.7/2.2 mm, 2.0/2.5 mm  | Trapezoid shape. Self-sealing attributes. All Signature Series Premium Diamonds are ultrathin and Stealth faceted   |
|   |   | 2.3/2.8 mm, 2.5/3.0 mm  |   |
|   |   | 2.7/3.2 mm, 2.4/3.5 mm  |   |
| Stealth Triamond Knife  | 0.3-mm truncated tip, angled to 1.2 mm                                | Self-sealing attributes. All Signature Series Premium Diamonds are ultrathin and Stealth faceted  |   |
| New: PhD II Refractive Phaco/LRI Knife  | Stealth Triamond 0.3-mm truncated tip                                 | All Signature Series Premium Diamonds are ultrathin. Ideal for creating arcuate incisions   |   |
| PelionSurgical<br>Aiken, SC<br>(888) 883-3991<br>www.pelionsurgical.com             | Pelion/Metico Dagianis Limbal Relaxing Diamond Knife                  | 1.0 mm; 0.17 mm thick   | Natural clear diamond, lance shape with microfacet at tip for ease of turning and more effective limbal relaxing incision   |
|   | Pelion/Metico Universal Cataract Diamond Knife                        | 1.0 mm; 0.17 mm thick   | Natural clear diamond, trifaceted, 45°, triamond (lance shape with microfacet)  |
|   | Pelion/Metico Angled Diamond Knife                                    | 2.65, 2.80, 3.00, 3.20 mm; any size of trapezoid from 3.20 to microincisional   | Natural, clear diamond in trapezoid for any cataract incision. Customized blades available  |
| Rumex International<br>Co.<br>St. Petersburg, FL<br>(727) 568-0909<br>www.rumex.net | Trapezoid Self-Diving Diamond Knife (No. 6-20/6-101)                  | 2.7/3.2-mm width  | ThermoCut natural Siberian diamond trapezoid blade  |
|   | Coaxial MicroIncision Diamond Knives (Nos. 6-20/6-144 and 6-20/6-107) | 1.8/2.0-mm width; 2.0/2.3-mm width  | ThermoCut natural Siberian diamond trapezoid blade  |
|   | LRI Trifacet Knife (No. 6-321/6-0531)                                 | 0.2/1.0-mm width  | ThermoCut natural Siberian diamond trifaceted 20° blade   |

**DIAMOND KNIVES**

(Continued from page 86)

may benefit from transitioning first to the ClearCut Dual-Bevel series before moving on to the HP series.

The decreased amount of tissue-related drag with the HP series can cause the blade to skid during its advancement without biting down into an incisional path. This sliding creates a long, anterior incision if the surgeon is not accustomed to the knife. We suggest that ophthalmologists advance the blade slowly at first until they have become familiar with it. Alcon Laboratories, Inc., recommends surgeons create an initial groove for a two-plane incision when initially transitioning to and becoming comfortable with the HP blades.

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## CONCLUSION

Surgeons who want to upgrade the performance of their metal blade, who are tired of the high costs and maintenance of diamond blades, or who seek a backup for their diamond knife may wish to consider the ClearCut HP series. We have found that these knives provide consistent results. ■

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