Incidental Finding of Calcification in Explanted Hydrophilic Acrylic Intraocular Lenses

Phillip Qu, MD[1], Catherine Culp, MD[1], Maceda Gurabardhi, MD[2], Liliana Werner, MD, PhD[1]

From the: 1) Department of Ophthalmology and Visual Sciences, John A. Moran Eye Center, University of Utah, Salt Lake City, UT, USA; and 2) Vivantes Klinikum Neukoelln, Ophthalmology Department, Berlin, Germany

Financial Disclosures

- Supported in part by an unrestricted grant from Research to Prevent Blindness, Inc, New York, NY, USA to the Department of Ophthalmology and Visual Sciences, University of Utah
- The authors have no financial or proprietary interest in any product mentioned in this paper

Background

- Intraocular lens (IOL) opacification is a rare complication after IOL implantation
- In hydrophilic acrylic IOLs, the most common cause of opacification is calcification
- To our knowledge, there have been no studies revealing the presence of calcification on IOLs before they become clinically significant

Methods

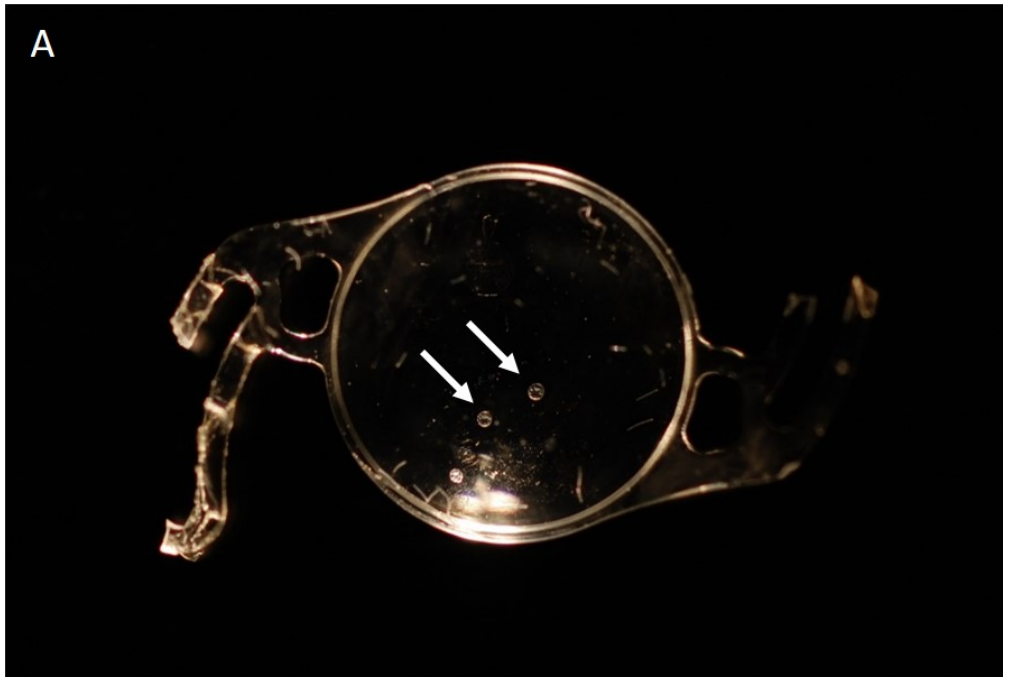
- 581 IOLs explanted at single surgical center in Germany from 2005 to 2019 were received in the dry state and prepared for gross examination and photographs
- Detailed light microscopic examination was performed and photographs were taken
- Further examination (as below) was done on explanted hydrophilic acrylic IOLs
- Histochemical staining with Alizarin Red was performed to confirm the presence of calcium deposits
- Scanning electron microscopy (SEM) coupled with energy dispersive X-ray spectroscopy (EDS) was done to confirm that the deposits are composed of calcium and phosphate
- Light transmission was assessed on suitable IOLs that exhibited incidental signs of calcification but were explanted for reasons other than opacification
- These values were compared to light transmission results obtained from IOLs that were explanted for opacification

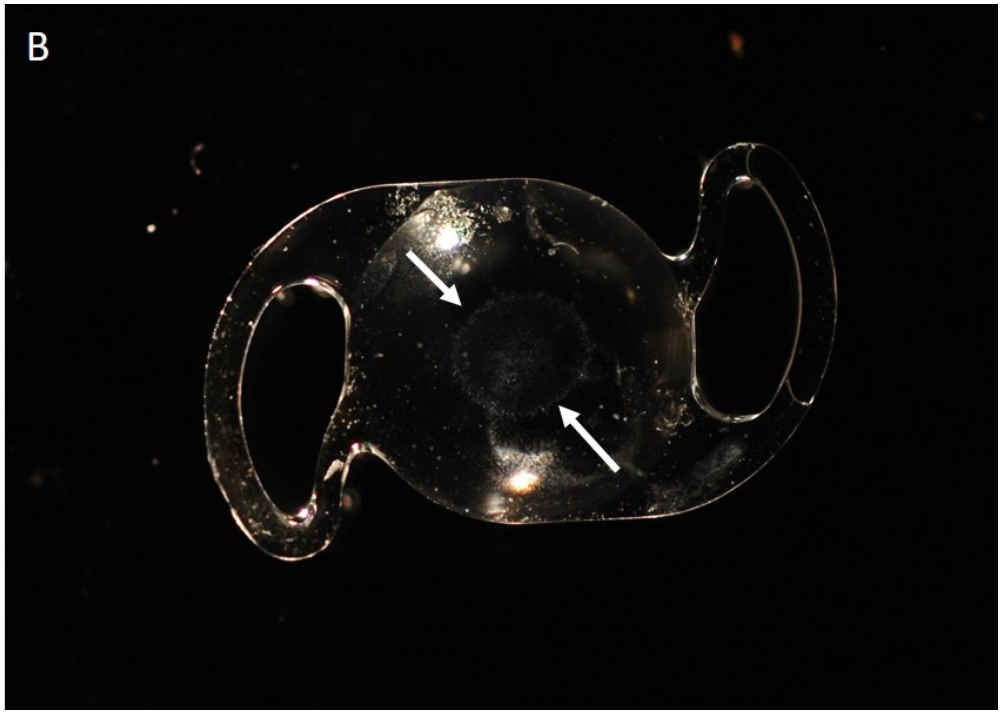
Results

- Of the 581 IOLs submitted, 144 were composed of a hydrophilic acrylic material
  - Reasons for explantation included opacification (N= 87), dislocation (N= 53), refractive error (N= 3), and photic phenomena (N= 2)
- All hydrophilic acrylic IOLs explanted for opacification showed calcified deposits on examination
- We also found subtle signs of calcification on 14 hydrophilic acrylic IOLs in patients with no history of opacification
- Explantation of hydrophilic acrylic IOLs due to opacification was performed at 61.2 ± 38.4 months after implantation
- Explantation of hydrophilic acrylic IOLs found to have incidental calcification was performed 75.44 ± 50.74 months after implantation

Results

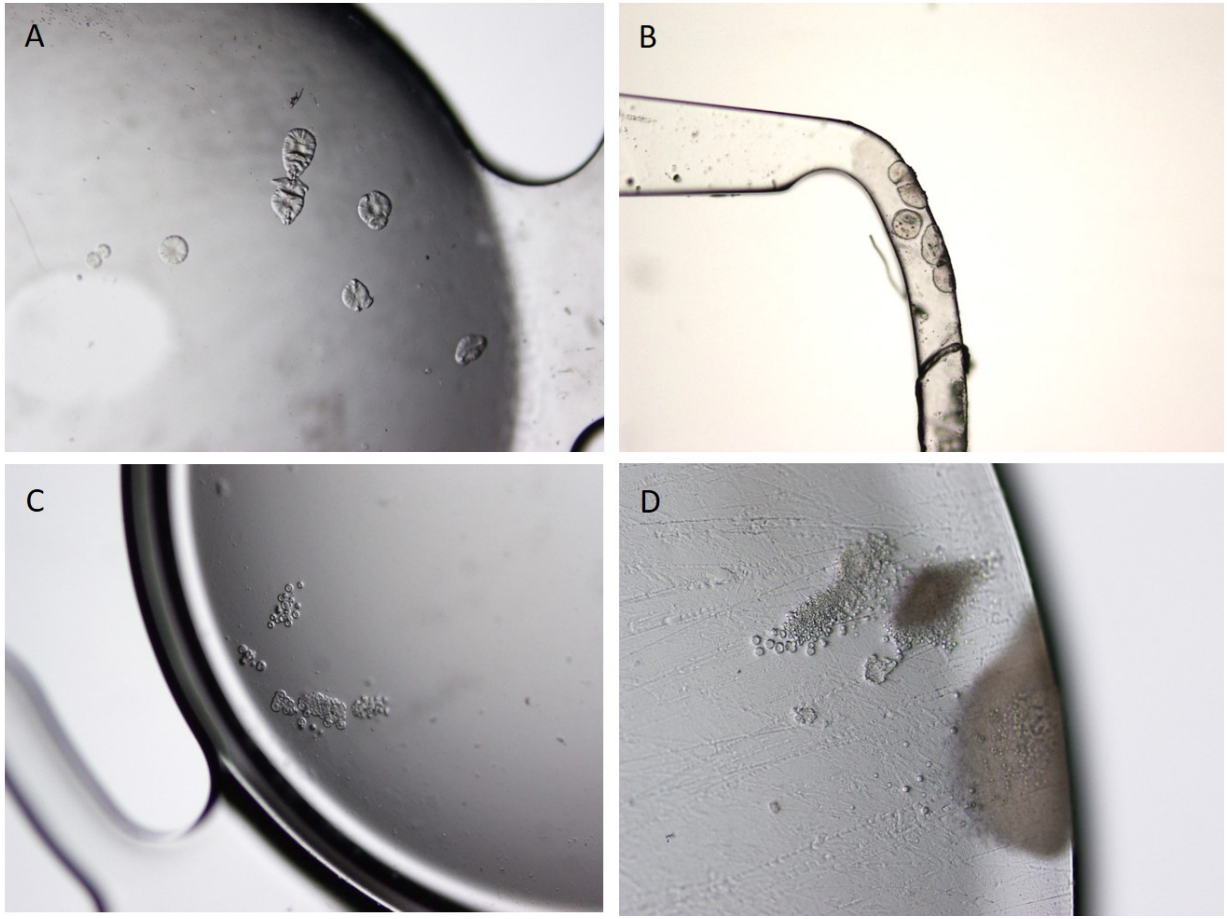
- Gross examination





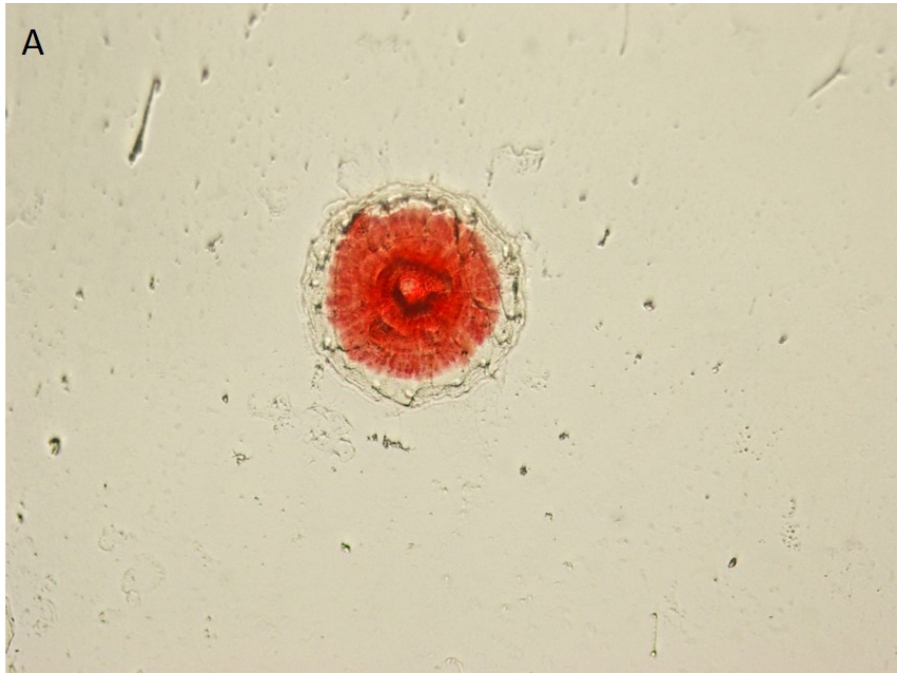
Results

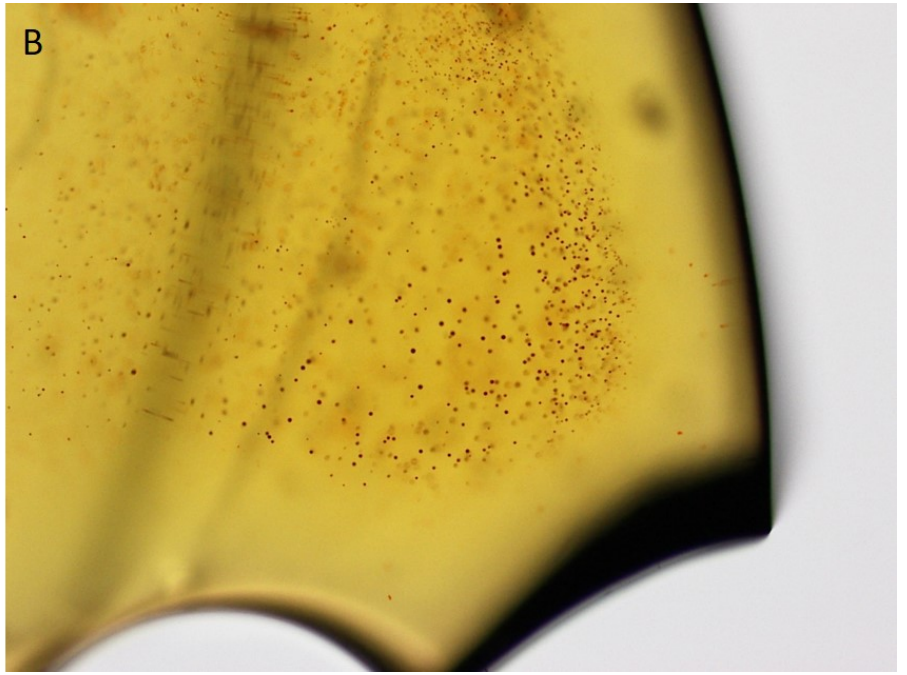
- Light microscopy



Results

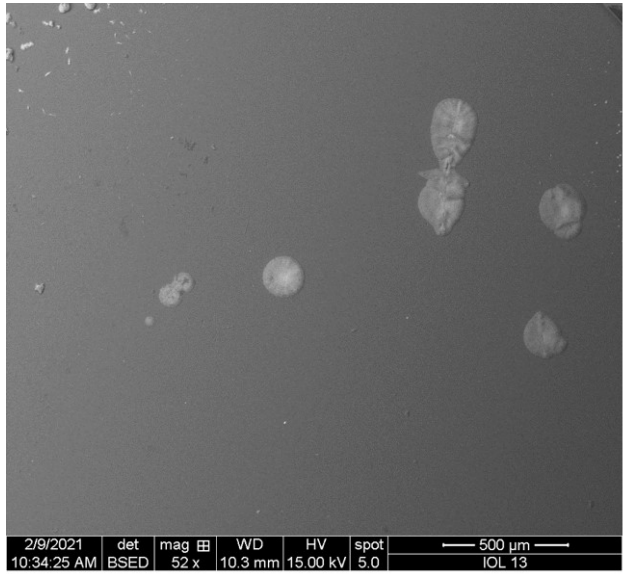
- Histochemical staining with Alizarin Red



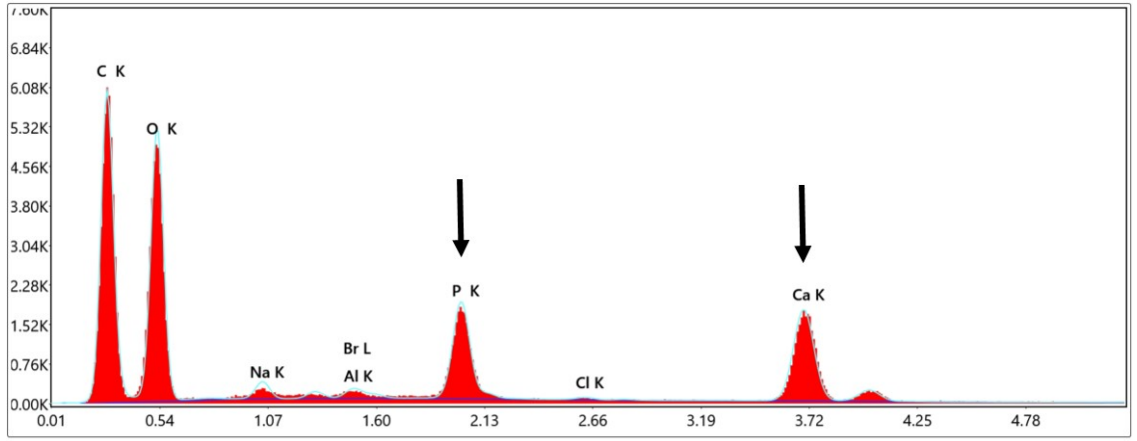


Results

- SEM/EDS



Element	Weight %	Atomic %
C K	41.9	54.2
O K	38.3	37.2
NaK	1.3	0.9
BrL	0.7	0.1
AlK	0	0
P K	5.9	2.9
ClK	0.2	0.1
CaK	11.8	4.6



Results

- Light transmittance of opacified IOLs was 89.5% ± 13.25%, and of incidentally calcified IOLs was 96.5% ± 1.06%

Conclusions

- Our study reveals incidental findings of localized calcification in hydrophilic acrylic IOLs explanted for reasons other than opacification
- These focal, asymptomatic areas of calcification were found on IOLs that remained in the eye for longer intervals than IOLs explanted for opacification
- The findings on light transmittance show that incidental findings of calcification likely had no visual symptoms
- Previous studies showed that explantation of hydrophilic acrylic lenses because of calcification occurs mostly within the second year after implantation
- This study suggests that calcification in some cases may take long time to become clinically significant after implantation, or may develop much later postoperatively