

Supplementary Online Content

Freedman SF, Kraker RT, Repka MX, et al; Pediatric Eye Disease Investigator Group (PEDIG). Incidence and management of glaucoma or glaucoma suspect in the first year after pediatric lensectomy. *JAMA Ophthalmol*. Published online November 21, 2019.
doi:10.1001/jamaophthalmol.2019.4571

eAppendix. Participating Clinical Sites

eTable 1. Baseline Characteristics of Eligible Children/Eyes Grouped by Those With and Those Without an Office Visit Between 6 and 18 Months Post-Lensectomy

eTable 2. Glaucoma Surgery Performed in First Year Following Lensectomy

eTable 3. Risk of Glaucoma Only (Excluding Glaucoma Suspect) According to Characteristics at Time of Lensectomy

This supplementary material has been provided by the authors to give readers additional information about their work.

eAppendix. Participating Clinical Sites

Sites are listed in order by number of participants enrolled. Personnel are listed as (I) for Investigator or (C) for Coordinator.

*Center received support utilized for this project from an unrestricted grant from Research to Prevent Blindness Inc., New York, NY.

†Center received support utilized for this project from unrestricted grant EY010572 from the National Institutes of Health.

Durham, NC - Duke University Eye Center (90)

Sharon F. Freedman (I); David K. Wallace (I); Laura B. Enyedi (I); Sasapin Prakalapakorn (I); Sarah K. Jones (C)

Kansas City, MO - Children's Mercy Hospitals and Clinics (65)

Denise Hug (I); Erin D. Stahl (I); Rebecca J. Dent (C)

Houston, TX - Texas Children's Hospital - Department of Ophthalmology (61)

Kimberly G. Yen (I); Lingkun Kong (C)

Dallas, TX - Children's Medical Center (53)

Serena Wang (I); Bryan K. Gallerson (C)

Atlanta, GA - Emory Eye Center (48)*

Scott R. Lambert (I); Amy K. Hutchinson (I); Phoebe Lenhart (I); Judy Brower (C)

Nashville, TN - Vanderbilt Eye Center (47)

David G. Morrison (I); Scott Ruark (C)

Chicago, IL - Ann & Robert H. Lurie Children's Hospital of Chicago (42)

Bahram Rahmani (I); Sudhi Kurup (I); Rebecca Mets-Halgrimson (I); Hawke Yoon (I); Hantamalala Ralay Ranaivo (C); Aaliyah Hamidullah (C)

Minneapolis, MN - University of Minnesota (35)*

Raymond Areaux (I); Jill S. Anderson (I); Erick D. Bothun (I); Ann M. Holleschau (C)

Montreal, QC, Canada - CHU Sainte-Justine (32)

Rosanne Superstein (I); Caroline Belanger (I); Nicole Fallaha (I); Patrick Hamel (I); Maryse Thibeault (C)

Miami, FL - Bascom Palmer Eye Institute (26)

Susanna M. Tamkins (I); Ta Chang (I)

Baltimore, MD - Wilmer Institute (25)*

Michael X. Repka (I); Courtney Kraus (I); Hee-Jung S. Park (I); Anya A. Trumler (I); Xiaonong Liu (C)

Calgary, AB, Canada - Alberta Children's Hospital (25)

William F. Astle (I); Emi N. Sanders (C)

Cleveland, OH - Cole Eye Institute (25)*

Elias Traboulsi (I); Fatema Ghasia (I); Diana C. McOwen (C)

Cincinnati, OH - Cincinnati Children's Hospital (23)

Michael E. Gray (I); Michael B. Yang (I); Corey S. Bowman (C)

New Haven, CT - Yale University Medical School, Department of Ophthalmology & Visual Science (21)

Jennifer Galvin (I); Margaret Therriault (C)

Indianapolis, IN - Riley Hospital for Children (20)

Kathryn Haider (I); Heather Smith (I); Michele E. Whitaker (C)

Cleveland, OH - Rainbow Babies and Children's Hospital Department of Ophthalmology (20)*

Faruk Orge (I); Adriana P. Grigorian (I); Alicia M. Baird (C)

Boston, MA - Tufts Medical Center (17)

Mitchell B. Strominger (I); Vicki Chen (I); Shelley Klein (C)

San Francisco, CA - University of California, San Francisco, Department of Ophthalmology (16)

Alejandra de Alba Campomanes (I); Jacquelyn D. Kemmer (C); Alexandra E. Neiman (C)

West Des Moines, IA - Wolfe Eye Clinic (16)

Myra N. Mendoza (I); Jill J. Frohwein (C)

Columbus, OH - Pediatric Ophthalmology Associates Inc. (14)

Don Bremer (I); Cybil Cassady (I); Richard Golden (I); Catherine Jordan (I); David Rogers (I); Sara A. Oravec (C)

Oklahoma City, OK - Dean McGee Eye Institute (14)

Tammy L. Yanovitch (I); Keven Lunsford (C)

Spokane, WA - Northwest Pediatric Ophthalmology, PS (14)

George Whitehead (I); Christina Nye (I); Caroline Shea (I); SueAnn M. Stillman (C)

Halifax, NS, Canada - IWK Health Centre (12)

G. Robert LaRoche (I); Stephen C. Van Iderstine (C)

Salt Lake City, UT - University of Utah/John A. Moran Eye Center (12)

Marielle Young (I); Elisa Robertson (C)

St Louis, MO - Saint Louis University Eye Institute (12)

Oscar A. Cruz (I); Rafif Ghadban (I); Dawn Govreau (C)

Iowa City, IA - University of Iowa Hospitals and Clinics (11)

Scott A. Larson (I); Susannah Longmuir (I); Xiaoyan Shan (C)

Newcastle upon Tyne, Tyne and Wear - Newcastle upon Tyne Hospitals NHS Foundation Trust (11)

Michael P. Clarke (I); Kate Taylor (C); Christine Powell (C)

Rochester, NY - Flaum Eye Institute (11)*

Benjamin P. Hammond (I); Matthew D. Gearinger (I); Andrea Czubinski (C)

Wilmington, DE - Nemours/Alfred I. duPont Hospital for Children (11)

Dorothy H. Hendricks (I); Jing Jin (I); Jonathan H. Salvin (I); Alicia Fisher (C)

Boise, ID - St Luke's Hospital (10)

Katherine A. Lee (I); Daniel Brooks (I); Bonita R. Schweinler (C)

Erie, PA - Pediatric Ophthalmology of Erie (10)

Nicholas A. Sala (I); Allyson M. Sala (C)

Portland, OR - Casey Eye Institute (10)*, †

Allison I. Summers (I); Daniel J. Karr (I); Lorri B. Wilson (I); Paula K. Rauch (C)

Sacramento, CA - University of California, Davis, Department of Ophthalmology (10)

Mary O'Hara (I); Nandini Gandhi (I); Tania Hashmi (C)

Spokane, WA - Spokane Eye Clinic (10)

Jeffrey Colburn (I); Eileen Dittman (C)

Wichita, KS - Charles R. Whitfill, MD (9)

Charles R. Whitfill (I); Amy M. Wheeler (C)

Aurora, CO - University of Colorado HSC (7)

Emily A. McCourt (I); Jasleen Singh (I); Nanastasia Welnick (C)

Chicago, IL - University of Illinois at Chicago, Illinois Eye and Ear Infirmary (7)

Nathalie F. Azar (I); Joseph Baker (C)

Grand Rapids, MI - Pediatric Ophthalmology P.C. (7)

Patrick J. Droste (I); Robert J. Peters (I); Jan Hilbrands (C)

Los Angeles, CA - Jules Stein Eye Institute at the University of California, Los Angeles (7)

Stacy L. Pineles (I); Marianne J. Bernardo (C)

Chattanooga, TN - Pediatric Eye Specialists (6)

Edward Peterson (I); Charla H. Peterson (C)

Houston, TX - University of Texas, Robert Cizik Eye Clinic (6)

Kartik Kumar (I); Ephrem Melese (C)

Irvine, CA - University of California, Irvine - Gavin Herbert Eye Institute (5)

Robert Lingua (I); Jeff Grijalva (C)

Norfolk, VA - Virginia Pediatric Eye Center (5)

Earl R. Crouch, Jr. (I); Earl R. Crouch III (I); Gaylord G. Ventura (C)

Philadelphia, PA - Children's Hospital of Philadelphia (5)

William Anninger (I); Shawn L. Benson (C); Karen A. Karp (C)

Tucson, AZ - University of Arizona Department of Ophthalmology & Vision Sciences (5)

Jordana M. Smith (I); Jill Brickman-Kelleher (C)

Chicago Ridge, IL - The Eye Specialists Center, L.L.C. (4)

Benjamin H. Ticho (I); Alexander J. Khammar (I); Deborah A. Clausius (C)

Newark, NJ - UMDNJ-NJMS, Institute of Ophthalmology and Visual Science (4)

Suqin Guo (I)

Omaha, NE - University of Nebraska Medical Center (4)

Donny Suh (I); Carolyn Chamberlain (C)

Saint Paul, MN - Associated Eye Care (4)

Susan Schloff (I)

Washington, DC - Children's National Medical Center (4)

William P. Madigan (I); Donna Burkman (C)

Boston, MA - Boston Medical Center (3)

Stephen P. Christiansen (I); Jean E. Ramsey (I); Kate H. McConnell (C)

Bronx, NY - Montefiore Medical Center (3)

Ilana Friedman (I); Jose Rosado (C)

Lincoln, NE - Eye Surgical Associates (3)

Donald P. Sauberan (I); Jody C. Hemberger (C)

Lisle, IL - Progressive Eye Care (3)

Patricia L. Davis (I); Indre Rudaitis (I)

Little Rock, AR - Arkansas Children's Hospital/ Univ. of Arkansas Medical Sciences (3)

Robert S. Lowery (I); Shawn Cupit (C)

Rochester, MN - Mayo Clinic (3)*

Jonathan M. Holmes (I); Brian G. Mohney (I); Suzanne M. Wernimont (C);

Rebecca A. Nielsen (C)

Seattle, WA - Seattle Children's Hospital (3)

Erin P. Herlihy (I); Francine Baran (I); Amy Gladstone (C)

Boston, MA - Harvard Vanguard Medical Associates (2)

Justin Smith (I); Mei Mellott (I); Troy Kieser (C)

Poland, OH - Eye Care Associates, Inc. (2)

S. Ayse Erzurum (I); Beth Colon (C)

Munster, IN - The Eye Specialist Center, LLC (1)

Birva Shah (I); Micaela Quebbemann (C)

eTable 1. Baseline Characteristics of Eligible Children/Eyes Grouped by Those With and Those Without an Office Visit Between 6 and 18 Months Post-Lensectomy

Characteristic	With an Office Visit Between 6 and 18 Months Post- Lensectomy	Without an Office Visit Between 6 and 18 Months Post- Lensectomy
Participant Level	N=702 n (%)	N=152 n (%)
Sex		
Female	349 (50)	78 (51)
Male	353 (50)	74 (49)
Laterality of Lensectomy		
Bilateral	309 (44)	60 (39)
Unilateral	393 (56)	92 (61)
Age at First Eligible Lensectomy		
≤3 months	177 (25)	15 (10)
>3 months to ≤6 months	57 (8)	6 (4)
>6 months to <4 years	200 (28)	43 (28)
4 to <7 years	141 (20)	32 (21)
7 to <13 years	127 (18)	56 (37)
Mean (SD) years	3.4 (3.5)	5.4 (4.1)
Race / Ethnicity		
American Indian / Alaskan	4 (<1)	1 (<1)
Asian	24 (3)	4 (3)
African American	84 (12)	31 (20)
Hispanic	119 (17)	20 (13)
White	427 (61)	85 (56)
More than One Race	24 (3)	9 (6)
Unknown / Not Reported	20 (3)	2 (1)
Eye Level^a	N=970 n (%)	N=221 n (%)
Lens Morphology^b		
Posterior lenticonus	87 (9)	11 (5)
Persistent fetal vasculature	53 (5)	9 (4)
Nuclear	321 (33)	56 (25)
Anterior polar	38 (4)	7 (3)
Posterior polar	71 (7)	28 (13)
Lamellar	120 (12)	33 (15)
Other	320 (33)	97 (44)
Not classified	68 (7)	17 (8)
Anterior Segment Abnormality in Addition to Cataract		
Yes ^c	102 (11)	23 (10)
No	857 (88)	197 (89)
Unknown	11 (1)	1 (<1)

Axial Length (mm)		
Unknown	371 (38)	72 (33)
≥Median (21.75)	267 (28)	91 (41)
<Median (21.75)	332 (34)	58 (26)
Mean (SD)	21.1 (2.5)	22.4 (2.2)
Intraocular Pressure Prior to Lensectomy (mmHg)		
Unknown	354 (36)	72 (33)
≥Median (14)	346 (36)	96 (43)
<Median (14)	270 (28)	53 (24)
Mean (SD)	13.9 (3.8)	14.8 (3.4)
Primary Intraocular Lens Implant		
Yes – pseudophakia	532 (55)	167 (76)
No – aphakia	438 (45)	54 (24)
Anterior Vitrectomy at Lensectomy		
Yes	739 (76)	142 (64)
No	219 (23)	74 (33)
Unknown	12 (1)	5 (2)
Intraoperative Complications		
Yes ^{d, e}	105 (11)	16 (7)
No	865 (89)	205 (93)

SD = standard deviation

^a Percentages and standard deviations were not corrected for the correlation between eyes of participants who received bilateral lensectomy.

^b More than one lens morphology was reported for some eyes.

^c Ocular abnormality of the cornea, iris, or anterior chamber noted at time of lensectomy.

^d For eyes with an office visit between 6 and 18 months post-lensectomy, at least one of the following operative complications were reported at the time of lensectomy: cloudy cornea (11), dislocated implant (1), hyphema (5), iris damage (6), iris prolapsed (4), iris sphincterotomy (1), lens fragment in vitreous (3), acute ocular hypertension (19), retained cortex (5), return to operating room (1), unplanned iridectomy (4), other (30).

^e For eyes without an office visit between 6 and 18 months post-lensectomy, at least one of the following operative complications were reported at the time of lensectomy: cloudy cornea (1), hyphema (2), iris damage (4), iris prolapsed (2), acute ocular hypertension (1), retained cortex (2), return to operating room (2), unplanned iridectomy (1), other (7)

eTable 2. Glaucoma Surgery Performed in First Year Following Lensectomy

	N=23 Eyes
Type of Surgery	n
Trabeculotomy	5
Trabeculectomy	6
Trabeculotomy and Trabeculectomy combined	1
Goniotomy	3
Glaucoma Drainage Device with external reservoir	7
Peripheral Iridectomy with Anterior Vitrectomy	1
Months between Lensectomy and Glaucoma Surgery	n (%)
<2 months	3 (13)
2 to <3 months	6 (26)
3 to <4 months	6 (26)
4 to <6 months	1 (4)
6 to 12 months	6 (26)
>12 months	1 (4)
Median (Range)	3.3 months (0.9 to 14.8)
Age at Time of Lensectomy	n (%)
≤3 months	20 (87)
>3 to ≤6 months	1 (4)
>6 months	2 (9)
Median (Range)	1.4 months (0.9 to 58.7)
Glaucoma Medications Being Used after Glaucoma Surgery	n (%)
Yes	15 (65)
No	8 (35)

eTable 3. Risk of Glaucoma Only (Excluding Glaucoma Suspect) According to Characteristics at Time of Lensectomy

Factor at Time of Lensectomy	Total Eyes	No. with Glaucoma	% with Glaucoma (99% CI) ^a	Relative Risk (99% CI)	p-value
Overall	970	52	4.7 (3.4 to 6.5)		
Sex					
Female	484	29	5.2 (3.0 to 9.1)	1.22 (0.52 to 2.83)	0.55
Male	486	23	4.3 (2.3 to 8.0)	ref	
Race/Ethnicity					
African-American	117	14	9.8 (4.3 to 22.5)	2.06 (0.77 to 5.56)	0.16
Other	100	3	2.8 (0.6 to 12.9)	0.59 (0.12 to 3.00)	
Hispanic	160	4	2.5 (0.6 to 11.0)	0.53 (0.11 to 2.54)	
White	593	31	4.7 (2.8 to 8.1)	ref	
Anterior Segment Abnormality in Addition to Cataract^{b,c}					
Yes	102	13	12.8 (5.7 to 23.5)	2.87 (1.26 to 6.58)	0.003
No	857	38	4.4 (2.8 to 6.6)	ref	
Anterior Vitrectomy at Lensectomy^d					
Yes	739	46	5.2 (3.4 to 7.9)	1.49 (0.82 to 2.69)	0.15
No	219	6	3.5 (1.8 to 6.7)	ref	
Age at Lensectomy					
≤3 months	256	36	14.0 (8.5 to 23.0)	6.88 (2.66 to 17.77)	0.02
>3 months to <13 years	714	16	2.0 (0.9 to 4.4)	ref	
Primary Intraocular Lens Implant					
No – aphakia	438	45	9.3 (5.9 to 14.4)	6.65 (2.19 to 20.24)	<0.001
Yes - pseudophakia	532	7	1.4 (0.5 to 3.9)	ref	
Laterality					
Bilateral	577	40	6.8 (4.1 to 11.3)	2.24 (0.92 to 5.45)	0.02
Unilateral	393	12	3.1 (1.5 to 6.4)	ref	
Intraoperative Complications					
Yes ^e	105	16	7.6 (1.8 to 33.0)	1.83 (0.34 to 9.78)	0.19
No	865	36	4.2 (2.5 to 6.9)	ref	

CI = confidence interval

^a Adjusted for correlation between eyes. The 95% CI is presented overall; The 99% CI is presented within each factor.

^b Ocular abnormality of the cornea, iris, or anterior chamber noted at time of lensectomy. Excludes 11 eyes with anterior segment abnormality unknown.

^c Regression models, which accounted for the correlation between eyes of participants enrolled following bilateral surgery, were not able to estimate the risk or relative risk of glaucoma. Estimates of risk and relative risk of glaucoma are not adjusted for correlation between eyes of children enrolled with bilateral lensectomy. Exact Poisson regression used to calculate 99% confidence intervals and p-value.

^d Excludes 12 eyes with anterior vitrectomy unknown.

^e At least one of the following operative complications reported at the time of lensectomy: cloudy cornea (11), dislocated implant (1), hyphema (5), iris damage (6), iris prolapsed (4), iris sphincterotomy (1), lens fragment in vitreous (3), acute ocular hypertension (19), retained cortex (5), return to operating room (1), unplanned iridectomy (4), other (30).