

Bilateral Large Peripapillary Venous and Arterial Loops

Sakiko Teramoto,*

Kyoko Ohno-Matsui,* Takashi Tokoro* and Seiji Ohno†

**Department of Ophthalmology, School of Medicine, Tokyo Medical and Dental University, Tokyo, Japan; †Ohno Eye Clinic, Tokyo, Japan*

Background: Peripapillary loops of venous origin are extremely rare.

Case: A 55-year-old woman was referred to us for further examination of peripapillary vascular abnormalities.

Observations: Fundus examination and fluorescein angiography clearly showed a venous and an arterial peripapillary loop in both her right and left fundi. The venous loop in the right eye was in a large hairpin configuration, extending into the retina about 1 disc diameter from the optic disc. Fluorescein angiography in the left eye revealed slow and irregular filling of dye into a venous loop that showed stasis of the bloodstream through the loop. Various retinal vascular abnormalities, including cilioretinal artery and triple branching of the retinal vein were also observed.

Conclusion: The findings in this case of bilateral peripapillary venous and arterial loops and unilateral trifurcation of retinal vein suggest that there could be an association in the other retinal abnormalities. Periodic follow-up examinations seem necessary. **Jpn J Ophthalmol 1999;43:422–425** © 1999 Japanese Ophthalmological Society

Key Words: Cilioretinal artery, fluorescein fundus angiography, peripapillary arterial loop, peripapillary venous loop, trifurcation.

Introduction

Peripapillary vascular loops are a variant of the normal retinal vasculature seen on and around the optic disc.^{1–9} Considered rare, this anomaly occurs in 1:2000 to 1:9000 in the general population.^{1–3} Most peripapillary vascular loops have been arterial, as observed by fluorescein angiography.^{1,2} Peripapillary loops of venous origin are extremely rare. To our knowledge, only a few reports have described venous loops demonstrated by fluorescein angiography,^{1,2} and no reports have included detailed angiographic findings. These loops have been small and mostly limited to the optic disc.²

In this report, we describe a patient with a large peripapillary venous loop that extended into the retina from the optic disc. Fluorescein angiography showed marked stasis of the bloodstream through the loop. Other retinal vascular abnormalities, including a cilioretinal artery and triple branching of a retinal vein, were also observed.

Case Report

A 55-year-old woman was referred to us for further examination of peripapillary vascular abnormalities in December 1996. The fundus findings were noted during a general physical examination, but the patient had no complaints of visual symptoms. At the initial examination, her best-corrected visual acuity was 0.7 in the right eye and 0.8 in the left. Slit-lamp biomicroscopy of the anterior segments showed no abnormal findings, other than mild cataract in both eyes. The intraocular pressure was 16

Received: July 6, 1998

Correspondence and reprint requests to: Kyoko OHNO-MATSUI, MD, Department of Ophthalmology, School of Medicine, Tokyo Medical and Dental University, 1-5-45 Yushima, Bunkyo-ku, Tokyo 113, Japan



Figure 1. Right fundus shows large peripapillary venous loop in large hairpin configuration superotemporal to optic disc. Cilioretinal artery also appears at temporal edge of optic disc. Inferotemporal to optic disc, retinal artery, and vein are intertwined (arrowhead).

mm Hg bilaterally. The fundus examination of the right eye showed a large peripapillary venous loop in a hairpin shape superotemporal to the optic disc (Figure 1). A cilioretinal artery was also observed at the temporal edge of the optic disc.

Inferotemporal to the optic disc, the retinal artery and vein were intertwined. In the left fundus (Figure 2), several peripapillary arterial loops with spiral

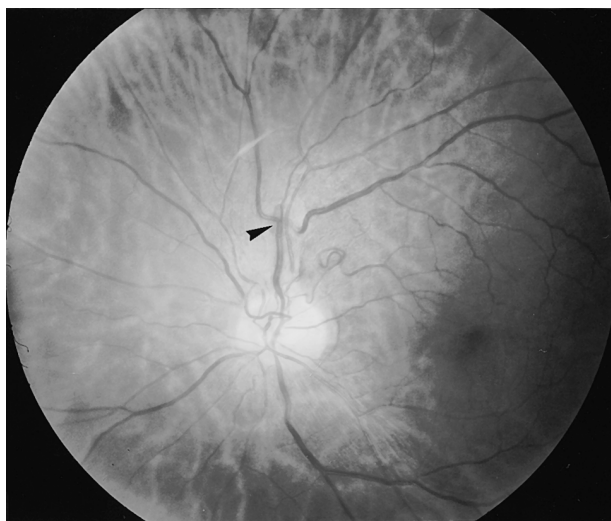


Figure 2. Left fundus shows several peripapillary arterial loops superior to the optic disc. Superotemporal retinal vein demonstrates triple branching pattern (arrowhead).

turns were seen superior and superotemporal to the optic disc. The supero-temporal retinal vein demonstrated a triple-branching pattern. Fluorescein and indocyanine green (ICG) angiography were performed at the first visit. Fluorescein angiography of the right fundus (Figure 3) showed that the peripapillary venous loop filled slowly and irregularly with the dye in the venous phase. It took 4 seconds for the venous loop to fill completely with dye. No obvious laminar flow was observed within the loop. In the left fundus, several arterial loops filled quickly with the dye in the arterial phase. Triple branching of the superotemporal retinal vein was clearly demonstrated angiographically (Figure 4).

No additional choroidal vascular abnormalities were apparent by ICG angiography (Figures 5, 6). The results of a visual field examination by Gold-

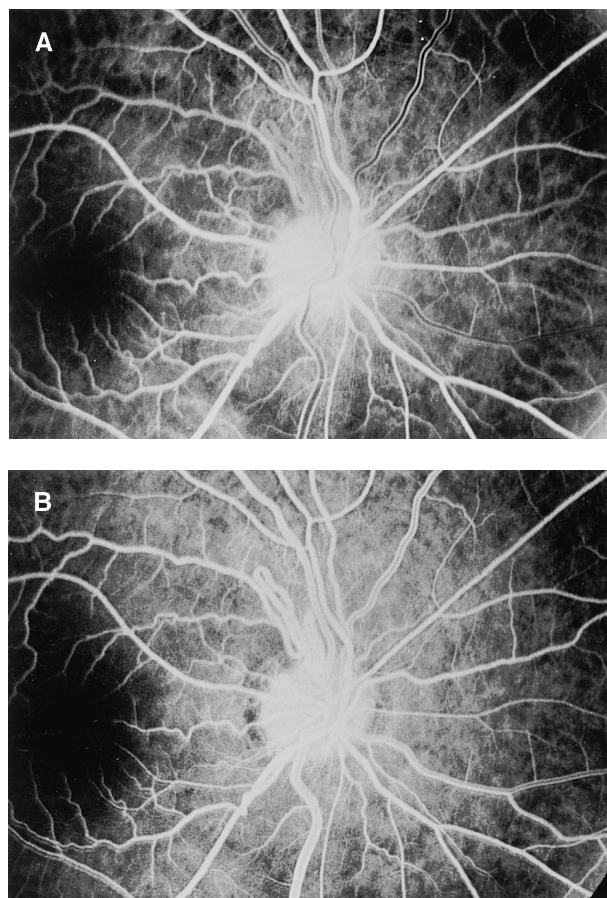


Figure 3. Fluorescein angiogram of right fundus. (A) Thirteen seconds after injection, dye gradually flows into venous loop. Dye fills unevenly within loop. No laminar flow is obvious within loop. Most proximal part to optic disc is not yet filled. (B) Sixteen seconds after dye injection, venous loop is completely filled with dye.

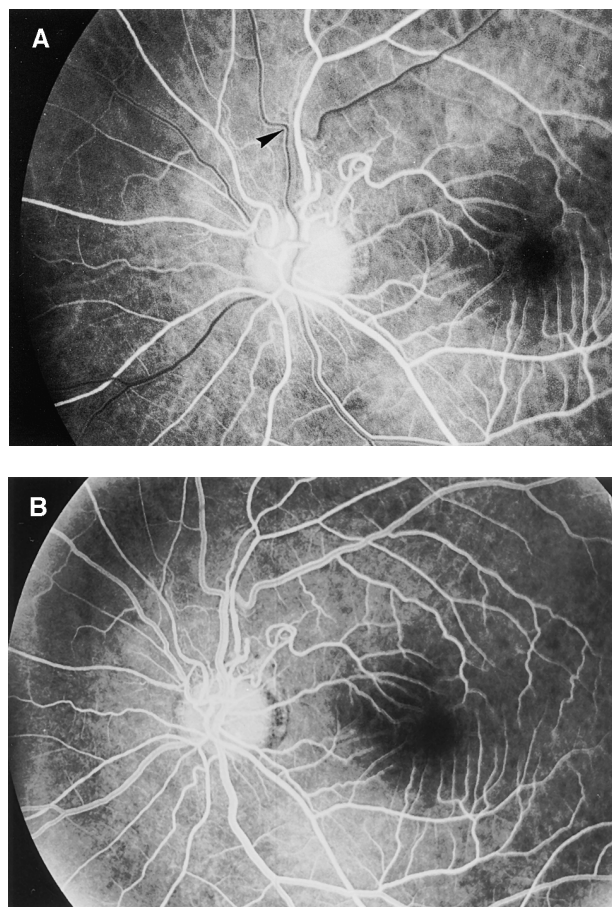


Figure 4. Fluorescein angiogram of left fundus. (A) Fifteen seconds after dye injection, several arterial loops with spiral turns are seen superior to optic disc. Laminar flow is observed within superotemporal retinal vein that shows a triple branching pattern (arrowhead). (B) Nineteen seconds after dye injection, retinal vein is filled with dye.

mann perimetry were normal in both eyes. Magnetic resonance imaging performed 1 week after the initial visit showed no retrobulbar or cerebral lesion.

Discussion

Peripapillary vascular loops occur rarely and usually as a unilateral anomaly that appears as a single small loop on and just around the optic disc.¹⁻⁹ Bilateral peripapillary vascular loops as seen in this patient are much rarer. Bilateral cases are seen in only 9%–17% of all cases with venous loops.¹

Approximately 95% of these loops are arterial, based on fluorescein angiographic findings.^{1,2} Matsui et al⁴ performed fluorescein fundus angiography on 7 patients with peripapillary loops and found that all the loops were arterial. Degenhart and associates¹

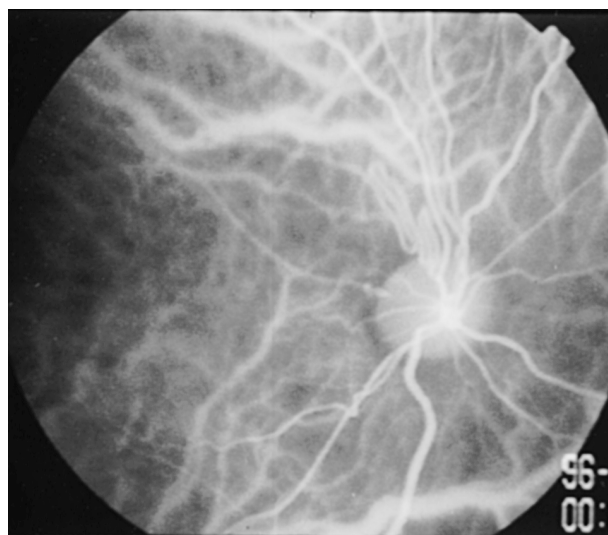


Figure 5. Indocyanine green angiogram of right fundus. Fifteen seconds after dye injection, no additional choroidal vascular abnormalities are obvious.

found only one peripapillary venous loop in a series of 21 during ophthalmoscopic examination. Although the exact incidence of venous loops is unknown, these reports suggest that they occur much less commonly than their arterial counterparts.

Moreover, all the venous loops described previously have been small and mostly limited to the optic disc.^{1,2,4} None has been as large as the peripapillary venous loop extending into the retina seen in this patient.



Figure 6. Indocyanine green angiogram of left fundus. One minute after dye injection, no additional choroidal vascular abnormalities are obvious.

Congenital venous loops are extremely rare, and have to be differentiated from acquired venous loops to make a diagnosis. Bronner et al¹⁰ listed several features to differentiate the two. Most acquired venous loops are formed secondary to central or branch retinal venous obstruction or optic nerve tumor.¹⁰ Our patient had no findings of retinal venous dilation, tortuosity, or retinal hemorrhages suggestive of retinal venous obstruction. Also, magnetic resonance imaging showed no lesions in the orbit or brain.

Mann⁵ has suggested that peripapillary arterial loops arise at about the 100 mm (3.5–4 months) embryonic stage, when a developing artery may grow into the glial tissue of Bergmeister's papilla anterior to the optic nerve. After regression of the surrounding glial tissue, the loop is left. The origin of venous loops is thought to parallel that of arterial loops.⁵

Peripapillary vascular loops are usually asymptomatic,² and may be found in eyes with good visual acuity, as seen in this patient. However, complications associated with arterial loops such as retinal arterial obstruction,^{1,2,6} amaurosis fugax,^{1,2} and vitreous hemorrhage^{1,2,8} have been reported. Because venous loops are much rarer than arterial loops, complications related to venous loops have not been reported. However, fluorescein angiography in this patient demonstrated that the bloodstream through the venous loop showed stasis. It took 4 seconds from the first entry of dye into the loop to complete the filling. This finding suggested that some retinal venous lesions, including branch retinal vein occlusion, might occur in eyes with venous loops. Periodic follow-up examinations appear necessary.

Other retinal vascular anomalies have been reported in association with peripapillary vascular loops.^{1,7,8} Cilioretinal arteries were most frequently reported in association with vascular loops^{1,7,8} and have been described in up to 75% of such eyes.¹ In this patient, a cilioretinal artery was observed at the temporal edge of the optic disc in the right eye. The retinal artery and vein were intertwined. Trifurcation of the superotemporal retinal vein in the pa-

tient's left eye is extremely rare. To our knowledge, only one case report by Primrose¹¹ described this anomaly. Triple branching is thought to result from abnormal budding of retinal branches from the parent vessel.¹¹ Although the detailed embryogenic relationship between the trifurcation of the retinal vein and peripapillary vascular loops is unclear, we believe that various retinal vascular anomalies can occur in association with the loops.

In summary, we report on a patient with bilateral large peripapillary venous and arterial loops associated with various other retinal vascular abnormalities. Fluorescein angiography was useful to show the circulatory disturbance within the venous loop.

References

1. Degenhart W, Brown CG, Augsburger JJ, Magargal L. Peripapillary vascular loops. A clinical and fluorescein angiography study. *Ophthalmology* 1981;88:1126–31.
2. Brown GC, Tasman W. Vascular anomalies of the optic disc. In: *Congenital anomalies of the optic disc*. New York: Grune and Stratton, 1983:31–59.
3. Awan KJ. Arterial vascular anomalies of the retina. *Arch Ophthalmol* 1977;95:1197–202.
4. Matsui M, Tashiro T, Matsumoto K, Asai Y. A case of retinal arterial loop. *Rinsho Ganka (Jpn J Clin Ophthalmol)* 1972;26:297–304.
5. Mann I. *Development abnormalities of the eye*. Philadelphia: JB Lippincott, 1957:133–6.
6. Walker CH. Thrombosis of the inferior temporal branch of the anterior centralis retinae in an eye with a vein caused by exposure to direct sunlight. *Trans Ophthalmol Soc UK* 1903;23:279–81.
7. Brown GC, Magargal LE, Augsburger JJ, Shields JA. Preretinal arterial loops and retinal arterial occlusion. *Am J Ophthalmol* 1979;87:646–51.
8. Limaye R. Cilioretinal circulation and branch arterial occlusion associated with preretinal arterial loops. *Am J Ophthalmol* 1980;89:834–9.
9. Duke-Elder S. Anomalies of the retinal vessels. In: *System of Ophthalmology*. London: Whitefriars Press, 1963:782–92.
10. Bronner A, Risse JF, Flament J. Boucles vasculaires peripapillaires et thrombose de la veine centrale de la retina. *Otolaryngol Neural Ophthalmol* 1976;48:249–56.
11. Primrose J. Triple branching of retinal blood vessel. *Br J Ophthalmol* 1960;44:246–7.