NIH Public Access
Author Manuscript
Curr Rheumatol Rep. Author manuscript; available in PMC 2013 August 23.

Published in final edited form as:
Curr Rheumatol Rep. 2012 April ; 14(2): 142–149. doi:10.1007/s11926-011-0229-z.

Prevention and Management of Cataracts in Children with Juvenile Idiopathic Arthritis–Associated Uveitis

Sheila Angeles-Han and
Division of Pediatric Rheumatology, Emory University School of Medicine, 2015 Uppergate Drive, Atlanta, GA 30307, USA

Steven Yeh
Section of Vitreoretinal Surgery, Department of Ophthalmology, Emory University School of Medicine, 1365B Clifton Road NE, Atlanta, GA 30322, USA

Sheila Angeles-Han: sangele@emory.edu; Steven Yeh: steven.yeh@emory.edu

Abstract

Juvenile idiopathic arthritis (JIA)-associated uveitis can be associated with vision-compromising complications such as cataracts, glaucoma, synechiae, and band keratopathy. Of these, cataracts are one of the most common sequelae of JIA-associated uveitis and can result in significant visual disability. Risk factors for cataracts include posterior synechiae and longstanding ocular inflammation. Prevention of cataract development is crucial through appropriate control of uveitis. However, not all preventive measures are successful, and further management consisting of medical and surgical techniques is often necessary. Various factors should be taken into consideration when deciding on cataract management, including timing of surgery and placement of an intraocular lens. Continued partnership between pediatric rheumatologists and pediatric ophthalmologists can help ensure favorable visual outcomes.

Keywords

Juvenile idiopathic arthritis; Uveitis; Cataracts; Treatment; Prevention; Management; Glaucoma; Synechiae; Band keratopathy; Visual acuity; Visual impairment; Corticosteroids; Surgery; Intraocular lens

Introduction

Juvenile idiopathic arthritis (JIA) is the most common rheumatologic condition of childhood. It is also the most common systemic cause of childhood uveitis in North America, with a reported prevalence in JIA up to 38% [1–3] and a range between 9% and 30% [4–15]. The risk of JIA-associated uveitis (JIA-U) differs based on arthritis subtype, wherein children with oligoarticular JIA have up to a 20% risk of uveitis development [2].

Uveitis is potentially blinding with a chronic and often relapsing course. Almost 80% of patients have bilateral disease [16]. Risk factors include early age at onset, short disease duration, arthritis subtype, and antinuclear antibody (ANA) seropositivity [7, 17–20]. Reported risk factors for vision loss include the presence of uveitis before arthritis, severe

© Springer Science+Business Media, LLC 2011

Correspondence to: Sheila Angeles-Han, sangele@emory.edu.

Disclosure No potential conflicts of interest relevant to this article were reported.

NIH-PA Author Manuscript
NIH-PA Author Manuscript
NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

disease and complications at initial examination, short duration between arthritis onset and uveitis, young age, presence of one or more anterior chamber flares, and male gender [7, 17, 18, 21–24]. The *HLA-B27* gene can be associated with painful symptomatic uveitis in older children with enthesitis-related arthritis, which is different from asymptomatic eye disease in younger children [2, 25].

There is a significant risk of secondary ocular complications associated with JIA-U; hence, the American Academy of Pediatrics recommends regular vision screening for children with JIA [16, 26]. According to these guidelines, a child is at higher risk of uveitis based on arthritis subtype (using the juvenile rheumatoid arthritis classification scheme), ANA status, age at juvenile rheumatoid arthritis onset, and disease duration (Table 1). Children at high risk should be screened by their ophthalmologists every 3 months to avert serious visual sequelae. Screening for uveitis consists of measuring visual acuity (VA) and a slit lamp examination of aqueous humor cell and protein flare graded according to the Standardized Uveitis Nomenclature guidelines [27].

Complications of Uveitis

Approximately 20% to 60% of children with JIA-U suffer from severe vision-compromising complications secondary to uveitis, which may include cataract, glaucoma, band keratopathy, posterior synechiae, and hypotony [7, 18, 28–31]. Up to 65% of children are asymptomatic in early JIA-U; about 45% suffer from complications at their initial visit [7]. Increased duration of eye inflammation leads to a greater likelihood of ocular damage and complications. In a study of 75 children with JIA-U, Thorne et al. [18] estimated that after 3 years, 30% of children developed a VA of 20/50, and 24% developed blindness or a VA of 20/200 or worse [18]. In the persistent and extended oligoarticular subtypes, 30% and 38% had a VA of 20/50 or worse, respectively, and 9% and 23% had a VA of 20/200 or worse [7]. Hence, JIA-U can lead to long-term visual impairment and ocular complications, with persistent visual morbidity extending into adulthood [30, 32•].

This paper focuses on the prevention and management of cataracts, one of the most common complications of JIA-U [1, 4, 31, 33, 34]. Although age-related cataracts are more common and their management frequently routine, the complexities of cataract management in patients with JIA-U warrants a thorough consideration of concomitant systemic and local immunosuppression, perioperative measures to prevent postoperative inflammatory flare-ups, and long-term coordination of care between pediatric rheumatologists and treating ophthalmologists to optimize visual outcomes.

Juvenile Idiopathic Arthritis–Associated Cataracts

Incidence/Prevalence of Cataracts in Juvenile Idiopathic Arthritis–Associated Uveitis

Cataracts, or lens opacities, are among the most frequently observed ocular complications of JIA. New-onset cataracts in JIA-U patients have an estimated incidence of 0.04/eye-year and a reported prevalence between 9% and 80% in children or uveitic eyes. However, their occurrence may be influenced by the duration of uveitis, degree of inflammation control, and concomitant topical corticosteroid (CS) use [4–8, 10, 15, 18, 29, 30, 35••, 36, 37].

Unfortunately, uveitis can persist into adulthood, and retrospective cohort studies report a cataract frequency of approximately 80% in adults with a history of JIA-U [30, 38•]. In one study of 18 adult patients with JIA-U, 70% of 30 eyes were visually handicapped or blind at follow-up due to cataract, hypotony, or macular pathology [30]. A recent study by Camuglia et al. [32•] reviewed the outcomes of 30 eyes in 17 adults with active JIA-U. Five patients underwent cataract surgery during childhood, and 9 patients, or 13 eyes (53%) had a new

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

complication of cataracts or glaucoma into adulthood, with 10 eyes requiring cataract surgery and intraocular lens (IOL) implantation. Interestingly, no patients received steroid-sparing agents in childhood and all had an older age at onset of uveitis (mean, 11.5 years), emphasizing the potential importance of early and aggressive treatment.

Risk Factors for Cataracts

Several retrospective series have described risk factors for cataract development in JIA-U, which include 1) posterior synechiae, or adhesion of the capsule to the iris of the lens, on initial examination; 2) systemic CS therapy; 3) topical CS therapy exceeding 3 drops/d; and 4) active, ongoing inflammation [35••, 36, 37, 39].

A study by Sijssens and colleagues [40] evaluated the factors that accelerate and mitigate the development of cataracts requiring surgery. They reviewed the records of 53 children with JIA-U or uveitis who were ANA positive from 1990 through 2006, specifically evaluating the interval from uveitis development to the first eye undergoing cataract extraction (U-CE). Children were observed for a mean of 3.4 years, and 51% underwent CE before the end of follow-up. Mean age at uveitis onset was 4.6 years for children needing CE and 6.2 years for those not needing CE. They described a shorter U-CE interval in patients with posterior synechiae at diagnosis and a longer U-CE interval in patients treated with methotrexate. Interestingly, no differences were identified in children in whom uveitis was diagnosed as the first manifestation of JIA compared with those patients in whom arthritis was the first manifestation. Gender and ANA status were similarly unrelated to the U-CE interval. On univariate analysis, periocular CS was associated with a shorter U-CE interval, but when adjusted for the presence of posterior synechiae, this was not found to be statistically significant.

More recently, Thorne et al. [35••] investigated the incidence of cataracts, risk factors for cataract development, and the effect of treatment with topical CS in 75 children with JIA-U over a 21-year period. In their population, the prevalence of visual impairment was 36.4%, 23.7% of whom were blind at presentation. Nearly 25% of eyes had a cataract at presentation, and 23.1% had undergone cataract surgery. Factors that were significantly associated with cataract development included active anterior chamber inflammation at increasing levels, use of topical CS, and the presence of posterior synechiae at presentation. Interestingly, an increased duration of uveitis prior to presentation was associated with a decreased risk of cataract development. The authors' explanation was that this counterintuitive finding was secondary to survivor bias because eyes with milder disease do not develop cataract as quickly compared with children with more severe disease at the time of presentation. They examined the effects of daily dosing of topical CS and concluded that the risk of cataract development increased as the number of daily drops increased; specifically, the use of topical CS, 3 drops or less daily, was associated with an 87% reduction in the risk of cataract when compared with 4 or more CS drops daily. They also noted a 68% reduction in cataract surgery in children who received less than 3 drops/d, although this was not significant after controlling for confounding factors. Hence, they concluded that in the setting of JIA-U anterior uveitis, low doses of topical CS may be associated with a low risk of developing cataract when compared with patients receiving higher doses.

Genetics and Cataracts

Some studies have shown an association between *HLA* class I and II genes and JIA-U wherein *HLA-B27*, *HLA-DR11* (*HLA-DRB1*1104*), and *HLA-DR13* (*HLA-DRB1*13*) increase disease susceptibility, and *HLA-DR1* is protective [21, 29, 41–47]. Other *HLA* alleles also have been associated with elevated uveitis risk [42, 43, 46]. Although certain

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

HLA alleles can increase the risk of JIA-U, the association between *HLA* polymorphisms and the risk of cataracts is unknown. Interestingly, one study that discovered an association between *HLA-DR5* and uveitis in a cohort of 72 children found that cataracts occurred in 24 of 61 of those children (39%) [45]. The role of *HLA* and the subsequent development of complications secondary to uveitis should be further elucidated.

Cataract Outcomes in Juvenile Idiopathic Arthritis

Outcomes from cataract surgery can differ depending on the etiology of the uveitis [38•]. Several factors should be considered in the decision of performing cataract surgery, including the risk of irreversible amyblyopia, patient age, degree of inflammation, preoperative VA, and current therapy [38•, 48•].

Children with JIA-U who have undergone cataract surgery have had worse visual outcomes and a more complicated postsurgical course compared with children with uveitis secondary to other causes (ie, idiopathic), likely due to more severe intraocular inflammation and younger age [48•, 49]. Studies have demonstrated that control of ocular inflammation by immunosuppressive therapy perioperatively and postoperatively leads to improved outcomes. Hence, it is important that uveitis be quiescent, typically for at least 3 months prior to surgery [48•, 50•, 51]. Likewise, the successful management of cataract in JIA-U requires a comprehensive assessment of the adequacy of immunosuppressive control of uveitis prior to surgery, and of complex surgical decisions regarding IOL implantation and other comorbid ophthalmic pathologies such as posterior synechiae, glaucoma, and band keratopathy, which often occur in the setting of JIA-U.

Cataract surgery can be challenging due to limited surgical exposure from posterior synechiae and fibrinous membranes overlying the anterior lens capsule. Moreover, the management of postoperative complications such as uncontrolled inflammation, early posterior capsular opacification, glaucoma, cystoid macular edema (CME), epiretinal membrane, hypotony, and phthisis bulbi requires meticulous care [51]. Controversy remains regarding the placement of an IOL due to various complications (eg, synechiae from fibrin deposition, pupillary membrane formation, hypotony, secondary cataract formation) and the possible need for IOL explantation if the visual axis is compromised by IOL pigmentation or secondary fibrinous membranes [38•, 51]. However, recent studies have demonstrated favorable overall outcomes.

Quinones et al. [48•] reviewed the medical records of 34 children (41 eyes) with chronic uveitis and cataracts requiring surgery, of whom 21 children (27 eyes) had JIA-U. Although the 2 patients whose eyes worsened after surgery, and 9 of 10 children who required surgery at 5 years of age or younger had JIA-U, 88% of the cohort of children who had improved visual outcomes also had JIA-U. Potentially, the need for escalation of immunosuppression in the perioperative period is an important consideration, as is the need for close postoperative follow-up for uveitis exacerbations following cataract extraction.

Cataract Surgery

Cataract surgery can be challenging due to limited surgical exposure from posterior synechiae and fibrinous membranes overlying the anterior lens capsule. Moreover, the management of postoperative complications such as uncontrolled inflammation, early posterior capsular opacification, glaucoma, CME, epiretinal membrane, hypotony, and phthisis bulbi requires meticulous care [51]. Controversy remains regarding the placement of an IOL due to various complications (eg, synechiae from fibrin deposition, pupillary membrane formation, hypotony, secondary cataract formation) and the possible need for IOL explantation if the visual axis is compromised by IOL pigmentation or secondary

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

fibrinous membranes [38•, 51]. However, recent studies have demonstrated favorable overall outcomes.

Acevedo et al. [51] examined the records of 24 patients (30 eyes) who underwent cataract surgery via standard phacoemulsification techniques [51]. A total of 93.3% of eyes improved or maintained VA and 6.7% of eyes worsened. A total of 76.7% of eyes were left aphakic, and 23.3% received an IOL implant with improvement after 1 year. Hence, the authors found that IOL implantation was well-tolerated in their subset of patients receiving an IOL.

Grajewski et al. [50•] examined whether intraocular tri-amcinolone acetonide injection intraoperatively and the use of a lensectomy–vitrectomy technique reduces the incidence and severity of postoperative inflammation and complications from IOL implantation. In their cohort, there was improvement of VA and no worsening of anterior chamber cell inflammation, suggesting that removal of cataracts using vitreoretinal instrumentation may lead to acceptable visual and structural outcomes.

Initial Strategies for Cataract Prevention

Uveitis Screening

Because cataracts remain a frequent ophthalmic complication of JIA-U, strategies to prevent and identify cataracts are needed. These preventive strategies involve adherence to early screening guidelines for uveitis, as defined by the American Academy of Pediatrics, and education of parents regarding the importance of regular ophthalmic examinations (Table 1).

Although studies differ with respect to the association of ANA positivity and male gender with cataracts, posterior synechiae and the use of topical CS have been associated with increased cataract risk. The presence of posterior synechiae may identify patients with more severe inflammation, and these patients should be monitored closely. Moreover, it is possible that patients with posterior synechiae warrant more aggressive immunosuppression to prevent further synechiae, as well as cataract development. The recent finding by Thorne et al. [35••] that topical CS use exceeding 3 drops/d is significantly associated with cataract development further emphasizes the need for immunosuppressive strategies that reduce the likelihood of cataract development exacerbated by frequent topical CS use.

The immunosuppressive strategies that allow the ophthalmologist to safely taper topical CS often require close collaboration among the pediatric rheumatologist, pediatric ophthalmologist, and uveitis or retinal disease specialist. Communication among subspecialists is paramount for the care of patients with JIA-U and fosters a comprehensive treatment plan while improving the ease of critical information exchange among the ophthalmologist, rheumatologist, patient, and family.

Immunosuppressive Therapy

Several retrospective series have addressed systemic immunosuppression for JIA-U. Methotrexate may reduce the rapidity of cataract formation in JIA-U. Other antimetabolites such as mycophenolate mofetil and azathioprine; tumor necrosis factor-α inhibitors such as infliximab and adalimumab; and other biologic agents, including the interleukin-2 receptor inhibitor daclizumab, have also demonstrated efficacy in the treatment of JIA-U and other forms of pediatric uveitis [40, 52–57].

Several authors have recently described the successful use of abatacept, a soluble fusion protein derived from the extracellular domain of cytotoxic T-lymphocyte antigen 4 linked to the FC domain of human IgG_1, for uveitis [58–60]. Its mechanism of action, binding B7-cell

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

surface molecule (CD80/CD86) on antigen-presenting cells and thereby blocking the CD28-B7 costimulatory signal required for T-cell activation, has been shown to reduce the severity of experimental autoimmune anterior uveitis. Recent reports of its efficacy in the treatment for JIA-U patients with severe uveitis refractory to multiple therapies, as well as reports of its efficacy in other animal models of uveitis have been particularly encouraging with regard to its potential for the treatment of JIA-U and prevention of secondary ocular complications, including cataract [61].

Perioperative Corticosteroid Management in Addition to Systemic Immunosuppression

While screening and prevention of cataract are important goals in the care of patients with JIA-U, the relatively high incidence of cataract development approaching 80% in the study by Acevedo et al. [51] requires a systematic strategy for effective management. No prospective evidence exists regarding the optimal timing for cataract surgery; however, there is a consensus that the uveitis should be inactive for 3 months or longer prior to surgery [38•, 62].

Preoperative escalation of immunosuppressive therapy with systemic or locally administered CS is advisable prior to surgery if the risk profile is acceptable to the patient. For example, oral prednisone may be prescribed at a dose of 0.5 to 1.0 mg/kg 3 to 7 days prior to surgery [38•]; however, systemically administered CS may be associated with elevated intraocular pressure, and patients need to be closely monitored following surgery for an intraocular pressure spike if systemic CS is recommended. Another alternative for perioperative escalation of immunosuppression is a local periocular CS injection. However, the difficulty of administering local CS injections in pediatric patients in the clinic and the concomitant risks of inadvertent globe injury make this method a less desirable approach. Finally, local topical CS or topical NSAIDs may be considered, particularly in patients who cannot tolerate high-dose oral CS (eg, those with brittle diabetes).

Postoperatively, oral and topical CS should be tapered judiciously based on the level of disease activity [38•]. In patients who develop a uveitis flare-up following cataract surgery, administration of intravenous CS, periocular CS, or escalation of CS-sparing immunosuppression may be needed. Close collaboration between the ophthalmologist and the treating pediatric rheumatologist is extremely important to ensure a successful surgical outcome [63].

Special Considerations in Cataract Management in Juvenile Idiopathic Arthritis–Associated Uveitis

Aphakia Versus Pseudophakia

One of the unresolved controversies regarding cataract surgery in JIA-U involves the implantation of an IOL (pseudo-phakia) following cataract extraction versus allowing the patient to remain without a lens (aphakia). An IOL implant may be associated with increased postoperative inflammation; posterior synechiae formation; and, less frequently, diffuse fibrin deposition on the IOL surface. Cyclitic membranes, hypotony, and phthisis bulbi also have been reported in patients with uncontrolled inflammation following cataract extraction with an IOL implant. However, more recently, several groups have described excellent outcomes with primary IOL implantation following cataract extraction [64, 65•]. In children who are left aphakic, early refractive correction is essential, particularly if the patient undergoes surgery during an amblyogenic period. In addition, difficulty with contact lens correction may make IOL placement a more desirable option.

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Sijssens et al. [65•] evaluated their long-term results of aphakic versus pseudophakic eyes in 48 eyes of 29 children treated over a 16-year period. In their series, secondary complications, including newly diagnosed ocular hypertension, glaucoma, and CME, did not differ between treatment groups. Moreover, pseudophakic status was associated with better VA at 7-year follow-up, and no patients developed hypotony, perilenticular membranes, or phthisis. However, the experience of other authors has differed, with one group reporting relatively poorer outcomes in patients with JIA-U undergoing cataract extraction with IOL implantation [49]. Specifically, in their series of five patients with JIA-U undergoing CE/IOL, all patients improved initially following surgery; however, three patients experienced deterioration in their vision due to amblyopia and/or maculopathy at 5-year follow-up. All three required a vitrectomy procedure due to retrolental membrane formation.

Type of Intraocular Lens Implant Material

Following the decision regarding whether to implant an IOL or leave the patient aphakic, there has been considerable debate in the literature regarding lens material selection. A prospective, randomized, comparative case series addressed this question in four different lens materials. Alio et al. [66] described a multicenter international study evaluating 140 uveitic eyes in 140 patients who underwent phacoemulsification with IOL implantation of hydrophobic acrylic, silicone, poly(methyl methacrylate) (PMMA), or heparin-coated PMMA lenses. A total of 46% of patients improved to VA of 20/40 or better [66]. Patients with acrylic lenses showed the least inflammation at postoperative day 1 and at 3-month follow-up, while the acrylic- and heparin-coated PMMA lenses showed the lowest incidence of uveitis relapses. The silicone lens group showed the highest rate of posterior capsular opacification, at 34%; for this reason and because of its potential for interfering with vitreoretinal instrumentation, the silicone lens appear less desirable for cataract management in the setting of uveitis. Another study by Papaliodis et al. [67] supported these conclusions and found that acrylic lenses provided better results than heparin-coated PMMA, PMMA, and silicone lens following evaluation of inflammation, posterior capsule opacification, VA, and macular edema.

Limited Vitrectomy with or Without Capsulectomy at Time of Pediatric Cataract Surgery

In pediatric patients, secondary opacification of the capsular bag containing the cataract being removed frequently occurs following surgery and presents a challenging problem. Specifically, posterior capsular opacification and fibrosis may develop, leading to obscuration of the child's visual axis with a reduction in central VA. In older children, a neodymium yttrium-aluminum-garnet (Nd:YAG) laser capsulotomy may be performed in the clinic and avoids the need for vitrectomy instrumentation at the time of cataract surgery. However, in younger children in whom repeat general anesthesia would be needed for a surgical capsulotomy, limited anterior vitrectomy with posterior capsulectomy may be advisable following cataract extraction and IOL implantation to ensure that the visual axis is not eventually obscured by a central posterior capsular opacity. Pars plana anterior vitrectomy and anterior approach through the cornea or sclera have been described and are both associated with safe and effective management of the posterior capsule in pediatric cataract surgery [68]. Ultimately, the surgical approach may be determined by the surgeon's comfort with a posterior or anterior approach and the patient's age [69].

Posterior Synechiae, Band Keratopathy, Glaucoma, and Cystoid Macular Edema

The management of cataract in JIA-U does not occur in isolation, as cataracts may be associated with other secondary complications, including posterior synechiae, band keratopathy, glaucoma, and CME. Because each of these findings may ultimately influence the visual outcome, careful attention is required to these individual processes during surgery and in the postoperative period.

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Posterior synechiae, or adhesions from the iris to the lens requires synechiolysis prior to cataract extraction. Viscoelastic may be used to dissect the iris adhesions from the lens, but in other situations, a blunt spatula (ie, cyclodialysis spatula or iris sweep) is needed to accomplish this task. However, special care should be taken to avoid manipulating the iris, as perturbation of iris pigment cells contributes to postoperative inflammation. Iris hooks may also be needed in some patients to retract the iris peripherally to gain visualization of the cataractous lens.

In patients with longstanding uveitis, the deposition of calcium in the subepithelial space may warrant ethylenedi-amine tetra-acetic acid (EDTA) chelation prior to or after cataract surgery. This may be especially relevant in circumstances in which dense band keratopathy precludes a view adequate for cataract extraction.

Following cataract extraction, patients should be monitored carefully for the development of glaucoma and CME, both of which may worsen following cataract surgery because of ongoing, active inflammation (glaucoma, CME) or because of topical CS use (glaucoma). Management of glaucoma may include topical ocular hypotensive agents or filtration surgery. CME may be treated with topical CS or topical NSAIDs. However, local periocular or intravitreal CS are required, particularly in severe cases of CME.

Amblyopia Management

Depending on the age at onset of JIA-U and degree of asymmetry of disease activity, patients with JIA-U may be at risk of amblyopia. For this reason, careful evaluation by the pediatric ophthalmologist is needed to determine if an intervention is needed following the detection of amblyopia.

Deprivation amblyopia may occur as a result of band keratopathy or cataract formation, while refractive/anisome-tropic amblyopia may result from aphakia following cataract extraction. Strabismic amblyopia is less common in JIA-U; however, sensory exotropia or esotropia may develop in the setting of deprivation and alert the clinician to another cause of amblyopia. Combinations of the above may also occur and emphasize the need for proper evaluation and management by ophthalmologists with expertise in amblyopia management (ie, occlusion, pharmacologic therapy).

Conclusions

We strongly emphasize the importance of screening for uveitis in children with JIA, especially because early disease is usually asymptomatic. More frequent screening is needed for children with risk factors such as ANA positivity, oligoarthritis, polyarthritis that is rheumatoid factor negative, age younger than 7 years, and disease duration of less than 4 years. Early detection and prompt therapy can help prevent visual complications such as cataracts. Likewise, if cataract surgery or IOL placement is needed in this population, children with quiescent disease tend to have better outcomes that often require a combination of systemic and local immunosuppression. For this reason, collaboration between the rheumatologist and ophthalmologist is advisable to determine a proper perioperative medication regimen and postoperative follow-up strategy. Judicious consideration of these complex medical and surgical aspects of cataract management may help optimize the patient’s surgical outcome and limit long-term cataract-associated visual morbidity.

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Acknowledgments

This work was supported by a grant from the American College of Rheumatology Research and Education Foundation and the Arthritis Foundation Career Development Bridge Funding Award, by a K23EY021760 grant from the National Eye Institute (content is solely the responsibility of the authors and does not necessarily represent the official views of the National Eye Institute or the National Institutes of Health), and by an unrestricted grant from Research to Prevent Blindness to the Emory Eye Center (New York, NY).

References

Papers of particular interest, published recently, have been highlighted as:

• Of importance

•• Of major importance

1. Kesen MR, Setlur V, Goldstein DA. Juvenile idiopathic arthritis-related uveitis. Int Ophthalmol Clin. 2008; 48:21–38. [PubMed: 18645397]
2. Kotaniemi K, Savolainen A, Karma A, Aho K. Recent advances in uveitis of juvenile idiopathic arthritis. Surv Ophthalmol. 2003; 48:489–502. [PubMed: 14499817]
3. Zierhut M, Michels H, Stubiger N, et al. Uveitis in children. Int Ophthalmol Clin. 2005; 45:135–56. [PubMed: 15791163]
4. Kotaniemi K, Kautiainen H, Karma A, Aho K. Occurrence of uveitis in recently diagnosed juvenile chronic arthritis: a prospective study. Ophthalmology. 2001; 108:2071–5. [PubMed: 11713082]
5. Kotaniemi K, Arkela-Kautiainen M, Haapasaari J, Leirisalo-Repo M. Uveitis in young adults with juvenile idiopathic arthritis: a clinical evaluation of 123 patients. Ann Rheum Dis. 2005; 64:871–4. [PubMed: 15897307]
6. Grassi A, Corona F, Casellato A, et al. Prevalence and outcome of juvenile idiopathic arthritis-associated uveitis and relation to articular disease. J Rheumatol. 2007; 34:1139–45. [PubMed: 17343317]
7. Heiligenhaus A, Niewerth M, Ganser G, et al. Prevalence and complications of uveitis in juvenile idiopathic arthritis in a population-based nation-wide study in Germany: suggested modification of the current screening guidelines. Rheumatology (Oxford). 2007; 46:1015–9. [PubMed: 17403710]
8. Skarin A, Elborgh R, Edlund E, Bengtsson-Stigmar E. Long-term follow-up of patients with uveitis associated with juvenile idiopathic arthritis: a cohort study. Ocular Immunology & Inflammation [Article]. 2009; 17:104–8.
9. Saurenmann RK, Levin AV, Feldman BM, et al. Prevalence, risk factors, and outcome of uveitis in juvenile idiopathic arthritis: a long-term followup study. Arthritis Rheum. 2007; 56:647–57. [PubMed: 17265500]
10. Sabri K, Saurenmann RK, Silverman ED, Levin AV. Course, complications, and outcome of juvenile arthritis-related uveitis. J AAPOS. 2008; 12:539–45. [PubMed: 18789737]
11. Chen CS, Roberton D, Hammerton ME. Juvenile arthritis-associated uveitis: visual outcomes and prognosis. Can J Ophthalmol. 2004; 39:614–20. [PubMed: 15559647]
12. Oren B, Sehgal A, Simon JW, et al. The prevalence of uveitis in juvenile rheumatoid arthritis. J AAPOS. 2001; 5:2–4. [PubMed: 11182663]
13. Kotaniemi K, Kaipiainen-Seppanen O, Savolainen A, Karma A. A population-based study on uveitis in juvenile rheumatoid arthritis. Clin Exp Rheumatol. 1999; 17:119–22. [PubMed: 10084046]
14. Chalom EC, Goldsmith DP, Koehler MA, et al. Prevalence and outcome of uveitis in a regional cohort of patients with juvenile rheumatoid arthritis. J Rheumatol. 1997; 24:2031–4. [PubMed: 9330949]
15. BenEzra D, Cohen E, Behar-Cohen F. Uveitis and juvenile idiopathic arthritis: a cohort study. Clin Ophthalmol. 2007; 1:513–8. [PubMed: 19668530]
16. Cassidy J, Kivlin J, Lindsley C, Nocton J. Ophthalmologic examinations in children with juvenile rheumatoid arthritis. Pediatrics. 2006; 117:1843–5. [PubMed: 16651348]

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

17. Raymaekers A, Foets B, Wouters C, Casteels I. Visual outcome in children with juvenile idiopathic arthritis related uveitis. Bull Soc Belge Ophtalmol. 2006:67–72. [PubMed: 16903513]

18. Thorne JE, Woreta F, Kedhar SR, et al. Juvenile idiopathic arthritis-associated uveitis: incidence of ocular complications and visual acuity loss. Am J Ophthalmol. 2007; 143:840–6. [PubMed: 17362866]

19. Kanski JJ. Anterior uveitis in juvenile rheumatoid arthritis. Arch Ophthalmol. 1977; 95:1794–7. [PubMed: 303091]

20. Ohno S, Char DH, Kimura SJ, O'Connor GR. HLA antigens and antinuclear antibody titres in juvenile chronic iridocyclitis. Br J Ophthalmol. 1977; 61:59–61. [PubMed: 300027]

21. Zulian F, Martini G, Falcini F, et al. Early predictors of severe course of uveitis in oligoarticular juvenile idiopathic arthritis. J Rheumatol. 2002; 29:2446–53. [PubMed: 12415607]

22. Holland GN, Denove CS, Yu F. Chronic anterior uveitis in children: clinical characteristics and complications. Am J Ophthalmol. 2009; 147:667–78. e5. [PubMed: 19195641]

23. Chia A, Lee V, Graham EM, Edelsten C. Factors related to severe uveitis at diagnosis in children with juvenile idiopathic arthritis in a screening program. Am J Ophthalmol. 2003; 135:757–62. [PubMed: 12788113]

24. Woreta F, Thorne JE, Jabs DA, et al. Risk factors for ocular complications and poor visual acuity at presentation among patients with uveitis associated with juvenile idiopathic arthritis. Am J Ophthalmol. 2007; 143:647–55. [PubMed: 17224116]

25. Ohno S, Kimura SJ, O'Connor GR, Char DH. HLA antigens and uveitis. Br J Ophthalmol. 1977; 61:62–4. [PubMed: 556942]

26. American Academy of Pediatrics Section on Rheumatology and Section on Ophthalmology. Guidelines for ophthalmologic examinations in children with juvenile rheumatoid arthritis. Pediatrics. 1993; 92:295–6. [PubMed: 8337036]

27. Jabs DA, Nussenblatt RB, Rosenbaum JT. Standardization of uveitis nomenclature for reporting clinical data. Results of the First International Workshop. Am J Ophthalmol. 2005; 140:509–16. [PubMed: 16196117]

28. Kump LI, Cervantes-Castaneda RA, Androudi SN, Foster CS. Analysis of pediatric uveitis cases at a tertiary referral center. Ophthalmology. 2005; 112:1287–92. [PubMed: 15921752]

29. Paroli MP, Speranza S, Marino M, et al. Prognosis of juvenile rheumatoid arthritis-associated uveitis. Eur J Ophthalmol. 2003; 13:616–21. [PubMed: 14552595]

30. Ozdal PC, Vianna RN, Deschenes J. Visual outcome of juvenile rheumatoid arthritis-associated uveitis in adults. Ocul Immunol Inflamm. 2005; 13:33–8. [PubMed: 15804767]

31. de Boer J, Wulffraat N, Rothova A. Visual loss in uveitis of childhood. Br J Ophthalmol. 2003; 87:879–84. [PubMed: 12812891]

32•. Camuglia JE, Whitford CL, Hall AJ. Juvenile idiopathic arthritis associated uveitis in adults: a case series. Ocular immunology and inflammation. 2009; 17:330–4. This article discusses the long-term outcome of adults diagnosed with JIA-U. [PubMed: 19831566]

33. Kanski JJ. Uveitis in juvenile chronic arthritis. Clin Exp Rheumatol. 1990; 8:499–503. [PubMed: 2261712]

34. Edelsten C, Lee V, Bentley CR, et al. An evaluation of baseline risk factors predicting severity in juvenile idiopathic arthritis associated uveitis and other chronic anterior uveitis in early childhood. Br J Ophthalmol. 2002; 86:51–6. [PubMed: 11801504]

35••. Thorne JE, Woreta FA, Dunn JP, Jabs DA. Risk of cataract development among children with juvenile idiopathic arthritis-related uveitis treated with topical corticosteroids. Ophthalmology. 2010; 117:1436–41. This article discusses risk factors for cataract development in a JIA-U population and effects of the use of topical CS. [PubMed: 20363502]

36. Dana MR, Merayo-Lloves J, Schaumberg DA, Foster CS. Visual outcomes prognosticators in juvenile rheumatoid arthritis-associated uveitis. Ophthalmology. 1997; 104:236–44. [PubMed: 9052627]

37. Kump LI, Castaneda RA, Androudi SN, et al. Visual outcomes in children with juvenile idiopathic arthritis-associated uveitis. Ophthalmology. 2006; 113:1874–7. [PubMed: 16884776]

38•. Van Gelder RN, Leveque TK. Cataract surgery in the setting of uveitis. Curr Opin Ophthalmol. 2009; 20:42–5. This article discusses perioperative management of cataract surgery in adults and

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

pediatric uveitis patients, including perioperative CS use, IOL choice, and other uveitis-specific surgical considerations. [PubMed: 19077828]

39. Wolf MD, Lichter PR, Ragsdale CG. Prognostic factors in the uveitis of juvenile rheumatoid arthritis. Ophthalmology. 1987; 94:1242–8. [PubMed: 3684202]
40. Sijssens KM, Rothova A, Van De Vijver DA, et al. Risk factors for the development of cataract requiring surgery in uveitis associated with juvenile idiopathic arthritis. Am J Ophthalmol. 2007; 144:574–9. [PubMed: 17706583]
41. Giannini EH, Malagon CN, Van Kerckhove C, et al. Longitudinal analysis of HLA associated risks for iridocyclitis in juvenile rheumatoid arthritis. J Rheumatol. 1991; 18:1394–7. [PubMed: 1757943]
42. Glass D, Litvin D, Wallace K, et al. Early-onset pauciarticular juvenile rheumatoid arthritis associated with human leukocyte antigen-DRw5, iritis, and antinuclear antibody. J Clin Invest. 1980; 66:426–9. [PubMed: 6967490]
43. Melin-Aldana H, Giannini EH, Taylor J, et al. Human leukocyte antigen-DRB1*1104 in the chronic iridocyclitis of pauciarticular juvenile rheumatoid arthritis. J Pediatr. 1992; 121:56–60. [PubMed: 1625093]
44. Miller ML, Fraser PA, Jackson JM, et al. Inherited predisposition to iridocyclitis with juvenile rheumatoid arthritis: selectivity among HLA-DR5 haplotypes. Proc Natl Acad Sci USA. 1984; 81:3539–42. [PubMed: 6610178]
45. Malagon C, Van Kerckhove C, Giannini EH, et al. The iridocyclitis of early onset pauciarticular juvenile rheumatoid arthritis: outcome in immunogenetically characterized patients. J Rheumatol. 1992; 19:160–3. [PubMed: 1556680]
46. Zeggini E, Packham J, Donn R, et al. Association of HLA-DRB1*13 with susceptibility to uveitis in juvenile idiopathic arthritis in two independent data sets. Rheumatology (Oxford). 2006; 45:972–4. [PubMed: 16495319]
47. Haas JP, Truckenbrodt H, Paul C, et al. Subtypes of HLA-DRB1*03, *08, *11, *12, *13 and *14 in early onset pauciarticular juvenile chronic arthritis (EOPA) with and without iridocyclitis. Clinical and experimental rheumatology. 1994; 12 (Suppl 10):S7–14. [PubMed: 7955632]
48•. Quinones K, Cervantes-Castaneda RA, Hynes AY, et al. Outcomes of cataract surgery in children with chronic uveitis. J Cataract Refract Surg. 2009; 35:725–31. This article discusses the successful outcome of cataract surgery in uveitis. [PubMed: 19304096]
49. BenEzra D, Cohen E. Cataract surgery in children with chronic uveitis. Ophthalmology. 2000; 107:1255–60. [PubMed: 10889094]
50•. Grajewski RS, Zurek-Imhoff B, Roesel M, et al. Favourable outcome after cataract surgery with IOL implantation in uveitis associated with juvenile idiopathic arthritis. Acta Ophthalmol. 2011 This article discusses the use of IOL implantation in JIA-U, which has been controversial.
51. Acevedo S, Quinones K, Rao V, et al. Cataract surgery in children with juvenile idiopathic arthritis associated uveitis. Int Ophthalmol Clin. 2008; 48:1–7. [PubMed: 18427255]
52. Saurenmann RK, Levin AV, Rose JB, et al. Tumour necrosis factor alpha inhibitors in the treatment of childhood uveitis. Rheumatology (Oxford). 2006; 45:982–9. [PubMed: 16461435]
53. Simonini G, Taddio A, Cattalini M, et al. Prevention of flare recurrences in childhood-refractory chronic uveitis: an open-label comparative study of adalimumab versus infliximab. Arthritis Care Res (Hoboken). 2011; 63:612–8. [PubMed: 21452272]
54. Vazquez-Cobian LB, Flynn T, Lehman TJ. Adalimumab therapy for childhood uveitis. J Pediatr. 2006; 149:572–5. [PubMed: 17011337]
55. Ardoin SP, Kredich D, Rabinovich E, et al. Infliximab to treat chronic noninfectious uveitis in children: retrospective case series with long-term follow-up. Am J Ophthalmol. 2007; 144:844–9. [PubMed: 17953940]
56. Biester S, Deuter C, Michels H, et al. Adalimumab in the therapy of uveitis in childhood. Br J Ophthalmol. 2007; 91:319–24. [PubMed: 17035274]
57. Sen HN, Levy-Clarke G, Faia LJ, et al. High-dose daclizumab for the treatment of juvenile idiopathic arthritis-associated active anterior uveitis. American journal of ophthalmology. 2009; 148:696–703. e1. [PubMed: 19664754]

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

58. Angeles-Han S, Flynn T, Lehman T. Abatacept for refractory juvenile idiopathic arthritis-associated uveitis- a case report. J Rheumatol. 2008; 35:1897–8. [PubMed: 18785302]

59. Zulian F, Balzarin M, Falcini F. Abatacept for severe anti-tumor necrosis factor alpha refractory juvenile idiopathic arthritis-related uveitis. Arthritis Care Res (Hoboken). 2010; 62:821–5. [PubMed: 20191477]

60. Kenawy N, Cleary G, Mewar D, et al. Abatacept: a potential therapy in refractory cases of juvenile idiopathic arthritis-associated uveitis. Graefe's archive for clinical and experimental ophthalmology = Albrecht von Graefes Archiv fur klinische und experimentelle. Ophthalmologie. 2011; 249:297–300.

61. Albini TA, Bajenaru ML, Ruggeri M, et al. Optical coherence tomography in experimental autoimmune uveitis. ARVO Meeting Abstracts. 2008; 49:4772.

62. Jancevski M, Foster CS. Cataracts and uveitis. Discov Med. 2010; 9:51–4. [PubMed: 20102686]

63. Rabinovich CE. Treatment of juvenile idiopathic arthritis-associated uveitis: challenges and update. Curr Opin Rheumatol. 2011; 23:432–6. [PubMed: 21738033]

64. Lam LA, Lowder CY, Baerveldt G, et al. Surgical management of cataracts in children with juvenile rheumatoid arthritis-associated uveitis. Am J Ophthalmol. 2003; 135:772–8. [PubMed: 12788115]

65•. Sijssens KM, Los LI, Rothova A, et al. Long-term ocular complications in aphakic versus pseudophakic eyes of children with juvenile idiopathic arthritis-associated uveitis. The British journal of ophthalmology. 2010; 94:1145–9. This report reviewed 48 eyes of 29 children with JIA-U who underwent cataract surgery prior to age 16 years. In this series, IOL use did not appear to increase the risk of secondary complications, including ocular hypertension and macular edema, and tended to achieve better VA than patients who did not receive an IOL. [PubMed: 20558424]

66. Alio JL, Chipont E, BenEzra D, Fakhry MA. Comparative performance of intraocular lenses in eyes with cataract and uveitis. J Cataract Refract Surg. 2002; 28:2096–108. [PubMed: 12498843]

67. Papaliodis GN, Nguyen QD, Samson CM, Foster CS. Intraocular lens tolerance in surgery for cataracta complicata: assessment of four implant materials. Semin Ophthalmol. 2002; 17:120–3. [PubMed: 12759839]

68. Alexandrakis G, Peterseim MM, Wilson ME. Clinical outcomes of pars plana capsulotomy with anterior vitrectomy in pediatric cataract surgery. J AAPOS. 2002; 6:163–7. [PubMed: 12075292]

69. Jensen AA, Basti S, Greenwald MJ, Mets MB. When may the posterior capsule be preserved in pediatric intraocular lens surgery? Ophthalmology. 2002; 109:324–7. discussion 8. [PubMed: 11825817]

NIH-PA Author Manuscript
NIH-PA Author Manuscript
NIH-PA Author Manuscript

Table 1

American Academy of Pediatrics screening guidelines

JRA type	ANA	Age at onset, *y*	Duration of disease, *y*	Risk category	Eye examination frequency, *mo*
Oligo- or polyarthritis	+	≤6	≤4	High	3
	+	≤6	>4	Moderate	6
	+	≤6	>7	Low	12
	+	>6	≤4	Moderate	6
	+	>6	>4	Low	12
	−	≤6	≤4	Moderate	6
	−	≤6	>4	Low	12
	−	>6	NA	Low	12
Systemic	NA	NA	NA	Low	12

ANA antinuclear antibodies, *JRA* juvenile rheumatoid arthritis, *NA* not applicable