Outcomes of phacoemulsification and in-the-bag intraocular lens implantation in Fuchs' heterochromic iridocyclitis

Mohammad-Ali Javadi, MD, Mohammad-Reza Jafarinasab, MD, Ali-Akbar Sanjari Araghi, MD, Mehrdad Mohammadpour, MD, Shahin Yazdani, MD

Purpose: To evaluate the visual outcomes and complications of phacoemulsification (PE) and posterior chamber intraocular lens implantation, (PC IOL) in patients with Fuchs heterochromic iridocyclitis (FHIC).

Setting: Private clinic and an academic hospital.

Methods: In this noncomparative interventional case series, existing data for 41 eyes of 40 consecutive patients clinically diagnosed with FHIC and cataract were studied retrospectively. Scleral tunnel PE and in-the-bag IOL implantation were performed in all cases. Preoperative and postoperative visual acuities and intraoperative and postoperative complications were evaluated.

Results: Twenty-four male and 16 female patients aged 12 years to 70 (SD) (mean 35 $\pm$ 12 years) were operated on and followed for 17.8 $\pm$ 8.7 months. Preoperatively, best corrected visual acuity (BCVA) was less than 20/40 in all patients, which improved to 20/40 or better after surgery. Twenty-two eyes (53.6%) achieved BCVA of 20/20. The major cause of postoperative visual acuity less than 20/20 was vitreous haze. There were no major intraoperative complications. Postoperatively, mild anterior chamber fibrin reaction occurred in 4 patients (9.7%), IOL deposits occurred in 11 eyes (26.8%), and decentration was observed in 1 eye. During follow-up, 6 eyes (14.6%) developed posterior capsule opacification requiring a neodymium:YAG (Nd:YAG) laser capsulotomy. There was 1 case of clinical cystoid macular edema that resolved with medication. There were no cases of posterior synechias, postoperative glaucoma, or retinal detachment.

Conclusion: Phacoemulsification with PC IOL implantation is a safe procedure with good visual outcomes in patients with FHIC and cataract.

J Cataract Refract Surg 2005; 31:997–1001 © 2005 ASCRS and ESCRS

Fuchs heterochromic iridocyclitis (FHIC) is a chronic nongranulomatous anterior uveitis usually seen in patients aged 20 to 40 years.[1] Both sexes are equally affected, and the disorder is unilateral in 90% of cases.[2] Mean age at presentation is 31 years, but it has been reported in patients from 5 to 80 years.[2] This entity accounts for 3.5% to 8% of cases of endogenous uveitis.[3,4] The definitive pathophysiology is unknown. However, herpes simplex virus DNA has been detected by Southern blot analysis from aqueous fluid samples, and toxoplasma has also been implicated in the pathogenesis of this disease.[5] The most common presenting symptom is visual deterioration, and the most common ocular signs are keratic precipitates (KPs), cataracts, and heterochromia.[6] Small transparent iris stromal nodules have also been observed.[7]

Accepted for publication August 26, 2004.

From the Ophthalmology Department and Ophthalmic Research Center, Labbafinejad Medical Center, Shaheed Beheshti University of Medical Sciences, Tehran, Iran.

No author has a financial or proprietary interest in any material or method mentioned.

Reprint requests to Mohammad-Ali Javadi, MD, Labbafinejad Medical Center, Boostan 9 Street/Pasdaran Avenue, Tehran 16666 Iran. E-mail: ma_javadi@yahoo.com.

0886-3350/05/$-see front matter
doi:10.1016/j.jcrs.2004.08.050

Cataract is among the most common complications, reported in 15% to 75% of cases.[2,8,9] Multiple factors influence the development of cataracts in patients with uveitis, including severity and location of the inflammatory process, presence of iris and lens adhesions, and cumulative exposure to corticosteroids.[10] The course, treatment, complications, and visual outcomes of uveitic cataract vary according to the type and cause of uveitis.[11] Over the past decades, outcomes of cataract surgery in patients with uveitis have greatly improved because of modern small-incision surgical techniques, popularization of capsulorrhexis, introduction of acrylic intraocular lenses (IOLs), and more effective treatment for uveitis and its complications.[10] Phacoemulsification (PE) with foldable IOLs has been reported to be safe in eyes with uveitis, but the optimal IOL material is a matter of debate.[12]

Fuchs' heterochromic iridocyclitis is known to have a better prognosis for cataract surgery than other forms of uveitis.[10] Such a good prognosis may be related to the rare occurrence of posterior synechias (PS) and the relatively small likelihood of complications such as hyphema, vitreous hemorrhage, glaucoma, and progressive vitreous opacification after surgery.[10] In this article, we report a case series of PE and IOL implantation in 41 eyes with FHIC and cataract, which, to our knowledge, is the largest report to date.

Patients and Methods

Existing data for 41 eyes of 40 patients with FHIC complicated by visually significant cataracts who had PE and IOL implantation from 1995 to 2003 were reviewed. The diagnosis of FHIC was made according to Kimura and coauthors[13] criteria, including fine, diffuse, nonpigmented, stellate KPs; few cells and little flare in the anterior chamber; stromal iris atrophy with or without heterochromia; few cells in the anterior vitreous; and the absence of peripheral anterior synechias (PAS) or PS.

Preoperatively, no active inflammation was present, and none of the patients received topical or systemic steroids. All patients had standard PE and posterior chamber IOL (PC IOL) implantation (using scleral tunnel incision, chip and flip, or divide and conquer technique). Irrigation and aspiration of the cortex was done either mechanically or manually. With the aid of hydroxypropyl-methylcellulose 2% (Chauvin-Opsia), a single-piece poly(methyl methacrylate) (PMMA) or acrylic IOL with an optic diameter of 5.5 to 7 mm and overall diameter of 12.5 to 13.5 mm was implanted into the capsular bag. At the end of surgery, a subconjuctival injection of 20 mg gentamicin and 4 mg betamethasone was given to all patients.

Patients were seen on the first, second, and third postoperative days, then weekly for 2 weeks, monthly for 3 months, and every 3 months thereafter. The postoperative regimen included topical gentamicin every 6 hours for 3 to 5 days and topical betamethasone 0.1% every 2 hours, which was tapered gradually and discontinued within 2 to 3 months. At each postoperative visit, visual acuity (VA), anterior chamber reaction (cell and flare), pigment and inflammatory debris on the IOL, posterior capsule opacification (PCO), and vitreous haze were evaluated. Goldmann applanation tonometry was performed on the first postoperative day, and if normal, repeated 1 week, 1 month, and 3 months later. Fundoscopy was performed 1 week and 1 month after the operation and repeated every 3 months.

Results

Forty-one eyes of 40 patients (24 men and 16 women) aged 12 to 70 years (mean 35 $\pm$ 12 [SD]) had the procedure. Most of them (87.5%) were young or middle-aged adults (20 to 50 years). Only 2 patients were under age 20, and 4 patients were older than age 50. Follow-up ranged from 4 months to 54 months (mean 17.8 $\pm$ 8.7). Preoperative best corrected visual acuity (BCVA) was less than 20/40 in all eyes, which improved to 20/40 or better postoperatively; 22 eyes (53.6%) attained 20/20 acuity. In 19 eyes (46.4%), BCVA remained less than 20/20, primarily because of moderate vitreous haze in 13 cases.

The only intraoperative complication was peripheral iris bleeding (Amsler sign) in 6 patients (14.6%), which did not obscure visualization during surgery. No instances of zonular dehiscence, posterior capsule rupture, or vitreous loss occurred in any patient. The implanted IOLs were PMMA in 32 eyes and acrylic in 9 eyes (6 hydrophilic and 3 hydrophobic IOLs). Postoperatively, mild to moderate intraocular inflammation, which gradually decreased, was in all patients. Fibrin formation in the anterior chamber occurred in 4 eyes (9.7%), all of which were seen in the PMMA group; however, severe inflammation (hypopyon formation), PS, and PAS were not observed in any patient. Precipitates on the IOL were seen in 11 eyes (26.8%; 9 PMMA and 2 acrylic IOLs). Intraocular lens decentration was noted in 1 eye (2.4%) in which a PMMA IOL with an optic diameter of 5.5 mm and an overall diameter of 12.5 mm was used. No decentration

occurred in other eyes in which IOLs with larger optics (6 to 7 mm) and overall diameters (13 to 13.5 mm) were used. Six eyes (14.6%) developed PCO that required Nd:YAG laser capsulotomy; all were in the PMMA group. Clinical cystoid macular edema was seen in 1 eye (2.4%), which resolved with topical diclofenac sodium (Voltaren) 4 times a day. There were 2 eyes (4.8%) with transient rise of intraocular pressure (IOP) that resolved with medication. No eye developed permanent increased IOP. There were no cases of retinal detachment after surgery. Postoperative conditions and complications are summarized in Table 1.

Discussion

Secondary cataracts have always been a challenging condition in patients with uveitis. The surgical technique, complications, and aphakic correction have been matters of significant change over the past few decades.[14–16] Historically, IOLs were strictly contraindicated in uveitis patients. Since the adoption of extracapsular cataract extraction (ECCE) and in-the-bag IOL implantation, this contraindication became less absolute. This is even more true with the widespread use of small-incision phacoemulsification surgery.[16] The earliest reports of successful IOL implantation in uveitis were of eyes with FHIC that had ECCE and PC IOL implantation.[1]

Surgical technique seems to affect the rate of intraoperative and postoperative complications. Extracapsular cataract extraction and PC IOL in FHIC have been associated with complications such as vitreous loss, PS and PAS formation, hyphema, neovascular glaucoma, and retinal detachment.[8,9,17–19] Phacoemulsification, in contrast, seems to have lower rates of such complications,[20] as evident in our study. An issue of importance is that most of our patients were 20 to 50 years of age, and the majority had posterior subcapsular cataracts, making PE an easy procedure with fewer complications; this is compatible with other reports.[20,21] There were only 4 patients over age 50 and 2 patients under 20 years, and all these patients had an uneventful postoperative course and attained 20/20 BCVA during the follow-up period. The only intraoperative complication in our study was hyphema, which occurred in 6 eyes (14.6%). The low rate of hyphema in our series may be due to the closed system, to the fact that we did not perform a peripheral iridectomy, and to the generous use of viscoelastic material. Rates of other complications noted earlier were practically nil in our series.

Table 1. Complications and conditions following phacoemulsification in eyes with FHIC.

Condition/Complication	N (%)
Vitreous haze	16/41 (39.0)
IOL deposits	11/41 (26.8)
PCO	6/41 (14.6)
Fibrinous reaction	4/41 (9.7)
Cystoid macular edema	1/41 (2.4)
IOL decentration	1/41 (2.4)
Transient increase in IOP	2/41 (4.8)
Glaucoma	0 (0)
Retinal detachment	0 (0)

CME = cystoid macular edema; IOL = intraocular lens; IOP = intraocular lens; PCO = posterior capsule opacification.

Severe postoperative inflammation is 1 of the most common complications of cataract surgery in patients with anterior uveitis.[10,22] O'Neill and coauthors,[23] Jones,[24] Ram et al.,[25] and Sherwood and Rosenthal[26] reported severe postoperative uveitis in 20% to 35% of their cases after ECCE and IOL implantation. In a series of FHIC reported by Budak et al.,[14] performing either ECCE or PE with IOL implantation, 17.1% of cases had severe postoperative uveitis. In our study, however, only 9.7% developed a mild to moderate fibrinous uveitis. The lack of PS formation and reduced postoperative inflammation in our cases could result from several factors, including use of smaller incisions, in-the-bag IOL implantation, and the fact that we did not perform a peripheral iridectomy. Previously reported factors linked with reduced postoperative inflammation include decreased incision size, reduced IOL contact with uveal tissue, and improved IOL biocompatibility.[27–30]

The uveal and capsular biocompatibility of hydrophilic acrylic, hydrophobic acrylic, and silicone IOLs were evaluated in a prospective study of eyes with uveitis and nonuveitic eyes.[29] This study showed that cell reaction was significantly more severe in uveitic than control eyes but was comparable with all 3 types of IOLs 6 months after surgery. Hydrophobic acrylic lenses had the best capsular biocompatibility, and hydrophilic acrylic lenses had the best uveal biocompatibility. Despite differences among IOL materials regarding

the immediate aqueous cell response, the blood–aqueous barrier recovery was similar among the various IOL groups. According to other reports, IOLs with a PMMA or acrylic optic may be preferable to flexible silicone IOLs in uveitis patients.[10,11]

Cellular and pigment deposits on the IOL have been reported in 33% to 100% of cases with FHIC,[25,31] which may lead to decreased vision in severe cases.[31] Heparin-surface-modified (HSM) PMMA IOLs have been shown to decrease deposits on the IOL.[11,14,27,31] Although we did not use HSM IOLs, only 11 cases (26.8%), comprising mostly of patients with PMMA IOLs, developed pigment deposition. Only 2 of these eyes had VA less than 20/20, both in the PMMA group.

The rate of PCO in FHIC has been reported to be from 20% to 45%.[26,32–34] It is more common in patients with PMMA IOLs than in those with acrylic IOLs.[10,11] Hydrophilic acrylic IOLs have been successfully implanted in uveitis patients[12]; however, Abela-Formanek et al.[29] concluded that despite the better uveal biocompatibilty of the hydrophilic acrylic IOLs, they should not be recommended for cataract surgery in uveitic eyes because of early and accelerated development of PCO. Regarding the tolerability of hydrophobic acrylic IOLs in uveitis, these lenses were implanted instead of PMMA in the later period of the current study. In our series, 6 of 32 eyes with PMMA IOLs developed PCO requiring Nd:YAG capsulotomy. None of 9 eyes with acrylic lenses developed clinically significant PCO during the follow-up period. Nonetheless, no definite conclusion can be made regarding the observed difference in PCO rates with PMMA and acrylic IOLs in our series. Acrylic IOLs were implanted later in the course of study, and therefore follow-up is limited for this smaller number of cases.

Another significant complication of cataract surgery in FHIC is elevated IOP, reported in 3% to 35% of cases.[15] Glaucoma has been reported in 15% to 50% of unoperated eyes with FHIC.[13–15] Therefore, IOP elevation may be considered part of the natural course of the disease. Neovascular glaucoma was reported by Estefanous et al.[20] in 1 case with FHIC after PE and PC IOL implantation. None of our cases developed glaucoma postoperatively, which is in agreement with Razzak A and al Samarrai's[28] report. We observed only 2 eyes (4.8%) with transient IOP elevation, which resolved with a topical antiglaucoma agent.

Most reports state excellent visual outcomes following cataract surgery in FHIC.[11,27,30] All our patients attained BCVA of 20/40 or better after surgery, which is comparable to results in studies by Gee and Tabbara[1] and Budak et al.[14] reports. Others have reported VA of 20/40 or better in 76% to 89% of patients with ECCE and a PC IOL.[19,23,25,28,32] Vitreous haze is the most common cause of postoperative visual impairment in FHIC and has been reported in 12% to 50% of cases.[24–26] In our study, 16 eyes (39%) had mild to moderate vitreous haze, which was the main cause of VA less than 20/20 in 13 patients. In Baarsma and coauthors[35] series, decreased VA was due to vitreous haze in 4 of 22 cases. Soheilian et al.[36] reported concurrent core or deep vitrectomy to be beneficial in cases with vitreous haziness and reported postoperative VA of 20/25 or better in 78% of their cases. Scott et al.[37] reported postoperative VA of almost 20/20 in 12 eyes that had vitrectomy for vitreous haze and floaters. Although we did not perform vitrectomy in any of our cases, 53.6% had BCVA of 20/20 or better.

In conclusion, phacoemulsification and in-the-bag IOL implantation yields good visual outcomes with low rates of intraoperative and postoperative complications and seems to be the preferred technique of cataract surgery in FHIC. The major vision limiting factor is vitreous haze.

References

1. Gee SS, Tabbara KF. Extracapsular cataract extraction in Fuchs' hetetochromic iridocyclitis. Am J Ophthalmol 1989; 108:310–314
2. Arellanes-García L, Preciado-Delgadillo MDC, Recillas-Gispert C. Fuchs' heterochromic iridocyclitis: clinical manifestations in dark-eyed Mexican patients. Ocul Immunol Inflamm 2002; 10:125–131
3. Pivetti-Pezzi P, Accorinti M, La Cava M, et al. Endogenous uveitis: an analysis of 1,417 cases. Ophthalmologica 1996; 210:234–238
4. Monowarul Islam SM, Tabbara KF. Causes of uveitis at The Eye Center in Saudi Arabia: a retrospective review. Ophthalmic Epidemiol 2002; 9:239–249
5. Barequet IS, Li Q, Wang Y, et al. Herpes simplex virus DNA identification from aqueous fluid in Fuchs heterochromic iridocyclitis. Am J Ophthalmol 2000; 129:672–673
6. Velilla S, Dios E, Herreras JM, Calonge M. Fuchs' heterochromic iridocyclitis: a review of 26 cases. Ocul Immunol Inflamm 2001; 9:169–175

7. Myers TD, Smith JR, Lauer AK, Rosenbaum JT. Iris nodules associated with infectious uveitis. Br J Ophthalmol 2002; 86:969–974
8. Coles RS. Uveitis. In: Sorsby A, ed, Modern Ophthalmology. Vol. 4: Topical Aspects. London, Butterworth, 1964; 636–687
9. Perkins ES. Heterochromic uveitis. Trans Ophthalmol Soc UK 1961; 81:53–66
10. Muccioli C, Belfort R Jr. Cataract surgery in patients with uveitis. Int Ophthalmol Clin 2000; 40(2):163–173
11. Foster CS, Rashid S. Management of coincident cataract and uveitis. Curr Opin Ophthalmol 2003; 14:1–6
12. Rauz S, Stavrou P, Murray PI. Evaluation of foldable intraocular lenses in patients with uveitis. Ophthalmology 2000; 107:909–919
13. Kimura SJ, Hogan MJ, Thygeson P. Fuchs' syndrome of heterochromic cyclitis. Arch Ophthalmol 1955; 54:179–186
14. Budak K, Akova YA, Yalvac I, et al. Cataract surgery in patients with Fuchs' heterochromic iridocyclitis. Jpn J Ophthalmol 1999; 43:308–311
15. Jones NP. Fuchs' heterochromic uveitis; an update. Surv Ophthalmol 1993; 37:253–272
16. Foster CS. Cataract surgery in the patient with uveitis. Focal Points: Clinical Modules for Ophthalmologists. American Academy of Ophthalmology 1994; 12(4):1–8
17. Ward DM, Hart CT. Complicated cataract extraction in Fuchs heterochromic uveitis. Br J Ophthalmol 1967; 51:530–538
18. Smith RE, O'Connor GR. Cataract extraction in Fuchs syndrome. Arch Ophthalmol 1974; 91:39–41
19. Mills KB, Rosen ES. Intraocular lens implantation following cataract extraction in Fuchs' heterochromic uveitis. Ophthalmic Surg 1982; 13:467–469
20. Estafanous MFG, Lowder CY, Meisler DM, Chauhan R. Phacoemulsification cataract extraction and posterior chamber lens implantation in patients with uveitis. Am J Ophthalmol 2001; 131:620–625
21. Okhravi N, Lightman SL, Towler HMA. Assessment of visual outcome after cataract surgery in patients with uveitis. Ophthalmology 1999; 106:710–722
22. Daus W, Schmidbauer J, Buschendorff P, et al. Results of extracapsular cataract extraction with intraocular lens implantation in eyes with uveitis and Fuchs' heterochromic iridocyclitis. Ger J Ophthalmol 1992; 1:399–402
23. O'Neill D, Murray PI, Patel BC, Hamilton AMP. Extracapsular cataract surgery with and without intraocular lens implantation in Fuchs' heterochromic cyclitis. Ophthalmology 1995; 102:1362–1368
24. Jones NP. Cataract surgery in Fuchs' heterochromic uveitis: past, present, and future. J Cataract Refract Surg 1996; 22:261–268
25. Ram J, Jain S, Pandav SS, et al. Postoperative complications of intraocular lens implantation in patients with Fuchs' heterochromic cyclitis. J Cataract Refract Surg 1995; 21:548–551
26. Sherwood DR, Rosenthal AR. Cataract surgery in Fuchs' heterochromic iridocyclitis. Br J Ophthalmol 1992; 76:238–240
27. Foster CS, Fong LP, Singh G. Cataract surgery and intraocular lens implantation in patients with uveitis. Ophthalmology 1989; 96:281–287; discussion by HJ Kaplan, 287–288
28. Razzak A, al Samarrai ARA. Intraocular lens implantation following cataract extraction in Fuchs' heterochromic uveitis. Ophthalmic Res 1990; 22:134–136
29. Abela-Formanek C, Amon M, Schauersberger J, et al. Results of hydrophilic acrylic, hydrophobic acrylic, and silicone intraocular lenses in uveitic eyes with cataract; comparison to a control group. J Cataract Refract Surg 2002; 28:1141–1152
30. Tessler HH, Farber MD. Intraocular lens implantation versus no intraocular lens implantation in patients with chronic iridocyclitis and pars planitis; a randomized prospective study. Ophthalmology 1993; 100:1206–1209
31. Jones NP. Cataract surgery using heparin surface-modified intraocular lenses in Fuchs' heterochromic uveitis. Ophthalmic Surg 1995; 26:49–52
32. Avramides S, Sakkias G, Traianidis P. Cataract surgery in Fuchs' heterochromic iridocyclitis. Eur J Ophthalmol 1997; 7:149–151
33. Guzak JP, Holm M, Cotter JB. Risk factors for intraoperative complications in 1000 extracapsular cataract cases. Ophthalmology 1987; 94:461–466
34. Kheireddine A, Turut P, Milazzo S. Résultats fonctionnels de la chirugie de la cataraced avec implantation dans la cyclite hétérochromique de Fuchs. J Fr Ophtalmol 1993; 16:326–331
35. Baarsma GS, de Vries J, Hammudoglu CD. Extracapsular cataract extraction with posterior chamber lens implantation in Fuchs' heterochromic cyclitis. Br J Ophthalmol 1991; 75:306–308
36. Soheilian M, Karimian F, Javadi MA, et al. Surgical management of cataract and posterior chamber intraocular lens implantation in Fuchs' heterochromic iridocyclitis. Int Ophthalmol 1997; 21:137–141
37. Scott RA, Sullivan PM, Aylward GW, et al. The effect of pars plana vitrectomy in the management of Fuchs heterochromic cyclitis. Retina 2001; 21:312–316