Diamond Blade Knife Care: Safe Reprocessing Without Breaking

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By:
Posted on: 04/09/2013

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While diamond blade surgical knives are still preferred by top ophthalmologists over steel knives for precise cuts that dissect tissue instead of tearing it, particularly for cataract surgery, the downside is that they are very fragile and expensive. Breakage can occur during cleaning before sterilization even without human error.

Improper cleaning of the blades can also lead to a clear material build-up, invisible to the naked eye, that dulls the cutting edge. This can lead ophthalmologists to send their diamond blades back to the manufacturer for costly cleaning and re-honing much more often than needed.

"You don't want any debris on the diamond blade," says board-certified ophthalmologist Mitchell A. Jackson, MD, a cataract and refractive surgery specialist who performs about 2,000 procedures a year between his private practice and ambulatory surgery center. "It's like having a damaged blade and hurts its performance. The whole purpose of using a diamond blade is reproducibility of a precise cut, every cut, every case."

To help ophthalmologists eliminate costly diamond blade knife damage and debris-caused dullness, cleaning systems have been developed that enable safe, efficient cleaning without breakage. This is helping ophthalmologists to save thousands of dollars annually while improving practice efficiency.

"Diamond blades are much more precise than steel, will cut right through softer eye tissue without distorting it, and provide better wound closure," says Jackson. His private practice, called Jacksoneye, is a clinical study site that conducts research and clinical studies on surgical devices, new lens implants and medications before they are available to the medical community.

"Over the years, we've used a variety of diamond blade cleaning techniques from punching styrofoam and special cloths to ultrasound and steam cleaning, but these techniques always led to a rougher, less precise edge or damaged blade, even when there was no human error," says Jackson, who has performed more than 50,000 cataract and laser vision correction procedures since 1993, and presents at U.S. and international symposiums on cataract and refractive technologies. "Once that happens, the diamond blade is no better than steel, typically requiring it to be sent back to the manufacturer for expensive re-honing or diamond replacement."

Though diamond blade re-honing can cost more than $500 and diamond replacement can cost a couple thousand dollars, if proper care is taken of diamond blades they are less expensive than disposable steel blades on a per case basis, according to Jackson.

"Cleaning diamond blades correctly is critical," says Jackson. "A diamond blade can last for decades if you take care of it. I've used some of mine for 15 to 20 years. One new cleaning system I've used has enabled very safe, cost-effective cleaning of diamond blade knives."

In general, "the more handling required or the more complex the cleaning process, the more likely that a diamond blade will accidentally be touched and damaged," according to Jackson. He also stresses the importance of not placing the diamond blade where debris from previous cleanings can contact or otherwise damage the blade.

"Ultrasonic cleaning is time consuming, as well as prone to vibration and human error," says Jackson. "You need to change the cleaning solution each time to prevent debris from previous cleanings from hitting the diamond and potentially chipping it."

"The ultrasound also eats away at the glue holding the blade in the handle so eventually the blade drops off, usually into the ultrasound," adds Jackson. "There have been cases where the blade was accidentally tossed out with the solution."

Since each diamond blade is thin and wide, high-pressure steam cleaning can push on one side of its crystalline structure, creating a tendency to break along a crystalline plane. This can cause chipping, leading to edges that become serrated instead of smooth over time.

To eliminate costly diamond blade knife damage, cleaning systems have been developed that do away with unnecessary actions, vibration, pressure, and contact surfaces. To eradicate debris-caused diamond blade dullness, these systems establish protocols that make placing the blade in an area with debris impossible.

One such system, available from various companies including Micro-Scientific, Accutome, Mastel Precision, and Rhein Medical, provides for cleaning of the blade in a small tray that holds three pre-packaged, gel-like pads. One larger pad contains a cleaning solution. Two smaller pads, soaked with distilled USP water, act as rinses.

"Since we've followed Micro-Scientific's Opti-Kleen diamond blade cleaning protocol, I haven't had to send my diamond blades to the manufacturer for cleaning," says Jackson. "It's simple enough for anyone to clean the blade without damage, and the blade is reproducibly sharp every time."

Rolling Meadows, Ill.-based Micro-Scientific develops products and systems to reduce risk in healthcare facilities, specializing in the prevention of microbial transmission and cross-contamination.

For cleaning, the blade is used to cut through the three pads in sequence, which can take less than 10 seconds. Several gentle passes will remove tissue and other debris from the blade surface and deposit it into each pad. Then, following standard industry practice, the blade is put in a sterilizer and sterilized.

The three pads are made of a closed-cell foam material designed to be safe for diamond blades and absorb fluid like a sponge. As the diamond blade cuts through each foam pad in sequence, bubbles in the foam stick to the blade, creating a resistance that safely removes debris and deposits it into the foam. Single-edged blades need only cut in one direction; double-edged blades cut back and forth to fully clean each blade edge to a pristine condition.

"Because the diamond blade is always put in a fresh part of each pad, there is no debris build-up," says Jackson. "It's a controlled, reproducible, cleaning technique that can help prevent diamond blade damage and contamination, while improving practice efficiency on surgery days."

With the diamond blade cleaning system, the knife is always put into a clean spot on each pad if the technician follows protocol. Moving from left to right about a half inch in each pad after each blade cleaning, the technician can clean about 50 diamond blades per cleaning tray without going over the same spot. Typically a new cleaning tray with new pads is used at the start of each surgical day.

"Following the diamond blade cleaning system, we save at least four repairs and a blade replacement per year, with the same surgeon and staff," says Jackson. "Practices with multiple surgeons and different staff, which are more prone to cleaning errors, would likely see greater benefit."

Compared to more complicated, time-consuming cleaning methods, ophthalmologists using the diamond blade cleaning system can realize significant timesavings that may allow them to see more patients per day.

"Compared to ultrasound cleaning, we save several minutes per surgical case with the diamond blade cleaning system, which allows me to do one or two additional surgical cases per day," says Jackson. "Using the system has added between $10,000 to $20,000 annually to our practice's bottom line in reduced diamond blade repair, replacement, and additional gained surgery slots."

Source: Micro-Scientific