Association between IOL design and incidence of PCO and Nd:YAG capsulotomy: A retrospective real world evidence study in the UK

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Background
- Posterior capsule opacification (PCO) is the most frequent complication following cataract surgery1–3, with incidence figures ranging between <5% and 10%4,5.
- PCO may develop in a few months to years following cataract surgery. Patients with PCO experience abnormal proliferation of lens epithelial cells on the posterior capsule, leading to visual obstruction and vision dimness.
- Neodymium-doped yttrium aluminium garnet (Nd:YAG) laser capsulotomy is the only effective surgical treatment for PCO, but can be associated with complications that include extracapsular cataract extraction, retinal detachment, and endophthalmitis.
- Previous studies have shown hydrophobic acrylic lenses to be associated with less frequent and less severe PCO6,7 and with longer time until the need for Nd:YAG capsulotomy8.
- In this study, real-world incidence of both PCO and Nd:YAG in the 5 years post-cataract surgery were assessed in a large UK population, including their association with IOL design.

Objectives
- To evaluate the long-term incidence of PCO and Nd:YAG capsulotomy in patients following cataract surgery at 5 years, comparing results for different single-piece acrylic intraocular lens (IOL) brands.
- To estimate the adjusted odds ratios of PCO and Nd:YAG capsulotomy at 5 years post-cataract surgery, based on IOL manufacturer/model and other covariates.

Methods
Study Design
- This was a longitudinal retrospective cohort study including electronic medical record data collected from 7 UK ophthalmology clinics.
- The study period was between 1st Jan 2010 and 31st Dec 2016.
- The cohort included patients aged 65 years or older that underwent cataract surgery and were implanted with acrylic monofocal IOLs between 2010–2013.
- For purposes of this analysis, only eyes undergoing cataract surgery up to the end of 2011 were included, to allow sufficient follow-up time post IOL implant.
- The study population was restricted to patient eyes implanted with frequently used single-piece IOL models (i.e. implanted in at least 500 eyes during the study period) considering large sample size of the study.

Statistical Analyses
- Bonferroni-adjusted series of painless comparisons were conducted, where the incidence of PCO and Nd:YAG capsulotomy at 5 years was evaluated in each IOL brand group, and compared using t-tests with the incidence observed in the AcrySof® IOL group.
- To estimate the odds ratios for PCO and Nd:YAG capsulotomy at 5 years post-cataract surgery:
  - An adjusted multivariate logistic regression analysis was performed by including different factors in the model: IOL brand/manufacturer (reference group: AcrySof®), age, gender, and other clinical and surgical characteristics.
  - Stepwise method was used for variables selection (with a 5% level of significance).

Results
The inclusion criteria for the study population were:
- Cataract surgery with single-piece, non-rotation, monofocal, acrylic lenses (<500 occurrences)
- In-the-bag placement of IOL during surgery
- Age 65+ at the time of cataract surgery
- Cataract surgery occurred between 1st January 2010 and 31st December 2011 to allow at least 5 years of follow-up time
- Exclusion of eye with vitrectomy, previous pars plana vitrectomy, PPV, or eyes with cataract surgery during the study period

The resulting population included 20,763 eyes (from 16,595) implanted with different IOL brands (see Figure 1 and Table 1).

Strengths and Limitations

Strengths
- Longitudinal design and large sample size, which provided robust statistical power for comparative analysis.
- The use of Medisoft EMR data, a validated and widely accepted source of research data.
- Use of adjusted logistic regression to account for potential confounders.

Limitations
- Absence of primary care data (e.g., missing co-pathologies) and secondary care data from other clinics (e.g., missing related procedures).
- Missing data, specifically with regards to death recording.
- Absence of an indicator of patients de-registering from the clinic or moving to a different area, which meant follow-up was estimated as the time between cataract surgery, and data extraction or death (where recorded).

Conclusions
- Choice of IOL implanted during cataract surgery can influence long-term outcomes, and this study demonstrates that single-piece AcrySof IOLs are associated with a significantly lower incidence of PCO and Nd:YAG capsulotomy compared with other single-piece IOL brands at 5 years post-cataract surgery.
- These findings were confirmed even when adjusted for confounding effects and related factors in the model (see Table 1).

References