

The Visual Effects of Acrylic Versus Silicone

Does the composition of the lens significantly influence patients' visual results?

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Today, cataract surgeons may choose among IOLs made of various materials, which raises the question of which material offers patients the best visual results. This article reviews the literature on this subject.

VISUAL FUNCTION

Many investigators have studied the effects of different IOLs on vision. These studies have largely focused on contrast sensitivity, functional visual performance, ocular aberrations, and scotopic/mesopic vision. In a comparison of the clinical results of silicone and acrylic lenses in a diabetic population, Choung and Lee¹ found no significant difference in visual acuity between the groups. Negishi et al² studied the effect of chromatic aberration on contrast sensitivity in patients who received IOLs made of different materials. They found that, under certain conditions, patients' mean contrast sensitivity was lower with acrylate-methacrylate copolymer lenses versus silicone or polymethylmethacrylate (PMMA) lenses.

Multiple researchers have studied the different lens materials. Although some have demonstrated benefits to certain styles of IOL, no single study has directly compared equivalently styled acrylic and silicone lenses to evaluate their effects on visual function.

POSTERIOR CAPSULAR OPACIFICATION

Numerous direct, comparative studies have examined the effects of lens material on the rate of posterior capsular opacification (PCO), but their results conflict. Although some studies have demonstrated a benefit of acrylic versus silicone in terms of decreasing PCO, other research has indicated that the IOL's design—square edges in specific—may be a more important factor in the rate of PCO.³ In a randomized, prospective study by Ursell et al,⁴ 90 patients received silicone, acrylic, or PMMA lenses. The investigators found that, at 2 years, the percentage of patients with PCO was significantly reduced ($P < .05$) in the patients receiving acrylic IOLs

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(11.75%) as opposed to either PMMA (43.65%) or silicone (33.50%) IOLs.

FLARE AND DEPOSITION

Acrylic IOLs have different viscoelastic properties and surface quality compared with lenses made of other materials. Junior and Wishart⁵ conducted a study comparing silicone, acrylic, and PMMA lenses in patients undergoing combined phacoemulsification and trabeculectomy surgery. They found that patients with silicone lenses developed more postoperative flare in the anterior chamber and more giant cell deposits on the IOL than patients who received IOLs composed of the other materials studied. Specifically, 24.6% of the silicone group developed giant cell deposits on the anterior surface of the lens compared with zero in the PMMA group and 2.7% in the acrylic group ($P < .0001$).

TILT AND DECENTRATION

After cataract surgery, the IOL may tilt or become decentered. Fortunately, improved phaco techniques and surgeons' increased use of a continuous curvilinear capsulorhexis have decreased the incidence of these complications. Jung et al⁶ compared the rate of decentration and tilt among IOLs composed of various materials and found no significant difference between the groups based on material.

CONCLUSION

There is little data to support a significant difference between equivalently styled acrylic and silicone IOL plat-

forms with regard to visual quality. Design features such as asphericity and the IOL's edge seem to play a more significant role in the differences of visual quality among available lenses. Surgeons' selection of a silicone or acrylic lens frequently relates to other factors, including handling, biocompatibility, the presence of silicone oil in the eye, and personal preference. ■

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