European Journal of Ophthalmology / Vol. 15 no. 3, 2005 / pp. 379-383

Therapeutic effects of laser photocoagulation and/or vitrectomy in Eales' disease

M.H. DEHGHAN, H. AHMADIEH, M. SOHEILIAN, M. AZARMINA, A. MASHAYEKHI, J. NAGHIBOZAKERIN

Department of Ophthalmology and Ophthalmic Research Center, Labbafinejad Medical Center, Shahid Beheshti University of Medical Sciences, Tehran - I.R. Iran

PURPOSE. To determine visual outcomes and regression of retinal neovascularization following laser photocoagulation and/or vitrectomy in eyes with Eales' disease.

METHODS. In a retrospective noncomparative study, the authors reviewed the existing data of 67 eyes of 54 patients with a diagnosis of Eales' disease who had undergone laser photocoagulation and/or vitrectomy based on their clinical presentations. Main outcome measures were visual acuity changes and regression of retinal neovascularization of the eyes following treatment.

RESULTS. Both laser therapy and vitrectomy improved visual acuity and induced regression of retinal neovascularization. Forty-three eyes had undergone laser therapy; their rate of visual acuity ≥20/30 improved from 53% before treatment to 60% after treatment. Twenty-four eyes had undergone vitrectomy; rate of visual acuity ≥20/30 improved from 13% before surgery to 38% after surgery. In eyes that had undergone laser therapy, additional laser therapy controlled recurrent neovascularization in 47% of the eyes, but ultimately, 12% of them required vitrectomy. In the primary vitrectomized group, additional required treatment was repeat vitrectomy in 21%, and/or laser therapy in 29% of the eyes.

CONCLUSIONS. Although laser photocoagulation should be the first line of treatment in Eales' disease, it cannot always induce regression of retinal neovascularization. In such cases vitrectomy may further enhance therapeutic success. (Eur J Ophthalmol 2005; 15: 379-83)

KEY WORDS. Eales', Ophthalmology, Photocoagulation, Retina, Vitrectomy

Accepted: November 28, 2004

INTRODUCTION

Eales' disease is an idiopathic obliterative vasculopathy that primarily affects the peripheral retina of adults. Retinal changes include extensive peripheral capillary nonperfusion, perivascular sheathing, and neovascularization (1). Soheilian and coworkers (2) have reported Eales' disease as the second most common cause (11.9%) of posterior uveitis in Iran. Most patients' symptoms include those of vitreous hemorrhage, such as small specks, floaters, cobwebs, blurring, or decreased visual acuity. Others have blurring associated with retinal vasculitis or uveitis, but without hemorrhage. Severe visual loss usually results from complications of neovascularization, such as persistent vitreous hemorrhage, retinal detachment, and anterior segment neovascularization with secondary glaucoma (1).

Laser photocoagulation is the treatment of choice for patients with neovascularization (3, 4). Magargal et al (3)

Presented as a poster at the annual meeting of the American Academy of Ophthalmology; Orlando, FL; October 20–23, 2002

1120-6721/379-05$15.00/0

found favorable results in eyes that were treated with fairly light, full scatter photocoagulation to the nonperfused retina and the junction of perfused and nonperfused retina. Vitrectomy can often be employed for removing persistent vitreous hemorrhage and scar tissue with good results (5, 6).

This study aimed to evaluate the therapeutic effects of laser photocoagulation and/or vitrectomy in complicated cases of Eales' disease.

METHODS

We evaluated 54 patients with Eales' disease who were referred to Labbafinejad Medical Center from 1988 to 1998. Main outcome measures were best-corrected Snellen's visual acuity changes and regression of retinal neovascularization. Visual acuity of patients was checked before and after the procedures, and during follow-up. Every patient had a thorough recorded history and physical examination including slit-lamp examination, intraocular pressure measurement with applanation tonometer, and complete fundus examination using an indirect ophthalmoscope with scleral depression and three mirror contact lens.

Funduscopy was performed to look for vitreous changes such as vitreous hemorrhage, vitreous organization, neovascularization, vessel tortuosity, vascular sheathing, retinal hemorrhage, and ischemic areas. Fluorescein angiography was performed for further evaluation if required. In case of vitreous hemorrhage precluding visualization of the fundus, echography was performed to rule out retinal detachment.

Laboratory evaluations of every patient included cell blood count, erythrocyte sedimentation rate, fasting blood sugar, serum calcium and phosphorus, purified protein derivative (PPD) test with 5 tuberculin unit (TU), antinuclear antibody, lupus erythematosus cell, rheumatoid factor, serum protein electrophoresis, hemoglobin electrophoresis, serum immunoglobulin electrophoresis, and angiotensin converting enzyme. Every patient also had a chest x-ray.

After informed consent, patients underwent laser therapy and/or vitrectomy depending on the severity of the disease. Different photocoagulation techniques were used as follows:

1. Local treatment for small isolated (less than 1 disc diameter) flat neovascularization elsewhere.
2. Sector peripheral scattered photocoagulation for involvement of one retinal sector only.
3. Mixed treatment for combination of the above two in one setting.
4. Peripheral panretinal photocoagulation (PRP) for complete involvement of the peripheral retina.

Argon green laser was applied as the routine laser type, and in case of vitreous hemorrhage the choice was Krypton red laser. The laser setting was spot size 500 µm, duration 0.2 to 0.5 sec., and power 200 to 400 mW. Six to 8 weeks after laser therapy, the regression of retinal neovascularization was documented by decrease in size, resolve of vitreous hemorrhage, or occasionally with fluorescein angiography. If no regression of new vessels or recurrence of vitreous hemorrhage was observed, additional laser therapy would be performed. Cases with good response to laser therapy were examined every 3 to 4 months.

Indications for vitrectomy were as follows:

1. Nonclearing dense vitreous hemorrhage lasting more than 6 months, or organized vitreous hemorrhage precluding fundus visualization.
2. Tractional retinal detachment involving or threatening the macula, or combined with rhegmatogenous retinal detachment.

The surgical technique was three-port pars plana vitrectomy with or without placement of an encircling band. Additional scleral buckling, lensectomy, endolaser photocoagulation, fluid/air exchange, and silicone oil injection were performed at the same session if indicated. After surgery, supplemental laser therapy was carried out if required.

Patients were followed up for 6 to 72 months depending on their condition. Pre- and post-treatment visual acuities were compared with Kruskal-Wallis test.

RESULTS

The study included 67 eyes of 54 patients. Fifty (93%) patients were male. Patients' age ranged from 19 to 56 years with a mean of 34 ± 5 years.

Thirty-eight (70%) patients had bilateral involvement. In unilateral cases, 12 (75%) had left and 4 (25%) had right eye involvement.

In 55% of bilateral cases, involvement of left eye was more severe. Presenting symptoms were sudden decrease of visual acuity in 83%, blurred vision in 11%, and floaters in 6% of cases.

Tuberculin (PPD, 5 TU) test was performed in 38 patients, with positive response (induration ≥10 mm) in 82%.

In systemic evaluation of our patients, past history was remarkable for severe headache in two cases, and for recurrent epistaxis, severe constipation, psychosomatic disease, and tuberculosis adenitis in one case each. Six cases had eosinophilia of more than 5%.

Retinal proliferative changes were peripheral in most of the eyes and only six eyes had posterior retinal proliferative changes. Retinal break was found in three eyes, and one eye had lattice degeneration.

Forty-three eyes underwent laser therapy, which resulted in regression of neovascularization in more than half of them until last follow-up, but 47% of them required additional laser therapy including 23% PRP, 12% sector (Fig. 1, A–C), and 12% local laser therapy. Five (12%) of these eyes eventually required vitrectomy: one was due to organized nonclearing vitreous hemorrhage, and four were due to tractional retinal detachment involving or threatening the macula. Seven of these eyes had previous treatment: laser therapy in five and cryotherapy in two (Tab. I).

Twenty-four eyes underwent vitrectomy with or without additional procedures such as placement of encircling band, scleral buckling, lensectomy, endolaser photocoagulation, fluid/air exchange, and silicone oil injection. Out of 24 eyes, 15 (63%) were the left eye. Indications for vitrectomy in these 24 eyes were nonclearing vitreous hemorrhage in 17 (71%) and tractional retinal detachment in 7 (29%) eyes. Five (21%) eyes had previous laser therapy. Twelve (50%) vitrectomized eyes required additional treatment including repeat vitrectomy in 5 (21%) and laser therapy in 7 (29%) eyes. Overall, two eyes required vitrectomy as a treatment modality for the third time. Vitrectomy alone, without any other concomitant procedure, was performed in four eyes, which resulted in regression of retinal neovascularization in all. However, after 3 years, vitreous hemorrhage recurred in one of them due to recurrence of neovascularization, which was controlled with laser therapy. Vitrectomy alone was also performed in one eye with rubeosis iridis, which resulted in improvement of the condition.

Complications of vitrectomy were recurrent vitreous hemorrhage in six, lens opacity in four, increased intraocular pressure in two, rubeosis iridis in two, and giant tear in one case. Trabeculectomy was performed in one eye for control of intraocular pressure, and extracapsular cataract extraction in another eye with severe lens opacity. Visual loss occurred in two eyes due to inoperable reti-

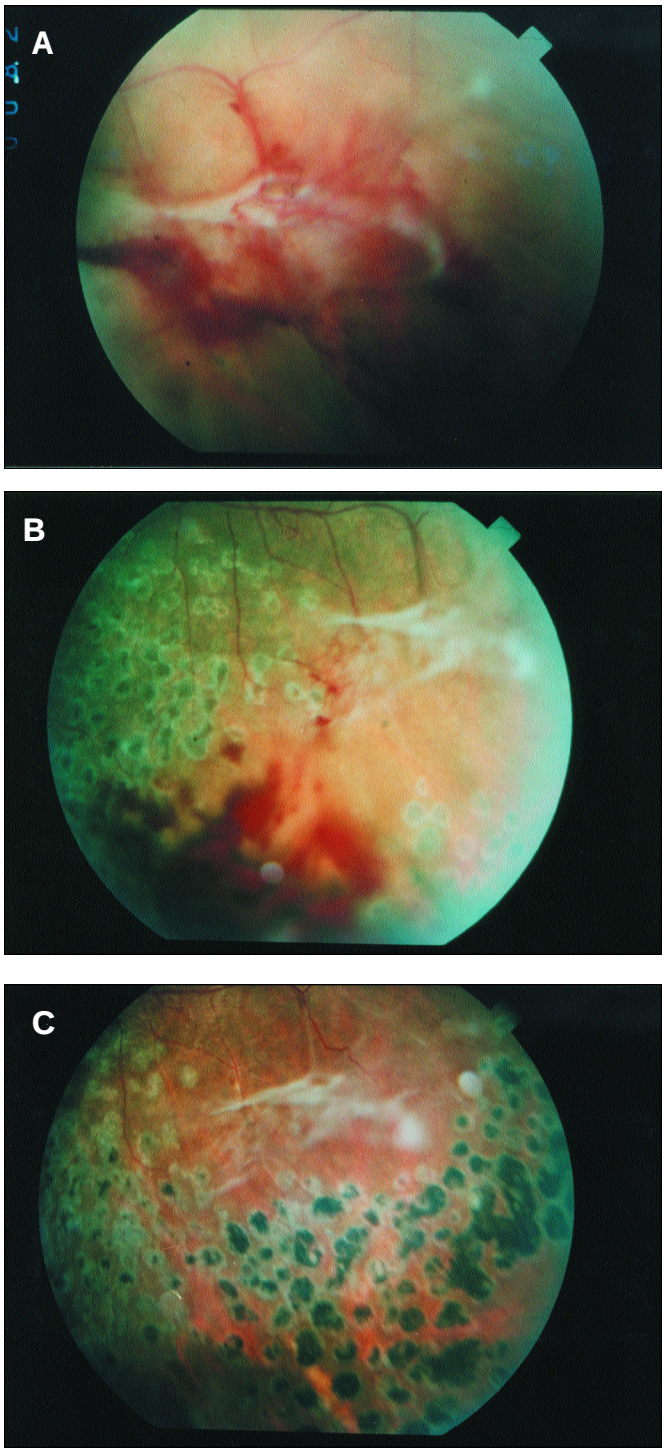

Fig. 1 - (A) Peripheral retinal fibrovascular proliferation with vitreous hemorrhage in an eye with Eales' disease before laser therapy. **(B)** Same eye 3 months after sector peripheral scattered laser photocoagulation, which shows relative control of the neovascularization with mild vitreous hemorrhage. **(C)** Same eye 6 months after additional sector peripheral scattered laser photocoagulation, which shows regression of neovascularization.

TABLE I - DIFFERENT LASER TECHNIQUES, PREVIOUS AND ADDITIONAL TREATMENT PERFORMED ON 43 EYES WITH COMPLICATED EALES' DISEASE

Type of laser therapy	No. (%)	Previous treatment		Additional laser treatment			Post-laser vitrectomy
		Laser	Cryo	PRP	Sector	Local	
Local	4 (9)	0	2	2	0	0	1
Sector scatter	9 (21)	2	0	2	3	2	1
Mixed	2 (5)	0	0	0	0	0	0
Peripheral	28 (65)	3	0	6	2	3	3
Total	43 (100)	5 (12)	2 (5)	10 (23)	5 (12)	5 (12)	5 (12)

TABLE II - VISUAL OUTCOMES OF EYES WITH COMPLICATED EALES' DISEASE AFTER LASER THERAPY OR VITRECTOMY

Visual acuity	Laser therapy, n (%) Before / After	Vitrectomy, n (%) Before/After
Less than 20/200	7 (16) / 4 (9)	12 (50)/ 5 (21)
20/200–20/60	3 (7) / 4 (9)	2 (8) / 7 (29)
20/50–20/30	10 (23) / 9 (21)	7 (29) / 3 (13)
Better than 20/30	23 (53) /26 (60)	3 (13) / 9 (38)
Total	43 (100)	24 (100)

nal detachment: one was giant retinal tear, which underwent multiple unsuccessful procedures, and the other was fibrinoid syndrome.

Visual acuities of the eyes before and after laser therapy and vitrectomy are summarized in Table II. Improvement of visual acuity after laser therapy and/or vitrectomy was statistically significant ($p<0.005$).

DISCUSSION

Most investigators have noted a male predominance in Eales' disease (7, 8), and results of our study also showed a significant male predominance (93%). The peak age at onset of symptoms is 20 to 30 years (1), which is nearly similar to the most prominent age group (19 to 38 years) in our study.

In our study, 70% of patients had bilateral involvement, and in 55% of bilateral cases the left eye was more severely affected. Also, 75% of unilateral involvements were in the left eye. Between 80% and 90% of the patients eventually develop bilateral involvement (1), and our lower rate of bilateral involvement may be due to shorter follow-up. Renie and coworkers (9) have reported that in 18 of 32 patients (56.3%), the left eye was initially involved.

The tuberculin test (PPD, 5TU) was positive in 82% of our patients, but information regarding their previous bacillus Calmette-Guerin (BCG) vaccination was not available. Others have emphasized a relationship between Eales' disease and tuberculosis (7, 8). Renie and coworkers (9) noted that in their group of 32 patients, 48% had either tuberculosis or a history of exposure to tuberculosis. However, no one has demonstrated any evidence that the ocular changes are related to infection of the eye or retina by tuberculin bacteria (10).

Renie and coworkers (9) have reported sensorineural hearing loss in 24% and vestibuloauditory dysfunction in 50% of their patients with Eales' disease. Also, there are multiple case reports of diseases of the central nervous system in patients with Eales' disease including multiple sclerosis, cerebellar ataxia, myelopathy, and hemiplegia (10). However, no concomitant central nervous system disease or hearing problem was detected in our series.

In our study, both laser therapy and vitrectomy improved visual acuity in patients with complicated Eales' disease ($p<0.005$). Rate of visual acuities <20/200 decreased from 16% before laser therapy to 9% after laser therapy, and from 50% before vitrectomy to 21% after vitrectomy up to the latest follow-up. Furthermore, rate of visual acuities of better than 20/30 increased from

53% to 60% after laser therapy, and from 13% to 38% after vitrectomy.

We found that additional laser therapy may control recurrent neovascularization in most cases (47%), but ultimately, some of them (12%) may require vitrectomy. Spitznas and coworkers (4) reported that by photocoagulation, in 91% of the patients, the disease could be brought to a morphologic standstill over a mean observation time of 5 years after completion of treatment. They also reported that visual acuity remained stable or improved in 87% of the patients after photocoagulation. Their report supports our results of laser therapy.

Half of our patients who underwent vitrectomy required either additional treatment by vitrectomy (21%) or laser therapy (29%). Therefore, vitrectomy is an effective complementary modality for control of the disease, although it may need to be repeated, or completed by laser therapy later on. Vitrectomy improves visual acuity in the majority of patients with complicated Eales' disease (6, 11). Shanmugam and coworkers (6) reported that after vitrectomy, 62.4% of the eyes at 2 months and 71.8% at 60 months had visual acuity of ≥6/60, and visual acuities for individual cases were stable at the 60-month follow-up, with 78.5% either maintaining or improving upon their 2-month postoperative visual acuity.

In conclusion, similar to other studies, our study disclosed that both laser therapy and vitrectomy are effective modalities for the control of neovascularization and improvement of visual acuity in patients with complicated Eales' disease. Close follow-up for early detection of neovascularization and early treatment may improve visual outcomes in such patients.

Reprint requests to:
Mohammad Hossein Dehghan, MD
Department of Ophthalmology and Ophthalmic Research Center
Labbafinejad Medical Center
Boostan 9 St.
Pasdaran Ave.
Tehran, I.R. Iran 16666
mhdehghan@hotmail.com

REFERENCES

1. Gieser SC, Murphy RP. Eales' disease. In: Ryan SJ, ed. Retina. St. Louis: CV Mosby; 2001: 1505-8.
2. Soheilian M, Heidari K, Yazdani S, Shahsavari M, Ahmadieh H, Dehghan MH. Patterns of uveitis in a tertiary eye care center in Iran. Ocular Immunol Inflamm 2004; 12: 297-310.
3. Magargal LE, Walsh AW, Magargal HO, Robb-Doyle E. Treatment of Eales' disease with scatter photocoagulation. Ann Ophthalmol 1989; 21: 300-2.
4. Spitznas M, Meyer-Schwickerath G, Stephan B. Treatment of Eales' disease with photocoagulation. Graefes Arch Clin Exp Ophthalmol 1975; 194: 193-8.
5. Smiddy WE, Isernhagen RD, Michels RG, Glaser BM. Vitrectomy for nondiabetic vitreous hemorrhage. Retina 1988; 8: 88-95.
6. Shanmugam MP, Badrinath SS, Gopal L, Sharma T. Long term visual results of vitrectomy for Eales' disease complications. Int Ophthalmol 1998; 22: 61-4.
7. Elliot AJ. Thirty-year observation of patients with Eales' disease. Am J Ophthalmol 1975; 80: 404-8.
8. Spitznas M, Meyer-Schwickerath G, Stephan B. The clinical picture of Eales' disease. Graefes Arch Clin Exp Ophthalmol 1975; 194: 73-85.
9. Renie WA, Murphy RP, Anderson KC, et al. The evaluation of patients with Eales' disease. Retina 1983; 3: 243-8.
10. Gieser SC, Murphy RP. Eales' disease. In: Albert DM, Jakobiec FA, eds. Principles and Practice of Ophthalmology. Philadelphia: W.B. Saunders Co.; 1994: 791-5.
11. Kumar A, Tiwari HK, Singh RP, Verma L, Prasad N. Comparative evaluation of early versus deferred vitrectomy in Eales' disease. Acta Ophthalmol Scand 2000; 78: 77-8.