Polypoidal Choroidal Vasculopathy in Taiwan

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Background: Polypoidal choroidal vasculopathy (PCV) has been described since the 1980s with great variations in patient data in different countries. We report the first case series in the Taiwanese population.

Methods: We reviewed the medical records of all patients diagnosed with PCV between January 2000 and October 2001 at the retina clinics of Chang Gung Memorial Hospital.

Results: Eight patients (9 eyes) were enrolled. Six were men. The average age was 60.9 (range, 48-72). One patient had bilateral disease. All of the 9 eyes had polypoidal lesions in the macular area; 2 eyes had peripapillary lesions. The average follow-up time was 16.5 months. One eye (1/9) improved more than 2 lines in the Snellen chart, 4 eyes (4/9) changed within 1 line, and 4 eyes (4/9) deteriorated more than 2 lines. Seven eyes (7/9) had final visual acuities worse than 20/200 and 5 eyes (5/9) developed disciform scarring.

Conclusions: The prognosis of PCV among Taiwanese patients seems worse than in other ethnic groups. A high incidence of disciform scar formation and predominantly centrally located polypoid lesions seem to play an important role in the poor prognosis.

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Key words: **polypoidal choroidal vasculopathy, choroidal neovascularization.**

Polypoidal choroidal vasculopathy (PCV) has been recognized since the 1980s. It was first described by Stern et al. and Perkovich et al. as "multiple recurrent retinal pigment epithelial detachments in black women."[1,2] Later, it was classified as "posterior uveal bleeding syndrome" by Kleiner et al.[3,4] In 1990, Yannuzzi et al. designated it "idiopathic polypoidal choroidal vasculopathy" in order to characterize it as a distinct clinical entity of unknown etiology with a peculiar network of choroidal vessels, polypoidal subretinal choroidal nodular lesions, and recurrent serous and hemorrhagic detachments of the retinal pigment epithelium and neurosensory retina.[5] The histopathological examination revealed degenerated retinal pigment epithelium-Bruch's membrane-choriocapillaris complex and abnormality in the inner choroidal vasculature.[6] Recent reports show an expanded clinical spectrum for PCV, affecting various ages, both genders, and several racial populations.[7] Patient data varies widely among patient populations.[7-12] We report the first case series in the Taiwanese population.

METHODS

This was a retrospective and noncomparative study. We reviewed the medical records of all patients diagnosed with PCV between January 2000 and October 2001 at the retina clinics of Chang Gung Memorial Hospital. Patients' medical histories,

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ocular manifestations, clinical courses, and treatments were recorded. Color fundus photography, fluorescein angiography and indocyanine green angiography data were collected. Definitive diagnoses were made based on typical aneurysmal terminal dilatations of the choroidal vessels on indocyanine green angiography.

RESULTS

Summary of data

Nine eyes of 8 patients were diagnosed with PCV from January 2000 to October 2001. All patients were Taiwanese and the average age at diagnosis was 60.9 years (range, 48-72 years). Six patients (75%) were men and 2 patients were women. Table 1 summarizes the patient data and clinical manifestations. All of the patients had an initial presentation of decreased vision in the affected eye with or without metamorphopsia and central scotoma. In the initial examination, 5 eyes had subretinal hemorrhages, 5 eyes had hard exudates, 2 eyes had retinal pigment epithelium detachment, 1 eye had retinal scarring, and 1 eye had a vitreous hemorrhage. None of the nine eyes had retinal detachment. Only 1 of the 8 patients had bilateral disease.

All of the patients had spotty hyperfluorescence appearing in the early and middle phases of fluorescein angiography with or without partial blockage by subretinal hemorrhages. Active leakage was found in 6 eyes. Indocyanine green angiography revealed aneurysmal terminal dilatation in all 9 eyes and branching vascular networks in 5 of the affected eyes. The lesions could be seen in the early phase on indocyanine green angiography and became more obvious in the late phase, due to pooling of dye at the terminal dilatation of the vessels. The vascular network varied in size and shape. It ranged from half of the disc diameter to 3 disc diameters in size and was round, umbrella-like, or linear. All 9 eyes had polypoidal lesions located inside the macular area and additional peripapillary lesions were found in 2 eyes.

Patients were monitored for an average of 16.5 months (range, 2-30 months). Six eyes with active leakage identified on fluorescein angiography, were treated with either argon laser photocoagulation or transpupillary thermal therapy for leakage points outside the foveal area. In order to remove a subretinal hemorrhage, 1 patient (case 7) received an intravitreous injection of tissue plasminogen activator and pneumatic displacement with sulfur hexafluoride. One patient (case 1) underwent limited macular translocation due to a disciform retinal scar involving the central macular area. The final visual acuity improved 2 Snellen chart lines or more in 1 patient, showed little or no improvement in 4 eyes (within 1 line) and decreased 2 lines or more in 4 eyes.

Example of cases

Case 5

A 63-year-old man had mild hypertension and hyperuricemia for many years. He complained of

Table 1. Summary of Patient Data and Clinical Manifestations.

No.	Gender/Age (years)	Systemic diseases	Eyes	Fundus findings	Location	Follow up (months)	VA(i)	VA(f)	Treatment	Reason for poor visual outcom (VA<6/60)
1	M/67	HTN, CVA	OD	SRH, HE	M	13	20/400	20/400	LMT	Disciform scar
2	M/50	HTN, HBV	OD	ME, HE, Drusen	M,P,F	15	50/500	FC	FRP	Disciform scar
3	M/65	HTN	OD	ME, HE, DH, RPED	M	6	20/400	20/250	TTT	Exudative maculopathy
4	F/71	HTN, CAD	OD	RPED	M,P	30	20/100	20/60	FRP	Not applicable
5	M/63	HTN, HU	OD	SRH, HE, RS	M,F	2	20/400	20/800	FRP	Disciform scar
6	F/72	CVA,	OS	SRH, HE	M	15	20/100	20/400	FRP, TTT	Disciform scar
7	M/48	Nil	OS	SRH	M	14	FC	20/1000	tPA + SF6	Disciform scar
			OD	Unremarkable	M	14	20/20	20/20	Observation	Not applicable
8	M/51	Nil	OS	RS, RPED	M,F	30	20/40	20/500	FRP	Hemorrhagic RPED

Abbrevations: HTN: hypertension; CVA: cerebrovascular accident, HBV: hepatitis B virus carrier; CAD: coronary artery disease; HU: Hyperuricemia; SRH: subretinal hemorrhage; HE: hard exudates; ME: macular edema; DH: disc hemorrhage; RPED: retinal pigment epithelial detachment; RS: retinal scar; M: macular; P: peripapillary; F: subfoveal or juxtafoveal; VA(i): initial visual acuity; VA(f): final visual acuity; FC: finger counting; LMT: limited macular translocation; FRP: focal retinal photocoagulation; TTT: transpupillary thermal therapy; tPA: intravitreous injection of tissue plasminogen activator; SF6: Sulfur Hexafluoride injection.

progressive blurring in his right eye for the previous 6 months. His initial corrected visual acuity was 20/400 in the right eye and 20/40 in the left eye. Intraocular pressure was normal for both eyes. The external eye and anterior segments of both eyes were generally normal. A fundus examination of the right eye (Fig. 1A) revealed hard exudates and small reddish-orange subretinal polypoidal lesions on the macula. Mild retinal pigment epithelial atrophy and retinal scarring were present in the superotemporal macula. Subretinal hemorrhages were also present. A fundus examination of the left eye was unremarkable. Fluorescein angiography of the right eye (Fig. 1B) showed multiple granular hyperfluorescent lesions in the macula along with fluorescein blocking by a subretinal hemorrhage. Subretinal leakage and pooling of fluorescein were present in the superotemporal macula. Indocyanine green angiography (Fig. 1C) disclosed multiple aneurysmal dilations at the terminus of the branching vascular network. Focal retinal photocoagulation of the leakage area was performed on an outpatient basis. The subretinal fluid resolved gradually after photocoagulation treatment. However, new leakage in the macular area was noted again on fluorescein angiography 2 months later. The patient's final corrected visual acuity further deteriorated to around 20/800.

Case 6

A 76-year-old woman had a history of cerebrovascular accident and urolithiasis. She had poor vision in her right eye for many years. She complained of metamorphopsia and blurred vision in her left eye for 3 days. Her corrected visual acuity was finger-counting at 50 cm in the right eye and 20/100 in the left eye. The initial ophthalmologic examination was unremarkable for both anterior segments. A fundus examination of her right eye revealed large areas of hard exudates along the upper and lower temporal arcades. Spotting hemorrhages and macular edema were noted in the posterior pole. Her left eye had a subretinal hemorrhage that was approximately 1 disc area in size and was surrounded by subretinal fluid (Fig. 1D). Hyperfluorecence on fluorescein

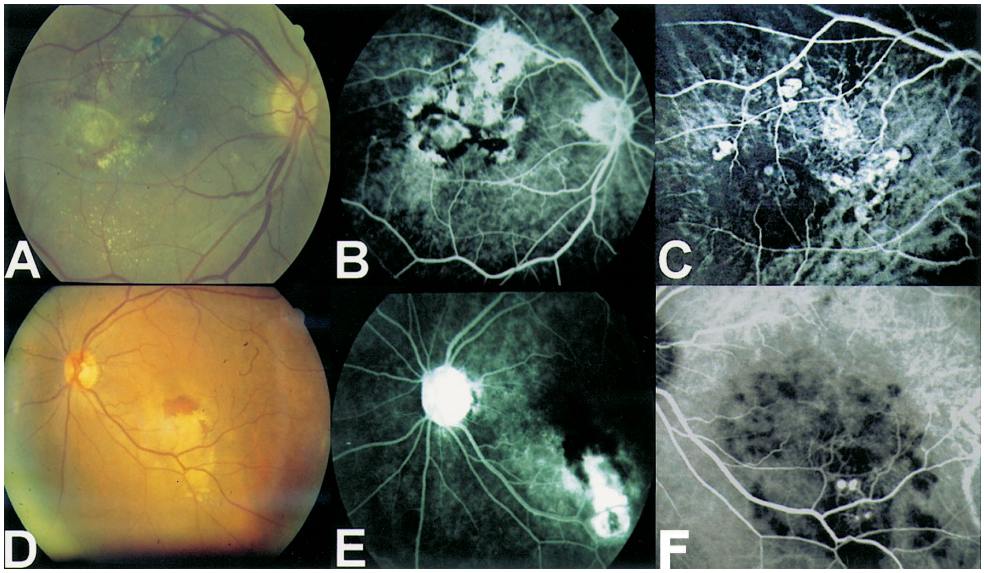

Fig. 1 (A) Color fundus of case 5. Some hard exudates and small reddish-orange subretinal polypoidal lesions can be seen over the macula. Mild retinal pigment epithelial atrophy and retinal scarring are present in the superotemporal macula. (B) Fluorescein angiography of case 5. Multiple granular hyperfluorescent lesions with subretinal leakage and pooling of fluorescein are seen in the macula. (C) Indocyanine green angiography of case 5. Multiple aneurysmal dilations are noted at the terminus of the branching choroidal vascular networks. (D) Color fundus of case 6. Subretinal hemorrhage about one disc diameter in size, surrounded by hard exudates. (E) Middle phase fluorescein angiography of case 6. Hypoflurescense is blocked by subretinal hemorrhage with surrounding leakage and pooling of fluorescein. (F) Late phase indocyanine green angiography of patient 6. Four well-defined polypoidal terminal dilatations of choroidal vessels can be clearly seen.

angiography (Fig. 1E) suggested subretinal fluid, with a few granular leaking lesions in both the left and right eyes. A fluorescein blocking subretinal hemorrhage was found just inferior to the foveal avascular zone. Indocyanine green angiography of the left eye (Fig. 1F) showed two large and two small polypoidal vascular dilatations in the lower temporal retinal artery, with small areas of branching vascular networks. Indocyanine green angiography of the right eye showed a large occult choroidal neovascularization in the macular area, though no obvious polypoid lesion was found. The patient underwent laser photocoagulation and transpupillary thermal therapy for the leaking polypoid lesion in her left eye. Nonetheless, visual acuity in her left eye declined progressively to 20/400 at 22 months follow-up.

DISCUSSION

The clinical presentations of PCV may sometimes mimic age-related macular degeneration (AMD), which has different treatment strategies and prognoses. Yannuzzi et al. reviewed 167 patients initially diagnosed with AMD and 13 (7.8%) of them had PCV.[13] Similar results were noted by Sforzolini et al., in which 19 (9.8%) of 194 presumed AMD patients had PCV.[11] AMD patients are usually older, always over 55 and mainly between 65 and 85 years of age. Our PCV patients were much younger; 3 patients (37.5%) were less than 55 years of age (mean age, 60 years; range, 48-72 years). Most patients with PCV in Japan and in our case series had unilateral disease, unlike patients with AMD, in whom bilateral disease is common.[8,13] Soft drusen in the eye with lesions, with or without involvement of the fellow eye, is a characteristic finding for the diagnosis of AMD, while it is a rare condition among patients with PCV.[13] In contrast, retinal pigment epithelium detachment is more common in PCV than AMD.[14]

Since 1990, there have been several reports on PCV from different countries and ethnic groups.[5-12] However, we could not find a report from Taiwan. We described a case series of 8 patients (9 eyes) with PCV in our population. Our study showed a male preponderance, unilateral disease, macular lesions, and a mean age of 60 years at onset. Our results were similar to reports from Japan and Hong Kong.[8-10] However, our results differed from reports from Western countries.[7,11,12] Yannuzzi et al. found a female predominance, bilateral disease and peripapillary lesions.[5,7] The results from Sforzolini et al. also showed a female predominance and an older mean age (70 years).[11]

Visual outcomes also differed among different studies. Yannuzzi et al. reported a series of 18 affected eyes in 11 patients (average of 4.7 years of follow-up).[7] The final visual acuity was 20/40 or better in 10 of the 18 eyes (56%) and 20/200 or better in 16 of the 18 eyes (89%). Uyama et al. also reported favorable visual outcomes.[8] The final visual acuity was 20/25 or better in 17 of 35 eyes (49%) and 20/66 or better in 25 of 35 eyes (71%). Of the 35 eyes, 17 underwent laser treatment and in 71% of these, visual acuity improved by 2 Snellen chart lines or more.[7,8] Kwok et at. reported that in 9 of 22 eyes from 19 Chinese patients in Hong Kong treated with laser therapy, the final visual acuity was 20/40 or better in only 3 eyes (14%) and better than 20/200 in 7 eyes (32%).[10] Our patients had worse outcomes. Only 1 of 9 eyes (11%) had a final visual acuity of 20/40 or better and 2 of 9 eyes (22%) had a final visual acuity of 20/200 or better. Populations in Taiwan and Hong Kong share the same ethnicity. Based on our results and those of Kowk et al., the Chinese population seems to have poorer outcomes for PCV. The reason for poor visual outcomes in these two studies was formation of disciform scars resembling the disciform lesions of age-related macular degeneration. Disciform scars were developed in 5 of 9 eyes (56%) in this study. All of them had final visual acuities of 20/400 or worse. Similarly, Kwok et al. showed that 10 of 22 eyes (45%) developed disciform scars. However, Yannuzzi et al. reported only 5 of 18 eyes (27%) developed disciform scars, leading to poor visual outcomes.[7] Similarly, Uyama et al. reported only 4 of 35 eyes (11%) developed disciform scars.[8]

The location of polyps is also important for final visual outcome. Our patients had a predominance of macular lesions, while those in the report by Yannuzzi et al. had more peripapillary lesions.[5,7] Among the eyes we studied, 3 had polyps located in the juxtafoveal or subfoveal area, and all of them had final visual acuities of 20/400 or less. Thus, the high incidence of disciform scars in the central macular, juxtafoveal, or subfoveal area appears to be an

important indicator of poor visual outcomes among our Taiwanese patients.

There is no standard protocol for the treatment of PCV. Studies of Chinese and Asian populations are limited. Although Kwok et al. reported that visual outcomes impoved with laser treatment, the difference did not reach statistical significance.[10] Uyama et al. noted clinical improvement with a decrease in hemorrhage and subretinal fluid after laser photocoagulation, better than untreated group.[8] Five patients underwent laser photocoagulation in our study and 4 of them had visual outcomes worse than 20/200. Yuzawa et al. performed laser photocoagulation in 38 PCV patients (47 eyes) with serosanguineous detachment involving the fovea and concluded that photocoagulation covering both the abnormal vessels and the polypoidal lesions was better than the same treatment covering polypoidal lesions only.[15] Large scale and well-controlled studies are necessary for further evaluation of the effectiveness of laser treatment of PCV in different locations in the eye.

Case reports of treatment with photodynamic therapy were published recently.[16,17] Spaide et al. performed a pilot study treating 16 patients with subfoveal PCV with verteprofin photodynamic therapy. The mean improvement of visual acuity after treatment was 2.38 lines on the Snellen chart.[18] Although the study was limited by small patient numbers and lacked a control group, it showed encouraging results in treating subfoveal PCV.

Some authors suggest surgical treatment. Shiraga et al. suggested surgical removal of subretinal hemorrhages to minimize iron toxicity and blockage of nutrient diffusion, which could cause irreversible damage to the outer retina.[19] However, there was a high incidence (37%) of retinal pigment epithelial tears after surgery. Morizane et al. reported that 7 eyes with subfoveal PCV underwent limited macular translocation.[20] Five of the 7 eyes improved 2 lines or more on the Snellen chart. The patient with limited macular translocation in our study attained stable vision after 13 months of follow-up. Further double blinded, randomized and well-controlled studies are necessary to evaluate treatments for PCV.

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臺灣地區之息肉狀脈絡膜血管病變

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背 景： 息肉狀脈絡膜血管病變自1980年代開始被討論，各國所報告的流行病學和疾病表現並不一致。我們透過此系列病例報告首次提出此疾病在台灣本地的表現情形。

方 法： 我們回顧2000年1月至2001年10月間於林口長庚醫院視網膜門診被診斷爲息肉狀脈絡膜血管病變病患之病歷。

結 果： 共有8位病患 (9隻眼睛) 被納入本次研究。男性佔6人。平均年齡60.9歲 (範圍48-72歲)。其中1人爲雙側性。病灶在黃斑部者有9眼，在視神經盤週圍有2眼。追蹤16.5個月後。視力進步Snellen chart兩行或以上有1眼 (1/9)，惡化兩行或以上有4眼 (4/9)，保持穩定有4眼 (4/9)，最後視力小於20/200者有7眼 (7/9)。共有5眼 (5/9) 產生盤狀疤痕。

結 論： 本疾病表現可能因人種不同而有所不同。此疾病在台灣人之預後較差可能是由於有較高比例的病患產生黃斑部疤痕造成。

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關鍵字： 息肉狀脈絡膜血管病變，脈絡膜新生血管。

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