Visual outcome of standard treatment of sarcoid uveitis at a tertiary eye center in Nepal

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ABSTRACT

Introduction: Sarcoidosis is a less-studied disease in Nepal, both as a systemic as well as ocular disease. We aimed to describe the visual outcome of standard therapy of sarcoid uveitis in Nepal. **Methods:** Observational study through Electronic Medical recording system of Tilganga Institute of Ophthalmology from December 2017 to March 2020. Patients diagnosed by IWOS criteria, treated with standard protocol and with minimum six-month follow up were included. The clinical parameters evaluated were type of uveitis, anatomical location and IWOS category. Treatment related factors evaluated were need for immunosuppressants, anti-glaucoma medication and cataract surgery. Visual outcome at six months was the major outcome evaluated, considering two lines of improvement or worsening as significant. Vision limiting complications assessed were cystoid macular edema, complicated cataract and secondary glaucoma. Visual outcome was stratified based on demography, anatomical involvement, uveitis subtype, IWOS category and need for immunomodulators. **Results**: Forty-six eyes of 25 patients were included. Based on IWOS criteria, presumed ocular sarcoidosis had best visual outcome with 93.33% improvement. Males had better post-treatment vision (90% vs. 76.9%). 20-40 years age group had best improvement (96.5%) and anterior uveitis had best visual outcome (100%). A single immunomodulator could not be recommended based on this study. 18(39%) eyes had raised IOP, 4(8.6%) had secondary angle closure glaucoma, 4(8.6%) had hypotony, 1(2.1%) eye underwent cataract surgery and 1(2.1%) eye had cystoid macular edema. **Conclusions:** Sarcoid uveitis has good visual outcome. High degree of suspicion, early diagnosis and prompt treatment aids in diagnosis and limits vision-limiting complications.

Keywords: Complications, sarcoidosis, treatment, uveitis, visual outcome.

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INTRODUCTION

Sarcoidosis is a chronic granulomatous inflammatory disorder that may affect any organ system but most commonly the lungs and hilar lymph nodes. Sarcoidosis as a disease has worldwide distribution.[1] The intrathoracic involvement of sarcoidosis is very similar to that of tuberculosis, which has a high incidence and prevalence in Nepal.[2] Although initially described by Hutchinson in the year 1869, it still remains a diagnostic and therapeutic challenge and there is no single clinical characteristic that is able to differentiate it from all other alternative diagnoses. The presence of non-caseating granulomas in the lung or affected organ as seen on biopsy of the tissue is considered definitive in the diagnosis of sarcoidosis but this may appear to be too invasive in most cases.[1]

The eye has been found to be involved in 20-70% of cases of systemic sarcoidosis, depending upon the geographical area of study.[3-6] Ocular sarcoidosis was found to occur in up to 70% of total sarcoidosis cases in a study done in Japan while other areas of the world showed a lesser frequency of ocular sarcoidosis. Uveitis has been the most common presentation of ocular sarcoidosis and the posterior segment was found to be involved in 28-33% cases.[3-6] Due to variability in the

clinical presentation and due to the fact the tissue biopsy is not always possible, it is many a times difficult to ascertain the diagnosis of ocular sarcoidosis. Hence, various clinical criteria have been laid down in different time frames. The most accepted criteria is that of International workshop on Sarcoidosis (IWOS) in 2009.[7] Although pulmonary sarcoidosis has been reported to be common in Nepal by a study done by pulmonologists,[8] various studies have shown that sarcoidosis is the cause of only 1.2-1.7% of the total uveitis cases.[9,10] All previous studies have shown panuveitis to be the most common presentation of ocular sarcoidosis in Nepal.[9-11] In terms of percentages, the most recent study showed ocular sarcoidosis presented with bilateral disease in 82.85% and with isolated anterior uveitis in 23% cases, anterior with intermediate uveitis in 29% cases and isolated posterior uveitis in 7%. Panuveitis was the presenting pattern in 39% cases.[11]

Hence, research on the same study population has been pending regarding the outcome of standard therapy in sarcoid uveitis in Nepal. This study was done to assess the outcome of standard treatment regimen in cases of sarcoidosis in terms of vision and the occurrence of vision limiting complications like cataract, glaucoma and macular edema.

METHODS

Observational study done at Tilganga Institute of Ophthalmology, uveitis out-patient department. This site was selected based on convenience and the presence of uveitis specialists with experience in the diagnosis and treatment of sarcoid uveitis. The duration of the study was two and half years from December 2017 to March 2020 and findings were recorded through the Electronic Medical Record (EMR) system of the Institute. The classification of uveitis was done according to the Standardization of Uveitis Nomenclature system (SUN classification).[12] All cases of suspected sarcoid uveitis fulfilling IWOS criteria of definite, presumed, probable or possible ocular sarcoidosis and having a minimum of six months of follow-up were included in the study. Although a total of 35 cases diagnosed with sarcoid uveitis were found in the study period, only 25 patients had a minimum six month follow-up and hence were included in the study.

Demographic factors of gender and age were noted. Age was grouped as <20 years of age, 20 to 40, 40 to 60 and >60 years of age. However, no patients were of >60 years age group and hence, later this group was removed. The Snellen's visual acuity was noted at presentation and at the final follow up at six months for the purpose of the study. Ocular features evaluated were the anatomical site of involvement (anterior, intermediate, posterior, or panuveitis), type of inflammation (granulomatous or non-granulomatous), intraocular pressure (IOP) by Goldmann applanation tonometry and presence or absence of complications. Complications evaluated were rise in intraocular pressure (>21mm Hg), established secondary angle closure glaucoma as determined by glaucoma specialist, hypotony (persistent IOP <8 mm Hg with vision loss due to hypotony maculopathy) and cystoid macular edema. Presence of cystoid macular edema was recorded based on clinical findings as well as OCT (Optical Coherence Imaging)- Zeiss stratus OCT 3000 with macular scan (3x3).

Standard treatment regimen for the treatment of anterior uveitis included use of topical prednisolone acetate 1% at a frequency depending upon the degree of anterior segment inflammation, along with cycloplegic-mydriatic (homatropine 1% in most of the cases and atropine sulfate 1% in certain selected cases requiring stronger mydriatic-cycloplegic action). These topical medications were tapered depending on the response to therapy as well as intraocular pressure. If necessary, IOP lowering agents were used, preference being given to topical dorzolamide as it has the least side effect profile, followed by beta-blockers (timolol/brimolol) and later alpha agonists (brimonidine) or a combination of the same.

Intermediate uveitis, in unilateral cases, was treated with proper counseling and giving patients the option of sub-tenon triamcinolone acetonide 20 mg for unilateral involvement or oral prednisolone starting at a dose of 1 mg/kg/day and tapered down by 10 mg per week after one to two weeks depending on clinical response. In bilateral intermediate uveitis cases, oral prednisolone was prescribed in the same dose regimen.

In cases of posterior uveitis, active disease was treated with oral prednisolone at the above mentioned dosage regimen. These included cases of retinitis, choroiditis, retinal vasculitis and disc granulomas. In cases of retinal vasculitis with vascular non-perfusion of retina, sectoral laser was given to the affected area with diode laser applying moderate burns to the retina, 300 micron spot size, for a duration of 200 milliseconds at intervals of 200 milliseconds. In non-responding cases or cases with steroid dependence, immunomodulators were started after consultation with pulmonologist in cases with pulmonary sarcoidosis and rheumatologist in cases of sarcoidosis affecting joints, skin and other organ systems. Preference was given to oral methotrexate due to the easy dosage schedule and easy availability and cost effectivity. Dosing

was started at 7.5 mg once a week and gradual tapering up following monitoring of complete haemogram and liver function tests was done. If case of methotrexate failure or development of intolerable side-effects, azathioprine was advised starting at a dose of 1 mg/kg/day. In severe non responsive cases, adalimumab was advised which was administered and monitored by rheumatologist. No other immunomodulator was prescribed from the ophthalmology side.

The expected complications of uveitis were development of cataract, rise in intraocular pressure and cystoid macular edema. Rise in intraocular pressure was managed as stated above. If topical therapy was not sufficient, oral medication was given with acetazolamide 250 mg thrice a day. For patients not responding to medical treatment, surgical treatment with trabeculectomy was performed by glaucoma specialist. In patients with visually significant cataract, if the eye had been quiet for three months with no medication or on less than 7.5 mg oral steroid per day or on once daily dosing of topical prednisolone acetate 1%, phacoemulsification was done for cataract extraction. If necessary, iris hooks were used for release of posterior synechiae and to expand the pupil. The post-operative regimen included intensive topical prednisolone acetate 1% (starting at half hourly dosage) and tapered weekly according to the degree of inflammation. For patients with cystoid macular edema, treatment was based on OCT finding and degree of edema. Then posterior subtenon injection of triamcinolone acetate 20 mg was given with 26 or 27G needle from the superotemporal approach for cystoid macular edema unless there was a contraindication, in which case therapy was started with topical NSAIDS.

The collected data were cleaned and coded in Microsoft Excel. Data was transported to Statistical Package for Social Science (SPSS) V.20 for analysis. For categorical variable, Fisher Exact test was used wherever applicable. The p-value less than 0.05 was considered as statistically significant. Ethical approval for the study was attained from the Institutional Review Committee (IRC) of Tilganga Institute of Ophthalmology (Ref. No. 16/2020). Confidentiality of data was maintained.

RESULTS

A total of 35 patients with sarcoid uveitis, including all four categories of the IWOS criteria. Of these, only 25(71.4%) patients had a follow up of six months or more and were included in this study. Twenty-one patients had bilateral disease and four eyes were of patients with unilateral disease.

Visual outcome comparing the first and final follow up visits revealed improvement in 38 eyes of a total of 46, stable in five eyes and worsening in three eyes.

Of total, 25 patients, 9(36%) patients had definitive ocular sarcoidosis, 8(32%) had presumed ocular sarcoidosis, and 8(32%) had probable ocular sarcoidosis based on IWOS criteria. There were no patients in the study group that had possible ocular sarcoidosis. (Figure 1 and 2)

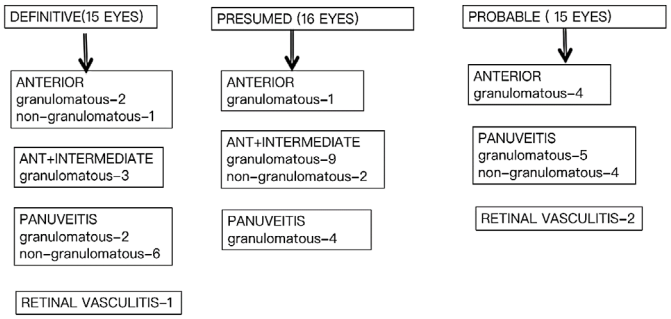

Figure 1: Anatomical involvement according to IWOS criteria

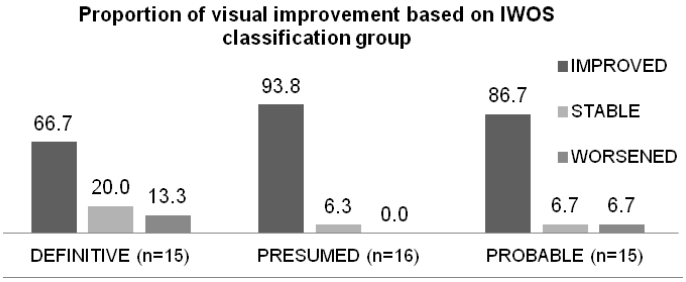

Figure 2: Visual improvement based on IWOS criteria

In terms of gender, 13 females were included in this study, all with bilateral disease, accounting for 26 eyes. 18 eyes had granulomatous disease with 4 having isolated anterior uveitis, while nine had granulomatous panuveitis. Among the females, only eight eyes had non-granulomatous disease of which all had panuveitis. Twenty eyes of 12 males were included in this study, with 66.67%) cases being bilateral. Of these 11 eyes had granulomatous disease with three eyes having isolated anterior uveitis, two having anterior with intermediate uveitis and six having panuveitis. Nine eyes had non-granulomatous disease with one eye having isolated anterior uveitis, three having anterior with intermediate uveitis, two having panuveitis and three eyes having isolated retinal vasculitis.

About 77% of the female patients (20 of 26 eyes affected) had improved visual status whereas 90% of the male patients (18 of 20 eyes affected) had improved visual status.

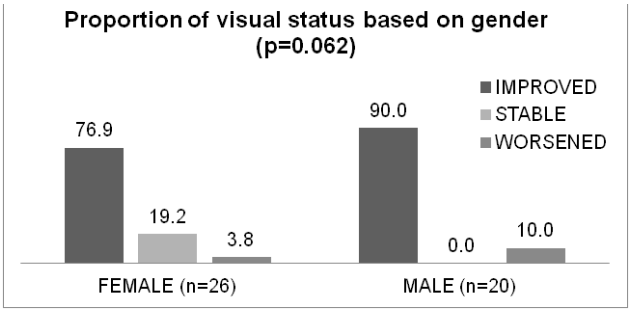

Figure 3: Visual improvement based on gender

Visual outcome is statistically similar gender wise (p=0.06).

Figure 4 shows the visual outcome by age group in the study population on the basis of type of uveitis, of seven eyes presenting with granulomatous anterior uveitis, all (100%) had visual improvement and one eye with non-granulomatous anterior uveitis had improved. Thus, 100% of cases with anterior uveitis had visual improvement. Of 14 eyes with anterior with intermediate uveitis, there were 12 eyes with granulomatous disease of which 11(91.7%) improved and one eye (8.3%) had stable vision and of two eyes with non-granulomatous disease both improved (100%). Thus 92.8% (13 of 14 eyes) of all sarcoid anterior with intermediate uveitis eyes had visual improvement. Of 21 eyes with panuveitis, there were 11 eyes with granulomatous disease of which eight eyes (72.7%) improved and one eye (9.1%) had stable vision and two eyes(18.2%) had worsened vision. 10 eyes had presented with non-granulomatous panuveitis of which 6(60%) had improved vision, 3(30%) had stable vision and 1(10%) had worsened vision. Three eyes had presented with isolated retinal vasculitis of which all improved (100%).

Of total 46 eyes, 30 (65%) had granulomatous inflammation, 13 (28%) had non-granulomatous inflammation and 3 (6.5%) eyes had only retinal vasculitis. Of the patients with granulomatous inflammation, 86.7% had visual improvement, 6.7% had stable vision and another 6.7% had worsening of vision. Among th patients with non-granulomatous inflammation (13 eyes), 64.3% had improvement of vision, 21.4% had stable vision and 14.3% had worsening of vision. There was no significant difference in visual outcome based on type of uveitis (p=0.209).

The use of immunomodulators, in accordance with hospital protocol, was limited to cases with non-response to steroids or steroid dependent disease or steroid intolerance or in cases where the pulmonologist or internist prescribed it for systemic disease. Six patients received methotrexate as initial therapy but only three patients had response to methotrexate alone. Other two cases had to stop methotrexate therapy due to duodenal ulceration and impaired liver function tests respectively. Four patients were treated with Azathioprine of which one had non response, was further treated with Adalimumab by the pulmonologist but had refractory disease and developed hypotony and maculopathy. One other patient who had been treated initially with methotrexate and later azathioprine had documented skin sarcoidosis and required hydroxychloroquine from dermatologist side. This patient too, later developed hypotony. The exact response to any single immunosuppressant could not be assessed due to the small number of patients and the need to change therapy due to the side effects and the need to stop therapy.

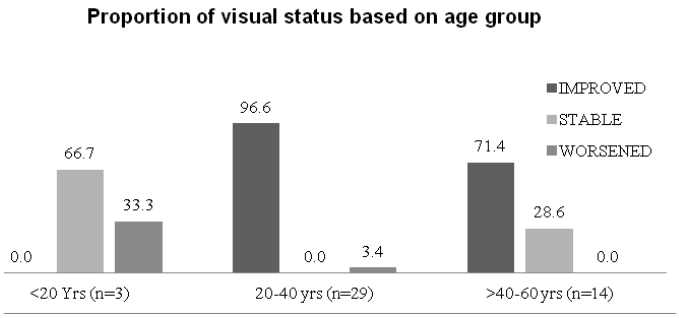

Figure 4: Complications affecting vision according to anatomical involvement

The complications of uveitis seen in sarcoid uveitis were raised IOP (18 eyes-39.13%), secondary angle closure glaucoma (four eyes-8.6%), hypotony (four eyes-8.6%), Band shaped keratopathy (two eyes, 1 patient;4.3%), cystoid macular edema (one eye-2.2%), and vitreous and preretinal hemorrhage (one eye-2.2%). One patient with bilateral disease developed herpes zoster as a complication of oral therapy with steroids. Two eyes with granulomatous anterior with intermediate uveitis developed visually significant cataracts and had cataract extraction with IOL insertion within the span of the study period. Of these, one had significant postoperative cystoid macular edema which was extremely refractory and did not respond to multiple doses of sub-tenon triamcinolone acetate.(Figure 5)

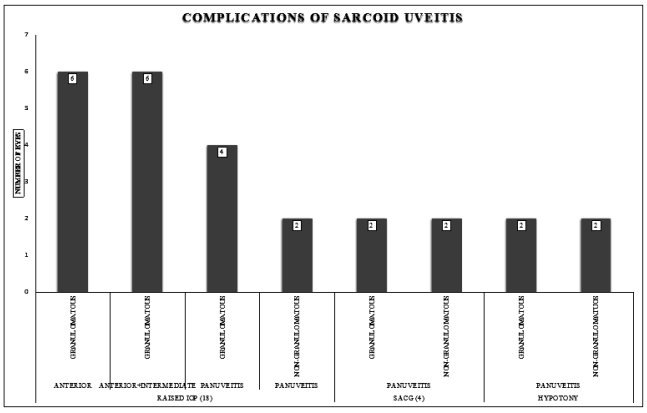

Figure 5: Visual improvement based on age group

DISCUSSION

This study included 46 eyes of 25 patients with sarcoid uveitis diagnosed according to IWOS criteria. Although this number is small, considering the rarity of the disease, it is still a statistically significant number from which some evaluation may be done. A long-term prognostic study of sarcoid uveitis showed that the majority (54%) of the patients retained vision of better than 20/40 in both eyes, and only 4.6% had lost vision less than 20/120 in both eyes, at 10 years after the onset of uveitis in a setting of an ophthalmic referral center.[13] Corroborative to that study, the response to treatment in terms of visual outcome in this study was found to be good. In general, the visual outcome of sarcoid uveitis was good with 28 of 46 eyes (60.86%) having a Snellen's visual acuity of 6/12 or better and 76.08% (35 of 46 eyes) having a vision of better than 6/18. In another study by Dana et al involving 112 eyes of patients with sarcoidosis, 34% of treated eyes and 51% of patients in that study had final visual acuities that were superior to their acuities at presentation.[14].The visual outcome seems to be variable in different studies with not all studies demonstrating a significant improvement. In a study done between 2013 to 2018 at the Kyorin eye center, Tokyo, among eyes of 53 patients with sarcoid uveitis, the best-corrected visual acuity was 1.0 or better (Snellen's equivalent-6/60) in 51% of eyes at presentation, 57% at six months, 50% at 12 months, and 58% at 36 months.[15] In another study done in Taiwan, a total of 122 eyes of 66 patients (13 males and 53 females) with ocular sarcoidosis (OS) were identified. Forty-three eyes (36.1%) and 74 eyes (62.2%) had a final vision of 20/20 and 20/40 or better, respectively.[16]

Isolated anterior uveitis cases in this study typically responded to topical steroids. The exceptions when anterior uveitis cases received systemic steroids were when the other eye needed treatment for posterior involvement or when being treated for systemic sarcoidosis by the treating physician. In a previous study involving 75 patients with proven systemic sarcoidosis, however, there was a slightly poorer visual outcome with 12.5% cases having a poor visual outcome (3/24 anterior uveitis cases).[17] All the cases had chronic anterior uveitis and three had recurrent episodes of inflammation. It was observed in this study that there was high risk of increase in IOP which may be due to both disease as well as topical steroid use as six of total eight eyes (75%) developed raised IOP. This is higher in comparision to generalised chronic anterior uveitis cases where raised IOP was found in 26.0% of eyes with acute uveitis and 46.1% of eyes with chronic uveitis.[18] The visual outcome of standard topical therapy in this study with regards to remission was found remarkable with eight of eight cases having significant improvement in vision at the end of the six-month study period. In previous studies too, the anterior uveitis associated with sarcoidosis have been of chronic type and the diagnostic delay has had toll on the final outcome with band shaped keratopathy being found in 5-10% cases.[19-21] Secondary cataract and glaucoma have been reported in one-third of cases.[5,13,21-23]. Although five of eight eyes (62.5%) in this study developed cataract, none had visually significant cataracts to require surgery during the time frame of the study. Occurrence of cataracts in anterior uveitis in other studies has been reported around 13.6-16.5%.[24,25] No eyes with isolated anterior uveitis developed cystoid macular edema in this study. This is in concordance with other studies that state that anterior uveitis is an unusual cause of macular edema, reported in 9-28%, with the exception of HLA-B27 associated anterior uveitis.[26]

Thirteen eyes presented with anterior with intermediate uveitis and six of these eyes were treated with sub-tenon triamcinolone, others required oral steroids due to bilateral presentation. Two eyes with anterior and intermediate uveitis developed cystoid macular edema (15.38%), one of these had non-response to repeated posterior sub-tenon injections. In other studies, it has been found that intermediate uveitis was the most common uveitis to cause cystoid macular edema, ranging from 20-75%.[27-29] Six eyes (46.15%) with anterior and intermediate uveitis developed a raised IOP and needed anti-glaucoma medication. This is similar to the general occurrence of, raised IOP in chronic uveitis (46.1%).[18] three eyes (25%) had cataract during the follow-up and two underwent cataract surgery. Cataract has been noted as a complication of pars planitis in 57% percent in other studies.[30] By the end of follow-up, of the total 13 cases presenting with anterior and intermediate uveitis, 12 had improvement in visual acuity (92.3%). One eye had no improvement or worsening in vision even after cataract surgery due to non-responsive cystoid macular edema. Previous studies on visual outcome in intermediate uveitis state that moderate visual loss (BCVA20/50->20/200) occurred in 7.1% and severe visual loss (BCVA<20/200) occur in 5.5%.[31]

Posterior uveitis was found as retinal vasculitis in two patients (three eyes-6.5% eyes). One eye had retinitis along with active vasculitis and the other two eyes had active vasculitis with old choroiditis scars. By protocol, these were treated by oral steroids and panretinal photocoagulation. All eyes had a visual acuity of better than 6/12 at the end of follow up (100%). In this study no posterior uveitis cases had cystoid macular edema whereas cystoid macular edema

(CME) has been found to occur in 19-34% in nonspecific posterior uveitis.[28,32] Posterior uveitis associated with proven systemic sarcoidosis has been noted to have a poor visual outcome in a previous study with 75 patients, especially in those eyes with multifocal choroiditis (5/7, 71.4%).[17] It is known that cases with choroiditis of any etiology have poor visual outcomes due to complications of CME and epiretinal membrane (ERM). However, ERM does not alter visual outcomes as significantly as CME does.[33]

Panuveitis was the most common presenting pattern of sarcoid uveitis and was found in 21 of total 46 eyes (45.65%). 14 eyes (66.67%) had improvement in vision, four eyes (19.04%) had stable vision and three of 21(14.28%) had worsening. Besides oral steroids, topical steroids and mydriatics, three eyes (14.28%) required posterior sub-tenon injection of triamcinolone for severe inflammation. Five patients (ten eyes-47.6% eyes)) required the use of immunomodulator for long term control of inflammation. Four patients were prescribed methotrexate and two patients responded to this as monotherapy (50% response rate). Three patients were prescribed azathioprine of whom two patients responded (66.67%response rate). One patient did not respond to either methotrexate or azathioprine and was prescribed adalimumab also but the disease did not respond to either of the three agents and the patient developed hypotony maculopathy. Complications of panuveitis were cataract (12 eyes-57.14%), disc edema (two eyes-9.5%), macular edema (6 eyes-28.57%). In previous studies also, macular edema was found to be the most common complication of ocular sarcoidosis (20–70% of cases). [5,13,22,23] In a previous study involving 75 patients of proven systemic sarcoidosis, patients with panuveitis had an equivocal visual outcome (13/28, 46.4% poor outcome) even after excluding cases with multifocal choroiditis which is known to have a poorer outcome in sarcoidosis.[17]

Stratifying by granulomatous and non-granulomatous uveitis, this study has found that 26 of 30 eyes (86.67%) with granulomatous and 10 of 13 eyes (76.92%) with non-granulomatous sarcoid uveitis have improved visual outcomes.

This study corroborates the findings of Dana et al. which stated that the use of steroids in topical periocular or systemic form cause significant improvement in clinical outcomes, of which vision is one. These results had been particularly impressive as those patients receiving systemic steroids almost definitely having had worse disease; hence, one might have expected those treated with systemic steroids to have fared worse.[14] This is noticeable as only five patients of total 21(23.8%) with panuveitis required the use of immunosuppressants for the control of inflammation. Analysis by Dana et al. also suggested that systemic immunosuppressive chemotherapies were associated with visual improvement, but the correlation did not reach nominal statistical significance. This could partially be accounted for by these patients having had a worse disease process from the outset compared with those not treated with these agents, thereby biasing the outcome.[14] In the present study also, only seven patients required the use of immunomodulators (four of these being for systemic involvement) and the use of steroids brought about improvements in most cases. One case of biopsy-positive bilateral granulomatous panuveitis with bone marrow, liver and spleen involvement was found to be non-responsive to all forms immunomodulator therapy and developed recurrent exacerbations and ocular hypotony. This suggests that multiple organ involvement in sarcoidosis may have a poor outcome.

Complications causing lack of improvement in vision have been attributed to various factors in various studies. In various studies on sarcoid uveitis, it was found that vision-threatening complications developed in many patients, including 56-58% in whom cystoid macular edema developed and 25-56% in whom media opacities developed, requiring cataract surgery or vitrectomy or both.[14,34] Other studies have noted additional complications as vision limiting such as hypotony, localized vitreous condensation and recurrences[35] and in cases with chronic sarcoidosis, chronic disease and posterior pole complications of chorioretinitis and optic neuropathy.[36] At univariate analysis, the presence of iris nodules, cystoid macular edema and cataract were clinically significant conditions for a visual outcome of 20/50 or worse in the worst-seeing eye. However, in multivariate analysis, cystoid macular edema (p=0.03) was the only statistically significant predictor associated with unfavorable visual outcome.[34] These findings were also corroborated by separate studies done in Tokyo and Taiwan which found that ocular complications were observed in upto 85%, most commonly cataract (50.8-73%), epiretinal membrane (24%), macular edema (24%) and glaucoma (19-25.4%) and also posterior synechiae(20.5%).[15,16] In this study, the most frequent complication was raised IOP(18 eyes-39.13%) with documented Secondary angle closure glaucoma in four eyes(8.6%). Although hypotony and the consequent hypotony maculopathy was the cause of decreased vision in only four eyes in this study, it was among the most common vision limiting complications. The study most consistent with the findings of the present

study included a large series of 461 eyes with the most important vision limiting complications being cataract, glaucoma, cystoid macular edema (CME), and epiretinal membrane.[37]

Previous data suggest that in general, a longer duration of disease activity and late presentation to ophthalmic care facility, development of cystoid macular edema or glaucoma, presence of intermediate or posterior uveitis, and systemic steroid use in sarcoid uveitis is positively associated with a lack of visual acuity improvement.[14,35] This emphasizes the critical point that effective treatment needs to be initiated in a timely fashion to arrest, and possibly reverse, damage to the eye from ongoing disease.[14] In another study, it was found that the causes of poor visual outcome were diverse, and generalized estimating equations analysis indicated that female and poor initial vision were risk factors.[16] In consideration to a delayed presentation causing poor visual outcome, these findings could not be validated in the present study as 100% cases of anterior uveitis were of insidious onset and chronic duration yet still had visual improvement. Also, in this study, there was notable improvement in patients with chronic uveitis (24/28 eyes- 85.7%) than in those with acute disease (14/18-77.78%). This discrepancy may have been due to a small sample size. The stratification on the basis of anatomical sub-types, granulomatous and non-granulomatous inflammation, age, gender and also IWOS criteria gives a better view of patterns of disease and success of standard treatment regimen. The major age group being the young patients removes potential biases from confounding factors of age-related cataract and age-related macular degeneration. Adequate time frame of at least six months allows for proper assessment of outcome as shorter duration may be affected by compliance issues as well as may mask recurrences.

The small sample size might affect the generalization of effectiveness of therapy. Systemic involvement and drugs primarily prescribed for systemic disease may have altered the course of disease. The lack of access to third line treatment regimen of antibody adalimumab and infliximab may have limited prospective better outcomes. The only surgery considered was cataract surgery further treatment in the forms of surgery for hypotony such as release of cyclitic membranes or glaucoma surgery was not considered which may have further improved visual outcome

CONCLUSIONS

Sarcoid uveitis may present as any and all form of uveitis and must be considered in the differential diagnosis of all uveitis entities. Treated by standard treatment protocols, sarcoid uveitis generally has a favorable visual outcome even when the disease process has an indefinite clinical course. Steroids are the mainstay of treatment either topically, as sub-tenon injection or orally prove to be effective treatment in terms of visual outcome. Early diagnosis, understanding of recurrence patterns and proper control of ocular inflammation may prevent vision-limiting complications.

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AUTHORS CONTRIBUTION

KS and AM did the conceptualisation. KS did the data collection, analysis, methodology. MP did the statistical analysis. KS did the original draft preparation. SS and AM did he editing. AM did the reviewing.

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