Non-Posterior Capsular Bag Intraocular Lens Implantation: A Comprehensive Review

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Purpose: To review the evolution, current techniques, and outcomes of intraocular lens (IOL) implantation in the absence of posterior capsular support (non-posterior capsular bag IOLs), with emphasis on historical developments, classifications, surgical considerations, complications, and future directions.

Methods: A narrative literature review was performed, analyzing historical milestones from early iris-supported IOLs to contemporary sutureless scleral-fixation techniques. Sources included peer-reviewed articles, clinical case series, and recent meta-analyses. Particular attention was given to anterior chamber, iris-supported, sulcus-fixated, and scleral-fixated IOLs in both adult and pediatric patients.

Results: Secondary IOL implantation has advanced considerably over the past seven decades. Early anterior chamber and iris-clip lenses addressed aphakia but carried high risks of endothelial damage and UGH syndrome. Scleral-sutured IOLs, introduced in the 1980s, allowed posterior chamber positioning but raised concerns about late suture breakage. More recent sutureless approaches, including fibrin glue-assisted fixation, flanged haptic externalization, and dedicated designs such as the Carlevale lens, have improved stability and reduced suture-related complications. Each technique has unique advantages and limitations. Anterior chamber lenses are simple but carry corneal risk; iris-fixated lenses allow rapid visual rehabilitation but depend on iris health; sulcus placement requires capsule remnants; scleral fixation offers physiologic lens position but carries higher risk of dislocation or hemorrhage. In children, timing of implantation and amblyopia management are critical; iris-claw and scleral-fixation lenses have both shown safety and efficacy in selected cases.

Conclusions: Non-PCB IOL implantation remains an essential solution for managing aphakia without capsular support. Surgical planning must be individualized, considering ocular anatomy, patient age, and surgeon expertise. Modern sutureless scleral-fixation techniques represent a significant step forward, offering stable long-term outcomes with fewer complications. Continued refinements in IOL design and technique are expected to further improve safety and effectiveness, particularly in complex adult and pediatric cases.