MAR Ophthalmology and Ocular Therapeutics (2026) 9:1

Case Report

Posterior Lens Capsule Thickness and the Role of Ethnicity in Posterior Capsule Rupture During Phacoemulsification a Long-Term Case Series Experience

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Received: 07 January 2026

Published: 01 February 2026

DOI: https://doi.org/10.5281/zenodo.18450232

Abstract

The posterior lens capsule is inherently thinner and more fragile than the anterior capsule. Despite extensive investigations into age-related and disease-associated changes affecting its biomechanical properties, there is no convincing histological or clinical evidence demonstrating statistically significant differences in posterior capsule thickness among different ethnic groups. Available evidence indicates that factors such as patient age, axial length, diabetes mellitus, prior intraocular inflammation, and zonular integrity play a more substantial role in the occurrence of posterior capsule rupture during cataract surgery than ethnicity itself.

Introduction

The posterior lens capsule constitutes the thinnest and most delicate portion of the crystalline lens, with a thickness of approximately 3–4 μm in adults. Although it exhibits a modest increase with advancing age, it remains significantly thinner than the anterior capsule [1–3]. Despite numerous investigations, current evidence remains insufficient to establish clear ethnic differences in posterior capsule thickness or mechanical strength [4,5]

Objective

To assess whether ethnicity influences susceptibility to posterior capsule rupture during phacoemulsification, while presenting a long-term clinical experience and acknowledging that factors such as age, axial length, and cataract maturity exert a greater impact on rupture risk [6–8]

Case Series Experience

The author reports a 15-year observational experience involving patients who underwent phacoemulsification cataract surgery in Sudan, Libya, Mauritania, Morocco, and Niger. All procedures were performed by a single surgeon using comparable surgical techniques and instrumentation. Approximately 1,000 consecutive cases from each country were included in the analysis.

Results

The highest incidence of posterior capsule rupture was observed in Sudan (150 per 1,000 cases), followed by Niger (90 per 1,000 cases) and Mauritania (50 per 1,000 cases). The lowest incidence was recorded in Libya and Morocco (10 per 1,000 cases)

Discussion

This case series was not designed as a controlled comparative study, and not all potential confounding variables were fully controlled. Consequently, the observed differences should not be interpreted as intrinsic ethnic variations but rather as the cumulative influence of anatomical, pathological, environmental, and surgical contextual factors. These findings further emphasize that posterior capsule rupture risk is predominantly related to patient-specific and procedure-related factors.

Conclusion

Current evidence does not support a definitive association between ethnicity and posterior capsule thickness or mechanical strength. The observed variability in posterior capsule rupture rates should be considered hypothesis-generating and underscores the need for well-designed prospective studies to further elucidate contributory risk factors.

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