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Treatment of retinal detachment with congenital optic pit by krypton laser photocoagulation*, **

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Abstract. Five patients with a congenital pit of the optic nerve and serous detachment of the macular retina were treated with krypton laser photocoagulation to the juxtapapillary region in an attempt to induce resolution of the retinal detachment. The subretinal fluid resolved after laser therapy in four of the patients. In the fifth, the retinal detachment was successfully treated with pars plana vitrectomy. One patient developed a macular hole and decreased visual acuity, despite resolution of the subretinal fluid.

Introduction

Congenital pit of the optic nerve is a well-described optic disc anomaly (Brown and Tasman 1983). Nonrhegmatogenous, macular retinal detachment has been observed to occur in 40%–66% of cases (Kranenburg 1960; Brown et al. 1980; Gordon and Chatfield 1969). Central visual acuity may be reduced in eyes with congenital optic pit secondary to this macular detachment and the complications of cystic retinal degeneration and macular hole formation. The natural history in over half the eyes with optic pit and retinal detachment is that visual acuity diminishes to 6/30 or less within 5 years (Brown et al. 1980).

The visual morbidity of this condition has stimulated interest in therapeutic intervention. Oral corticosteroids (Mustonen and Varonen 1972), decompression of the optic nerve sheath (Galbraith and Sullivan 1973), scleral buckling (Vogel and Wessing 1974), and vitrectomy with air-fluid exchange (Cox, in press) have been suggested to repair the retinal detachment associated with an optic pit. Photocoagulation in the juxtapapillary region in cases of optic pit has been described by Brockhurst (1975) and Gass (1967). At Wills Eye Hospital, our approach to this problem during the past few years has been to perform krypton red laser photocoagulation at the temporal disc margin if the visual acuity is decreased as a result of serous macular retinal detachment. The treatment is repeated several months later if the macular retinal detachment persists. If retreatment is unseccessful, a third treatment is given; in one instance this was performed in conjunction with a pars plana vitrectomy and air-fluid exchange. We report our experience with five initial cases.

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Subjects and methods

The medical records, fundus photographs, and fluorescein angiograms of five persons seen in the Retina Service of Wills Eye Hospital between November, 1982 and May, 1984 were retrospectively reviewed. The criteria for patient treatment included: (1) a temporally located congenital pit of the optic nerve, and (2) reduced visual acuity in the affected eye attributable to serous detachment of the macular retina. All patients had a complete eye examination including recording of visual acuity, slit lamp biomicroscopic evaluation of the anterior segment, measurement of intraocular pressure by applanation tonometry, fundus examination by binocular indirect ophthalmoscopy, and contact lens biomicroscopic examination of the disc and macula, as well as fundus photography and intravenous fluorescein angiography. In no instance was leakage of dye into the subretinal space from either the pit or the underlying choroid noted.

Each patient was treated with a double row of confluent 200 μm spot size burns temporal and adjacent to the optic nerve in the area of retinal detachment. The treatment was initiated over detached retina and was extended into attached retina at the superior and inferior juxtapapillary margins of the detachment. Exposures of 0.1–0.2 s were employed and the power was adjusted to a level sufficient to give a yellow-white burn at the level of the retinal pigment epithelium in regions where subretinal fluid was present. Within flat retina the desired endpoint was a yellow-white burn at the level of the retinal pigment epithelium and outer neurosensory retina. Treatments were delivered through a flat contact lens under topical anesthesia. The krypton red laser (wavelength 647 μm) was used in all patients.

Results

In four of five affected eyes the macular subretinal fluid associated with the optic pit resoved following krypton laser therapy (Table 1). However, three of the four cases which responded to laser treatment alone required more than one

Table 1. Results of krypton laser photocoagulation for serous, macular retinal detachment associated with congenital optic pit

Case	Age	Sex	Eye	Worst visual acuity	Number of treatments	Final visual acuity	Macular detachment
1	15	F	Left	6/18	1	6/6	Flattened
2	28	M	Right	6/18	2	6/6	Flattened
3	51	F	Right	6/30	2	6/21	Flattened – vision remained decreased due to macular hole
4	28	F	Right	6/60	2	6/6	Macula remained detached after laser – flattened with vitrectomy and air/gas fluid exchange
5	46	M	Left	6/60	3	6/6	Flattened

session. In the fifth patient (case 4), a pars plana vitrectomy and gas/fluid exchange, in combination with krypton laser therapy, were required to induce resolution of the detachment. With the exception of one instance in which a macular hole developed, the resultant visual acuity was uniformly good in all instances. In no eye was a clinical adverse effect observed following the therapy. Descriptions of the individual cases follow below.

Case 1

A 15-year-old white female presented with a history of decreased vision in the left eye for a period of 1 year. Visual acuity was 6/6 in the right eye and 6/18 in the left eye. Fundus examination disclosed a temporal congenital pit of the optic disc and serous detachment of the macular retina. Cystic changes were present in the detached retina.

The patient was treated with 48 spots of krypton laser photocoagulation along the temporal disc margin, as described above. When she was seen 1 month later, the visual acuity had improved to 6/6 and all subretinal fluid had resolved. The patient has been followed for 3 years and 8 months without recurrence.

Case 2

A 28-year-old white male noted blurred vision in the right eye for about 6 months. Visual acuity was 6/18 in the right eye and 6/6 in the left. Fundux examination of the right eye revealed an optic pit on the temporal side of the optic disc and an associated serous macular retinal detachment (Fig. 1).

The patient was treated with 75 spots of krypton laser photocoagulation along the temporal disc margin (Fig. 2). He noted a transient improvement in vision and was observed to have a slight reduction in the amount of subretinal fluid during the first post-treatment month. However, at the 3-month follow-up the fluid in the macula had increased. Therefore, a second krypton laser treatment (41 burns) was administered. One month after the second treatment, the retinal detachment had totally resolved (Fig. 3) and the visual acuity in the right eye was improved to 6/6. The retina has remained attached during 3 years of follow-up.

Case 3

A 51-year-old white female related a history of a progressive decrease in vision in her right eye over the last year. The visual acuities were 6/18 and 6/6 in the right and left eyes respectively. The patient was noted to have an optic pit on the temporal aspect of the right optic disc and serous detachment of the macular retina. A congenital optic pit was also noted on the left optic disc, but serous retinal detachment was absent.

The patient was treated with 93 spots of krypton laser photocoagulation temporal to the right optic disc. At 4 months after treatment the visual acuity in this eye remained at 6/18, but a macular hole had developed. At 9 months after treatment the visual acuity was 6/30, and macular subretinal fluid was still present. An additional session of 163 burns was given. By 4 weeks after this second treatment, the retinal detachment had resolved. Unfortunately, the visual acuity improved to only 6/21 because of the macular hole.

Case 4

A 28-year-old white female presented with a chief complaint of distortion of vision in the right eye for 2 months. Visual acuity was 6/12 in the right eye and 6/6 in the left eye. On examination the patient had an optic pit in the right eye with serous detachment of the macular retina. Subretinic precipitates were present in the area of the detachment.

The patient was treated with 84 krypton laser applications to the retina adjacent to the temporal disc margin. There was an initial improvement in the detachment, but the subretinal fluid never resolved completely. By 5 months after the treatment, the visual acuity had dropped to 6/60. A second photocoagulation treatment consisting of 95 burns was given at that time. There was still no improvement in the retinal detachment. Ten months after the initial treatment, a third application of krypton laser was given, followed several hours later by a pars plana vitrectomy and gas/fluid exchange. The retina was flat postoperatively and the visual acuity in this eye slowly improved to 6/6 over the next year.

Case 5

A 46-year-old male had noted decreased visual acuity in the left eye over the past year. Examination revealed a visual acuity of 6/6 in the right eye and 6/60 in the left eye. There was an optic pit of the nerve head in the left eye and serous detachment of the neurosensory retina in the macular area.

Sixty krypton laser photocoagulation burns were applied to the retina adjacent to the temporal disc margin. Three months later the treatment was repeated with

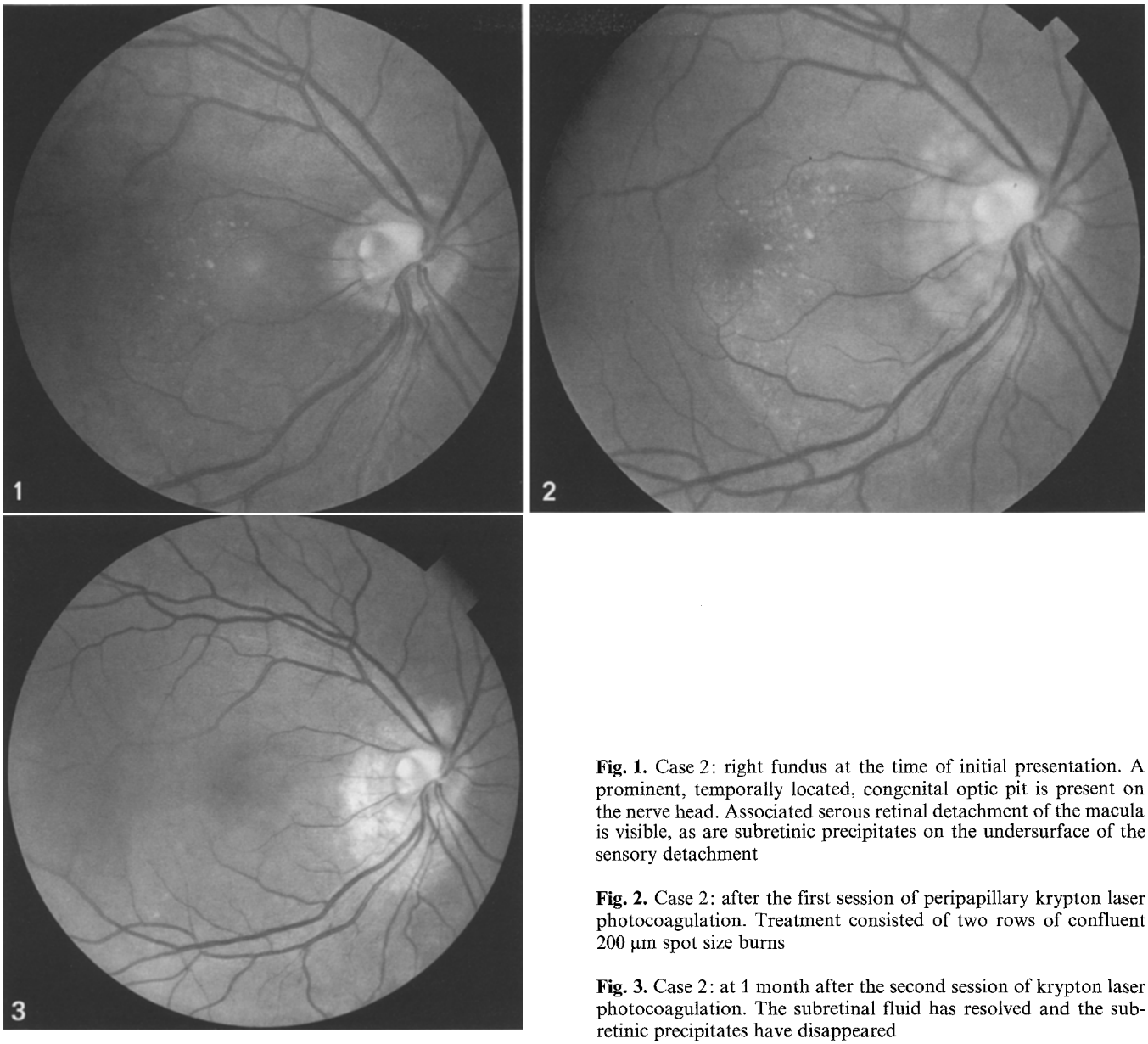

Fig. 1. Case 2: right fundus at the time of initial presentation. A prominent, temporally located, congenital optic pit is present on the nerve head. Associated serous retinal detachment of the macula is visible, as are subretinic precipitates on the undersurface of the sensory detachment

Fig. 2. Case 2: after the first session of peripapillary krypton laser photocoagulation. Treatment consisted of two rows of confluent 200 μm spot size burns

Fig. 3. Case 2: at 1 month after the second session of krypton laser photocoagulation. The subretinal fluid has resolved and the subretinic precipitates have disappeared

70 burns. There was no response to the first two treatments and a third treatment of 56 burns was given 5 months after the first. One month after the third treatment there was partial resolution of the retinal detachment. Over the next 6 months, the retinal detachment resolved and the visual acuity returned to 6/6.

Discussion

Decreased visual acuity in patients with a congenital pit of the optic disc usually occurs as a result of complications of chronic serous detachment of the macular retina, including cystic degeneration of the retina, macular pigmentary changes, and macular hole formation. The goal in peripapillary photocoagulation is to effect resolution of the macular retinal detachment and hopefully reduce the incidence of these complications.

Spontaneous resolution of the retinal detachments associated with optic pits is well described and occurs in approximately 25% of untreated cases (Brown and Tasman 1983). This may have been a factor in case 5 in which there was slow resolution of subretinal fluid over a 6-month period. However, in cases 1, 2, and 3 the retinal detachment resolved less than 1 month after the last treatment. The temporal relationship of treatment to the resolution of the subretinal fluid suggests a cause-and-effect relationship. A firm chorioretinal adhesion at the disc margin would theoretically decrease the chances of recurrence of retinal detachment if it is assumed that the subretinal fluid gains entrance to subretinal space via the pit (Brown and Tasman 1983).

To our knowledge, this is the first report of the use of krypton laser for the treatment of macular retinal detachments associated with congenital optic pits. Brockhurst (1975) suggested that red might be a good wavelength for producing a chorioretinal adhesion in cases of retinal detachment secondary to optic pit, since the energy is absorbed primarily at the level of the deep retina and choroid, thus tending to spare the nerve fiber layer. In our clinical

experience, the nerve fiber layer is usually unaffected by argon laser in the area of the retinal detachment. However, we have observed arcuate scotomas after heavy argon laser treatment at the margin of the disc in persons with congenital optic pits and serous macular detachment when treatment extends into areas of attached retina.

In summary, we have presented five cases of detachment of the macula secondary to congenital optic pit treated with krypton laser photocoagulation. In four of the patients the subretinal fluid resolved after photocoagulation. The fifth improved after pars plana vitrectomy and gas/fluid exchange. One patient suffered decreased visual acuity secondary to macular hole formation. Our initial experience with krypton laser photocoagulation for retinal detachment secondary to optic pit is encouraging. We believe that krypton laser photocoagulation offers the theoretical advantage of sparing the nerve fiber layer in peripapillary flat retina, as compared to argon laser therapy.

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