

# Shrinkage of the scleral canal during cupping reversal in children.

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**PURPOSE:** The mechanism of cupping reversal seen after lowering intraocular pressure (IOP) in pediatric glaucoma is unknown. Theories include forward movement of the lamina cribrosa or shrinkage of a stretched scleral canal. Our study aimed to quantify changes in optic disc size occurring in children who had undergone glaucoma surgery.

**DESIGN:** Retrospective, single-center, observational case series.

**PARTICIPANTS:** Children undergoing incisional surgery for pediatric glaucoma at the University of California, Davis.

**METHODS:** The electronic charts of all patients with pediatric glaucoma were reviewed for the presence of RetCam digital optic nerve photographs (Clarity Medical Systems, Pleasanton, CA). Cases in which the photographs (baseline and follow-up after surgical intervention) were of sufficient quality were analyzed. The optic disc margin was outlined manually using ImageJ software. Inter-session changes in magnification were accounted for by drawing a control polygon joining 4 or 5 fixed landmarks (e.g., vessel crossings) to include a second larger area containing the optic nerve. The optic disc area (in pixels adjusted with the control polygon) was compared between baseline and follow-up images.

**MAIN OUTCOME MEASURES:** Change in disc area between baseline and follow-up after surgery.

**RESULTS:** We identified 29 eyes for which baseline and follow-up images were available for analysis. Fifteen eyes of 9 children showed clinically obvious cupping reversal. Fourteen eyes of 12 children showed no cupping reversal. Disc area decreased by 6.8% (95% confidence interval [95% CI], -10.0 to -3.3) in the obvious reversal group and increased by 4.3% (95% CI, +1.0 to +7.6) in the no reversal group after surgery.

**CONCLUSIONS:** When cupping reversal is clinically apparent after successful IOP-lowering surgery for congenital glaucoma, the scleral canal shrinks in area. In contrast, when cupping reversal is not observed, the scleral ring continues to enlarge, indicating ongoing stress on the optic nerve. Clinically obvious cupping reversal is less frequently observed in adults after surgery, which may reflect a lower elasticity of the scleral ring in adults compared with children.

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