

SURGICAL APPROACHES TO THE MANAGEMENT OF EPITHELIAL CYSTS

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ABSTRACT

Purpose: The purpose of this study was to review management strategies for treatment of epithelial cysts.

Study Design: Retrospective consecutive interventional case series.

Methods: Charts of patients treated for epithelial ingrowth over a 10-year period by a single surgeon (J.A.H.) were reviewed. Cases of epithelial cysts were identified and the following data were recorded: details of ocular history, preoperative and postoperative visual acuity, intraocular pressure (IOP), ocular examination findings, type of surgical intervention, and details of subsequent procedures performed.

Results: Seven eyes with epithelial cysts were identified. Patients ranged in age from 1 1/2 years to 53 years at presentation. Three patients were children. Four cysts were due to trauma, one was presumably congenital, one developed after corneal perforation in an eye with Terrien's marginal degeneration, and one developed after penetrating keratoplasty. Three patients were treated with vitrectomy, en bloc resection of the cyst and associated tissue, fluid-air exchange, and cryotherapy. Four patients were treated with conservative strategy consisting of cyst aspiration (three cases) or local excision (one "keratin pearl" cyst) and endolaser photocoagulation of the collapsed cyst wall or base. In all cases, the epithelial tissue was successfully eradicated; one case required a second excision (follow-up, 9 months to 78 months; mean, 45 months). Two eyes required subsequent surgery for elevated IOP, two for cataract extraction, and one for a second penetrating keratoplasty. Final visual acuity ranged from 20/20 to hand motions, depending on associated ocular damage. Best visual results were obtained in the more conservatively managed eyes.

Conclusion: Epithelial cysts can be managed conservatively in selected patients with good results. This strategy may be particularly useful in children, in whom preservation of the lens, iris, and other structures may facilitate amblyopia management.

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INTRODUCTION

Epithelial cysts may develop as a complication of penetrating trauma or intraocular surgery, or they may be congenital.¹⁻¹⁹ Although most epithelial ingrowth is in the form of a sheetlike layer of cells growing across the ocular structures, a cystlike pattern also may occur, as an intraocular rest of implanted or congenital cells grows centripetally (Figure 1). Small, stable, and asymptomatic cysts may be observed. Larger cysts composed of proliferating epithelial tissue within the eye may require surgical therapy to prevent or treat serious problems, including pupillary obstruction, secondary glaucoma, iridocyclitis, corneal decompensation, loss of vision, and intractable pain.²⁻¹⁹ Treatment of epithelial ingrowth has traditionally involved aggressive excision of the cellular proliferation and associated tissue as well as ablative therapy to the excision site to eradicate residual cells. One of the challenges is to identify the full

extent of ocular involvement by the epithelial cellular incursion, so as to treat it completely. In cystic ingrowths, the tissue margins are clearly defined and readily seen during surgery. Cysts may be amenable, therefore, to more conservative and less destructive surgical approaches that have the potential for commensurately less collateral damage to the delicate ocular structures, and thus better visual preservation.

Numerous conservative surgical approaches to cystic epithelial proliferations have been reported, including aspiration with and without cauterization, aspiration and diathermy, aspiration and iridectomy, injection of sclerosing agents, electrocautery, and photocoagulation.³⁻¹⁹ Xenon arc photoablation of cysts was described by Cleasby¹⁰ and Okun and Mandell.^{10,11} Scholz and Kelley¹⁵ reported long-term follow-up of two eyes in which cysts that developed after penetrating keratoplasty were successfully treated with argon laser photocoagulation. We sought to evaluate results of our surgical approach to these complicated cases, particularly with respect to a new technique of aspiration and endophotocoagulation.

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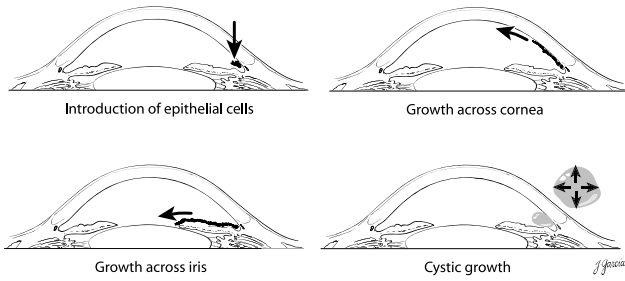


FIGURE 1

Epithelial cells implanted into anterior chamber grow in three basic patterns: initial growth anteriorly across cornea, initial growth posteriorly across iris, and centripetal expansion into a cyst.

MATERIALS AND METHODS

We reviewed our records over the last 10 years to identify cases of epithelial ingrowth and then searched these for

eyes with cystic patterns of growth. Charts were reviewed and data collected for patient age, sex, previous ocular history and surgery, preoperative ocular examination findings (including visual acuity, intraocular pressure [IOP], and slit-lamp and fundus examination), type of surgery, postoperative complication, further postoperative surgical procedures required, and postoperative examination at last follow-up (including visual acuity, IOP, and details of slit-lamp and fundus examination).

RESULTS

Seven eyes of seven patients were identified. Patients ranged in age from 18 months to 53 years. Three patients were children, and four were male (Table I). The epithelial cysts developed after penetrating trauma in four cases, after corneal perforation due to Terrien’s marginal degeneration in one case (requiring a corneal patch graft), and following

TABLE I: PREOPERATIVE AND POSTOPERATIVE FINDINGS IN SEVEN PATIENTS WITH EPITHELIAL CYSTS

PATIENT	AGE, SEX	CYST ETIOLOGY	PREOP VA	PREOP IOP	SURGERY	FOLLOW-UP	POSTOP VA	POSTOP IOP	OTHER OPERATIONS
1	7 yr, M	Trauma	Hand motions	13	Vtx, excision of cyst and associated iris, IOL removal, cryotherapy	78 mo	Hand motions	42	Endoscopic cyclophotocoagulation
2	53 yr, M	Trauma in 1952; cyst treated with radiation but grew again in 1992	20/60	35	Lens, vtx, excision of cyst and associated iris, fluid-air exchange, cryotherapy	77 mo	Counting fingers 4ft	21	Cyclophotocoagulation
3	2 yr, F	Trauma	LP	10	Vtx, excision of cyst and associated iris, fluid-air exchange, cryotherapy	30 mo	Hand motions	23	None
4	45 yr, M	Penetrating trauma (BB)	20/25	14	Excision of “keratin pearl” cyst, endolaser to base	29 mo	20/20	15	Repeated excision and laser, phaco/IOL
5	18 mo, M	Congenital	Fix and follow		Cyst aspiration and endolaser	43 mo	20/40	15	None
6	27 yr, F	Perforation due to Terrien’s marginal degeneration	20/100	10	Cyst aspiration and endolaser	51 mo	20/40	6	None
7	57 yr, F	PK	3/200	21	Cyst aspiration and endolaser	9 mo	20/40	20	Phaco/IOL, repeated PK

IOL, intraocular lens; PK, penetrating keratoplasty; vtx, vitrectomy.

penetrating keratoplasty in one case; one cyst was congenital. In all cases, the cysts were large and expanding and were causing complications such as visual axis obstruction, iritis, glaucoma, and corneal decompensation.

Surgery consisted of an aggressive ablative approach in the three eyes treated earliest; all underwent pars plana vitrectomy, en bloc excision of the cyst and associated iris tissue, fluid-air exchange to provide a thermal insulation effect, and then cryotherapy to the tissue adjacent to the excision site in an attempt to devitalize any remaining cells. The last four eyes treated were managed more conservatively, with a technique including viscodissection of the cyst wall from adjacent ocular structures, aspiration of cyst contents in three of the eyes with fluid-filled cysts, and cyst excision with a vitrectomy probe in one eye with a “keratin pearl” solid cyst, and then endolaser photocoagulation of the collapsed cyst wall or base (Figures 2 and 3). In all

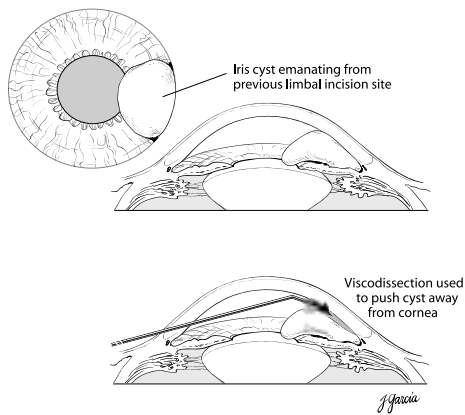


FIGURE 2

Conservative surgical strategy: cyst is first viscodissected from cornea and other structures.

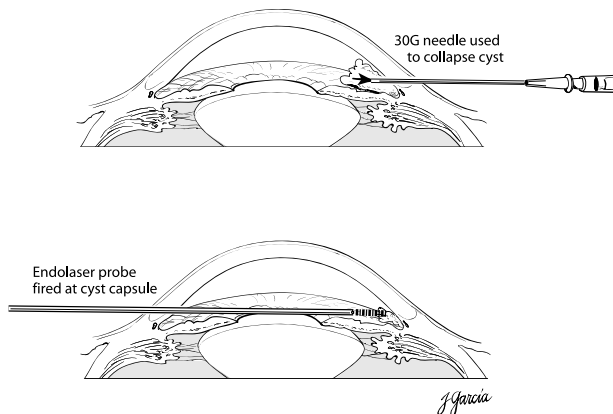


FIGURE 3

Conservative surgical strategy: A 30-gauge needle is inserted into apex of the cyst, and its contents are aspirated. Endolaser probe is then directed at residual cyst wall, and collapsed capsule is destroyed with photocoagulation.

cases, the epithelial tissue was successfully eradicated, although one case treated conservatively required a second excision.

Preoperative visual acuity ranged from 20/25 to hand motions; postoperative visual acuity ranged from 20/20 to counting fingers (follow-up, 9 months to 78 months; mean, 45 months), depending on associated ocular damage. Poor final visual acuity in three eyes was attributed to corneal opacity; one of these eyes also had uncontrolled glaucoma. Two eyes required subsequent procedures for glaucoma control, two eyes underwent later cataract surgery, and one eye had a second penetrating keratoplasty. Best visual results were obtained in the conservatively managed eyes (Table I, Figures 4 through 11).

DISCUSSION

Numerous approaches to the management of epithelial cysts have been reported.¹⁻²⁰ Small cysts that are stable in size and otherwise asymptomatic may be observed, often for years. If the cyst enlarges, however, it may require surgical treatment, since it may obstruct the visual axis and incite further complications, such as uveitis, corneal edema, or glaucoma.

Epithelial cysts have been treated with a variety of techniques, including en bloc excision, vitrectomy-instrumented cyst excision combined with cryodestruction, injection of sclerosing agents, radiation, aspiration, electrolysis, and diathermy.¹⁻¹⁹ More recently, investigators have described the use of laser photocoagulation to ablate these cysts.^{10,11,15} Limitations of photocoagulation include recurrences requiring subsequent treatment, problems with anterior cyst wall visualization and treatment, difficulty in treating large cysts in some cases, and the risk of rupture of the cyst wall, converting the cyst into a sheetlike epithelial ingrowth.^{4,10,11,15}

More aggressive surgical excision and devitalization of the epithelial tissues have been recommended by some investigators, with vitrectomy, sometimes lensectomy, fluid-air exchange to fill the eye with an intraocular bubble, and cryodestruction of residual cells at the excision site.^{4,5} Other investigators have further advocated the complete excision of all epithelial layers and adjacent cornea, iris, anterior chamber angle, and ciliary body, with full-thickness corneoscleral graft.^{16,20} These strategies involve large procedures and the possibility of considerable collateral damage to ocular structures. In children, loss of the crystalline lens and iris may complicate amblyopia therapy. As well, excision of the cyst with vitrectomy instrumentation has occasionally been reported to convert the cyst into sheetlike epithelial ingrowth, which then becomes a more difficult management issue.^{4,14,15} We sought to evaluate our own experience with this rare clinical entity.



FIGURE 4A

Patient 1. Solid "keratin pearl" epithelial cyst in 45-year-old man 2 years after he sustained a penetrating injury to the cornea from a piece of BB that embedded in his inferior angle and was subsequently removed.

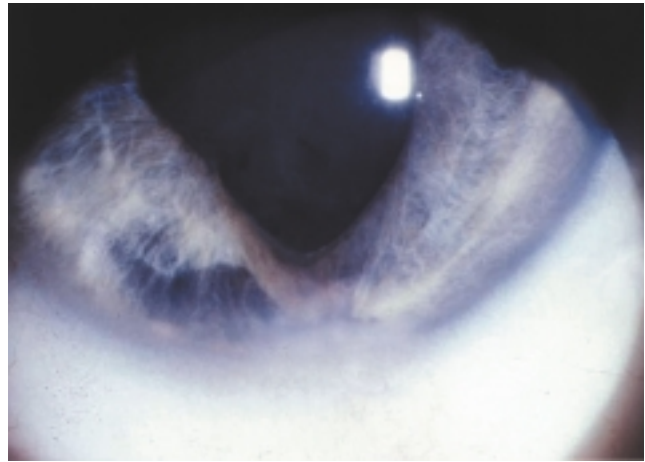


FIGURE 4B

Patient 1. Cyst required two local resections with endolaser to the base, leaving the patient with some inferior iris atrophy. Following cataract extraction 29 months postoperatively, visual acuity was 20/20.

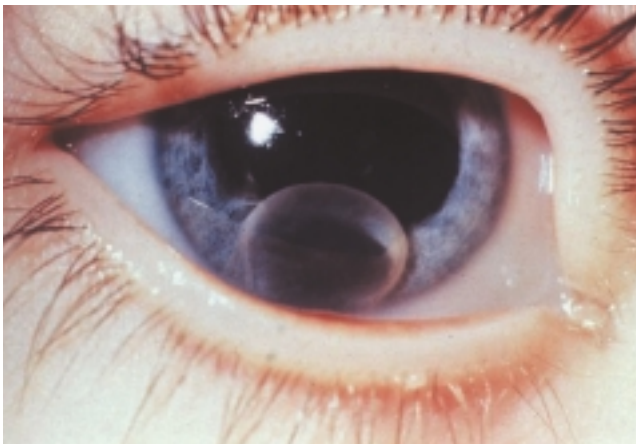


FIGURE 5A

Patient 2. Inferior iris cyst in 18-month-old boy. Reprinted with permission from the *American Journal of Ophthalmology*.

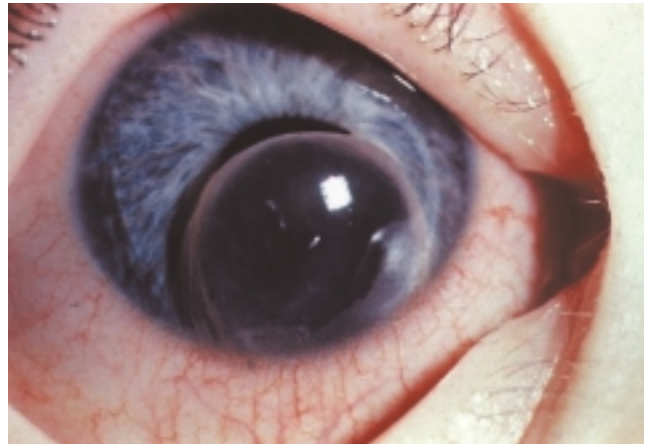


FIGURE 5B

Patient 2. Cyst grew over a few months to occlude the visual axis. Reprinted with permission from the *American Journal of Ophthalmology*.

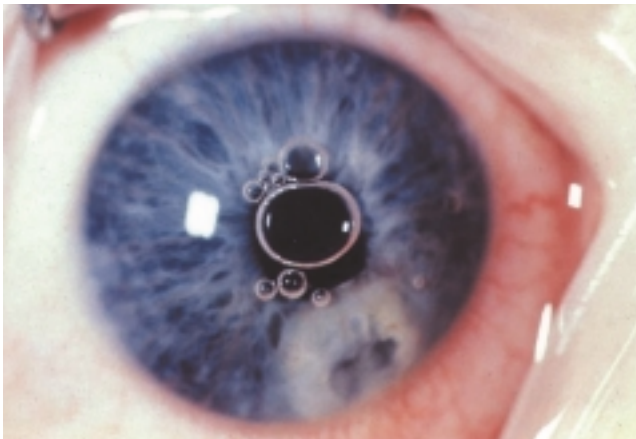


FIGURE 5C

Patient 2. At the close of surgery, after aspiration and endophotocoagulation, no residual cyst is seen, and iris shows thermal effect of the laser. Reprinted with permission from the *American Journal of Ophthalmology*.

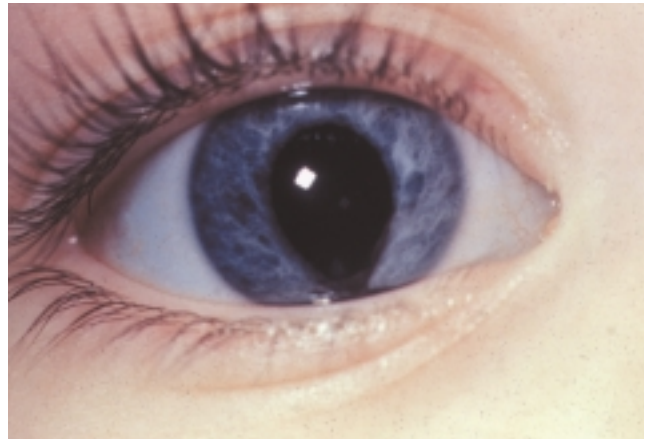


FIGURE 5D

Patient 2. After 43 months of follow-up, no cyst recurrence is seen. Some iris atrophy was present inferiorly, the lens remained clear, and vision was 20/40 with Allen cards. Reprinted with permission from the *American Journal of Ophthalmology*.

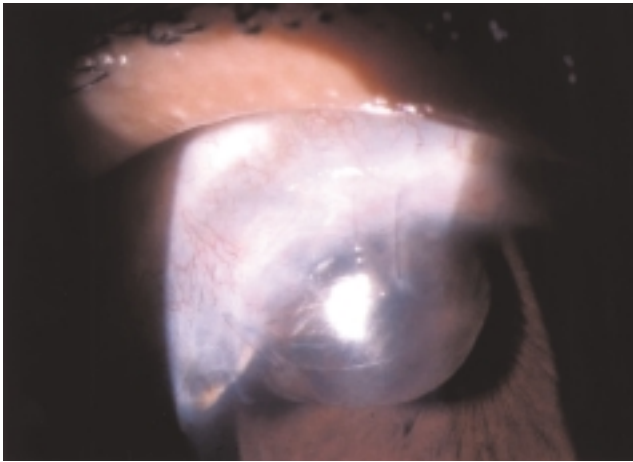


FIGURE 6A

Patient 3. Epithelial cyst in 27-year-old woman that developed after corneal perforation due to Terrien's marginal degeneration. It was treated with a patch graft. Visual acuity was 20/100, with the cyst occluding the visual axis.

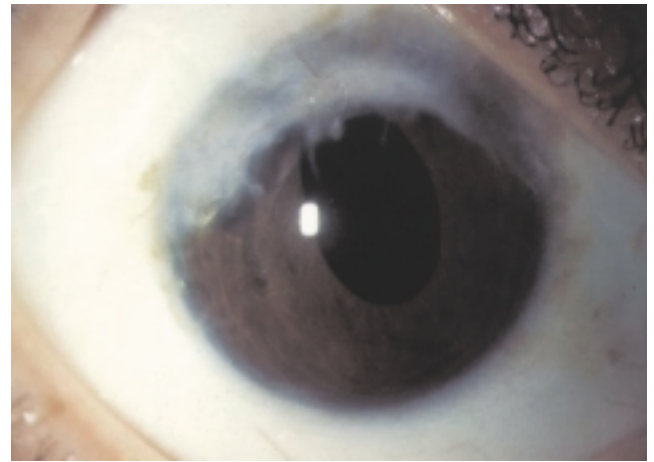


FIGURE 6B

Patient 3. Visual acuity had recovered to 20/40 at 14 months postoperatively, following cyst aspiration and endolaser to collapsed cyst wall.

We followed seven cases managed in two ways. The first three cases were treated with vitrectomy, cyst excision, and local cryoablation of adjacent tissue under thermal insulation by an air bubble. The last four cases were treated with aspiration or excision of just the cyst contents, followed by photocoagulation of the remaining cyst wall or base to devitalize remaining cells. Both methods were efficacious in eradicating the epithelial tissue and preserving the eyes. The more conservative approach seemed to result in better visual outcomes, but the cases were not entirely comparable, and the series is subject to the limitations of all retrospective reviews. In particular, eyes may have been preselected for a more conservative approach because of more limited and manageable disease and may have had a better prognosis to begin with. The fact that the earlier cases were more aggressively managed and all later cases more conservatively managed, however, argues against this. Three of the patients in this series were children. The eyes of children present a particular challenge to the surgeon, who seeks to salvage as much of the iris, lens, and other anterior chamber structures as possible in order to optimize vision in the face of the threat of amblyopia. The more conservative surgical approach may be particularly useful in these eyes.

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DISCUSSION

DR JAMES S. KELLEY. Twenty-five years ago Richard Scholz and I were confronted with two patients similar to those reported by Dr Haller and her colleagues. We had similar choices: en bloc excision, major surgery, or applying the then new technology of argon laser photocoagulation. The two patients were treated with laser and, with good luck as much as good technique, have done well. The first is a retired minister volunteering in Wales. He was treated in 1975. The second was a park service employee treated in 1976. Since that time, neither Dr Scholz nor I have seen another case of anterior chamber epithelial cyst.

Now we are a quarter century later and still faced with the same difficult clinical decisions. Is the best approach more definitive surgery or more conservative aspiration and ablation? The questions we raise are more rhetorical in nature. Can evidence-based medicine ever apply to these rare conditions? Small case series can be interesting. I am reminded that Dr James Lind in his work on scurvy had only two severely affected sailors on a diet of oranges and two "similar" crewmen on the normal ship's diet. The results were dramatic and eventually changed the history of the British navy. In general, the data from a handful of cases are insufficient.

Can new information technology help? Could there be an Internet Web site for each of these orphan conditions? By collecting worldwide statistics, we may better understand the etiology of the cysts. Are there factors in the host that increase susceptibility? The patients appear relatively young; might advanced age be a protective factor? What are the inhibiting factors? Some cysts do not enlarge aggressively, and the more common residual lens epithelium forms only the more benign pearls. Prevention is the ultimate goal. New surgical techniques such as small incisions seem to reduce epithelial down-growth incidence. A more complete database would verify this suspicion. How do we ethically apply new technology to rare

cases? Dr Scholz and I were interested in the then new application of argon laser. Dr Groh was using en bloc excision for tumors and extended that technique to epithelial cysts. There is temptation to move on to the latest technology before fully evaluating the previous methods. Will there be applications for photosensitizing dyes or growth factor inhibitors?

The patient often asks, "What if it was your mother or daughter, what would you do?" How can we answer this question when the case numbers are small and the results are conflicting? There is the fear of converting the cyst to diffuse epithelial down-growth. Rupturing the cyst with YAG laser seems particularly hazardous. The conservative approach can be followed by more extensive excision if necessary. The conservative approach appears more prudent.

I thank Dr Haller and colleagues for reporting the additional cases and adding a new management option to our arsenal. I would appeal to the national and international community to collect information on these rare conditions in some systematic fashion. Show me the data.

DR RICHARD K. FORSTER. In 1995, I presented a paper at this meeting of three similar cases requiring en bloc excision, with approximately 2-year follow-up in the three cases. And at that time, there was no evidence of recurrence; all patients had good visual function. One of the three, unfortunately, passed away shortly afterwards. Another patient presented with a recurrence of the anterior chamber cyst 39 months after initial en bloc excision; it developed contiguous with the site of en bloc excision. He still has 20/25 vision. Long-term follow-up on these cases is necessary.

DR JULIA A. HALLER. I think those are both excellent points: one being the rarity of these cysts and consequent difficulty comparing treatment options, and the second being the necessity of follow-up. One of the cases that we treated had, 53 years prior to presentation, developed epithelial ingrowth after trauma; it was treated with radiation. The patient developed a recurrent cyst 53 years later that was so large that it displaced the lens posteriorly. This one was in our initial group. Certainly, these eyes have to be followed for life, and we need better treatments. I enjoyed hearing Dr Kelly's ideas about an Internet-based system to help improve our ability to provide evidence-based data on these rare conditions, and I think that's something that the AOS might pursue.