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Case report

Purtscher-like retinopathy associated with cerebro- or cardiovascular surgery

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ABSTRACT

Purpose: To report the findings in five patients of Purtscher-like retinopathy that developed after cerebro- or cardiovascular surgeries.

Observations: Three women and two men with a mean age of 56.6 years were studied. They had had cerebro- or cardiovascular disease that was treated by major vascular surgery. Postoperatively, all of the patients developed multiple patches of retinal whitening in the area corresponding to the radial peripapillary capillaries in the posterior pole of the eye uni- or bilaterally. In two patients, the optic nerve head was involved which affected their vision severely. Hematological examinations showed hypercoagulable state after the surgeries. The retinal pathologies abated with time.

Conclusions and importance: These results indicate that major cardio- or cerebrovascular surgeries can cause Purtscher-like retinopathy. The hypercoagulable state and specific structures of the radial peripapillary capillaries may play a role in pathogenesis of this disease.

1. Introduction

Purtscher described a retinopathy associated with non-ocular compression injuries which is now called Purtscher retinopathy. It is characterized by ophthalmoscopic alterations of the ocular fundus including a whitening of the inner retina, retinal hemorrhages, and dilated retinal veins.[1,2]

When the retinal findings resembling Purtscher retinopathy occur in the absence of trauma, the condition is called Purtscher-like retinopathy. Purtscher-like retinopathy has been reported to occur in several pathologic conditions and after different medical disorders and interventions including acute pancreatitis, collagen diseases, renal failure, childbirth, retrobulbar anesthesia, and periorbital injections.[3–10]

We have had five patients with Purtscher-like retinopathy which developed following major cerebro- or cardiovascular surgeries. We report the clinical characteristics of the five patients.

2. Findings

The demographic findings of the five patients with Purtscher-like retinopathy are summarized in Table 1. Three women and two men whose age ranged from 48 to 66 years with a mean of 56.6 ± 9.2 (± standard deviation) were studied. They had medical histories including hypertension, diabetes, brain infarction, and hyperlipidemia. The vascular diseases included acute aortic dissection, atrial thrombus, and cerebral aneurysm, and they had been promptly treated by surgical interventions. Despite anticoagulant therapy following the surgeries, most of the patients developed a hypercoagulable state.

Patient 1 presented to us complaining of an acute reduction of the size of his visual fields of both eyes that had started on day 6 after artificial blood vessel replacement surgery for an acute aortic dissection. The best-corrected visual acuity (BCVA) was 1.0 OU. Multiple superficial patches of retinal whitening were seen in the peripapillary area of the ocular fundus bilaterally (Fig. 1A and B). Thrombin-antithrombin III (TAT) complex and alpha2-plasmin inhibitor-plasmin complex (PIC) were abnormally increased after the surgery suggesting a hypercoagulable state (Table 1). The white patches were not detected 4 months after the initial examination but the nerve fiber layer defects could be seen (Fig. 1C and D).

Patient 2 visited us 16 days after surgery for the removal of a left atrial thrombus for a regular checkup for her diabetic retinopathy. She did not have any visual symptoms, and her BCVA was 20/20 OU. Ophthalmoscopy showed multiple whitening in the posterior pole of the retina bilaterally (Fig. 2A and B), which was not detected 1 month after the initial visit (Fig. 2C and D). Activated partial thromboplastin time (APPT) was abnormally short in the blood examination after the surgery (Table 1).

Patient 3 was referred to us complaining of decreased vision one day

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Table 1
Demographic findings of five patients with Purtscher-like retinopathy.

No	Age	Sex	Medical history	Vascular disease	Surgery	Blood clotting function
1	47	M	hypertension	acute aortic dissection	artificial blood vessel replacement surgery	TAT 6.6 (< 3.0 ng/ml) PIC 0.93 (< 0.8 μg/ml)
2	48	F	hypertension, diabetes	left atrial thrombus	thrombus removal surgery	APTT 18.2 (25–36 sec)
3	57	F	uterine fibroid	cerebral aneurysm	pipeline embolization	PT activity 145 (80–125%)
4	63	M	old brain infarction	acute aortic dissection	artificial blood vessel replacement surgery	Fibrinogen 805 (150–400 mg/dl)
5	66	F	hyperlipidemia	cerebral aneurysm	endovascular coiling	not available

APTT, activated partial thromboplastin time; PIC, alpha2-plasmin inhibitor-plasmin complex; PT activity, prothrombin activity; TAT, thrombin-antithrombin III complex.
Parentheses indicate normal ranges.

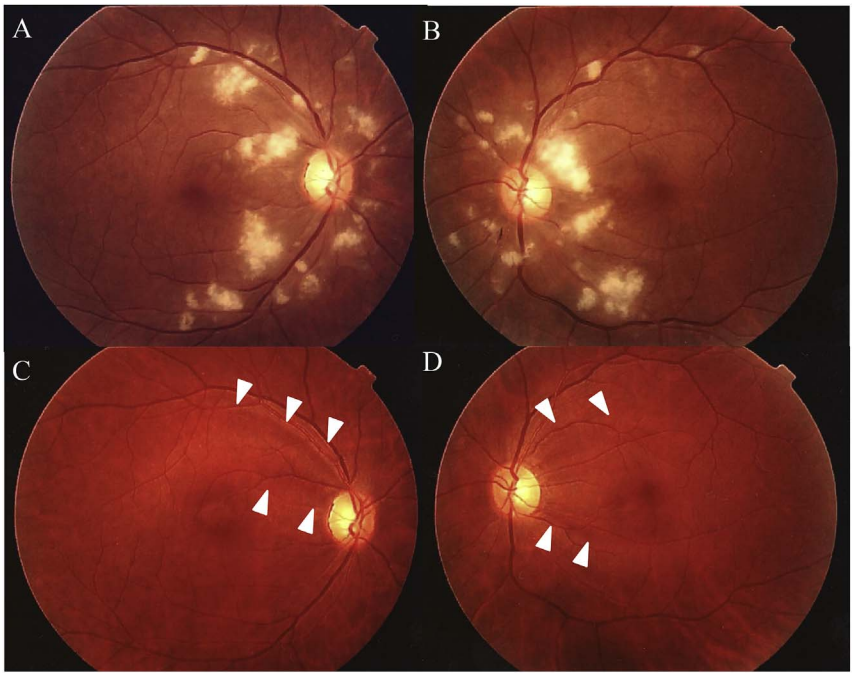

Fig. 1. Fundus photographs of Patient 1 showing many patches of retinal whitening around the optic nerve head and vascular arcades bilaterally at the initial visit (A and B). The white patches are not present at 4 months after the initial visit but defects of the nerve fiber layer are present (arrowheads, C and D).

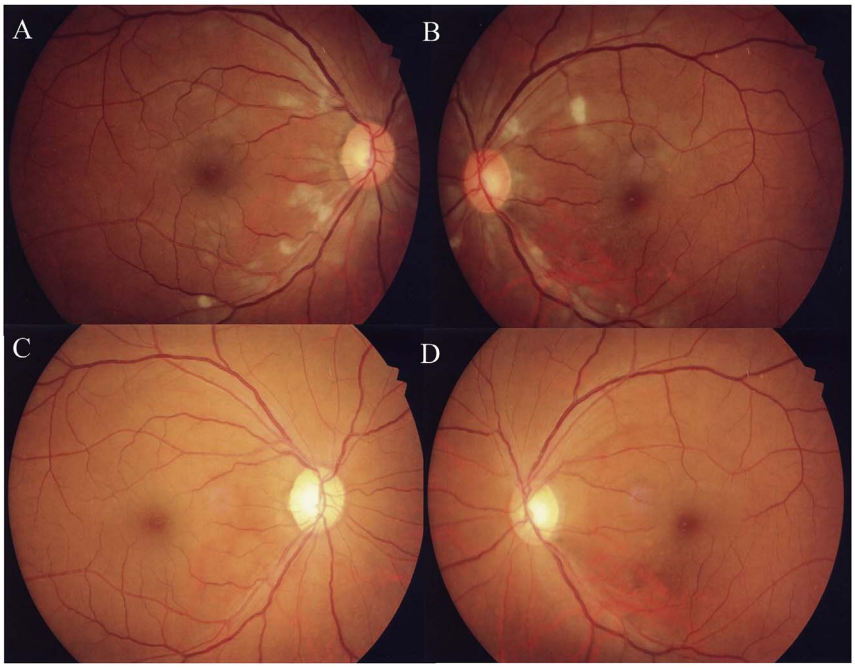

Fig. 2. Fundus photographs of Patient 2 showing many patches of retinal whitening around the optic nerve head and vascular arcades bilaterally at the initial visit (A and B). The white patches are not present at 1 month after the initial examination (C and D).

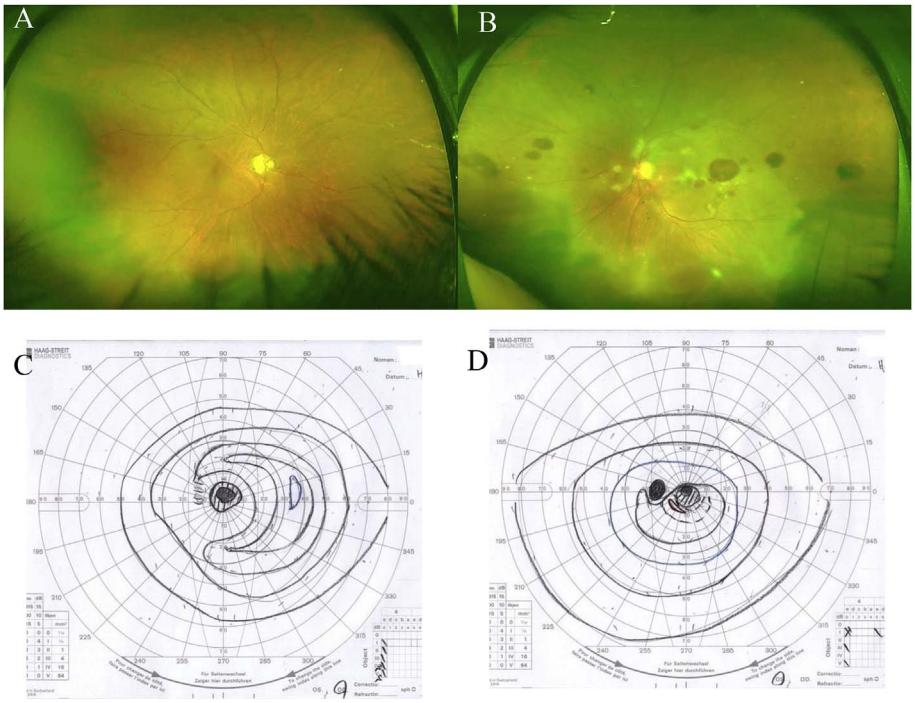

Fig. 3. Fundus images of Patient 3 obtained by scanning laser ophthalmoscope showing multiple patches of retinal whitening and preretinal hemorrhages in the left eye at the initial visit (A and B). Bilateral central scotomas are detected by kinetic perimetry (C and D).

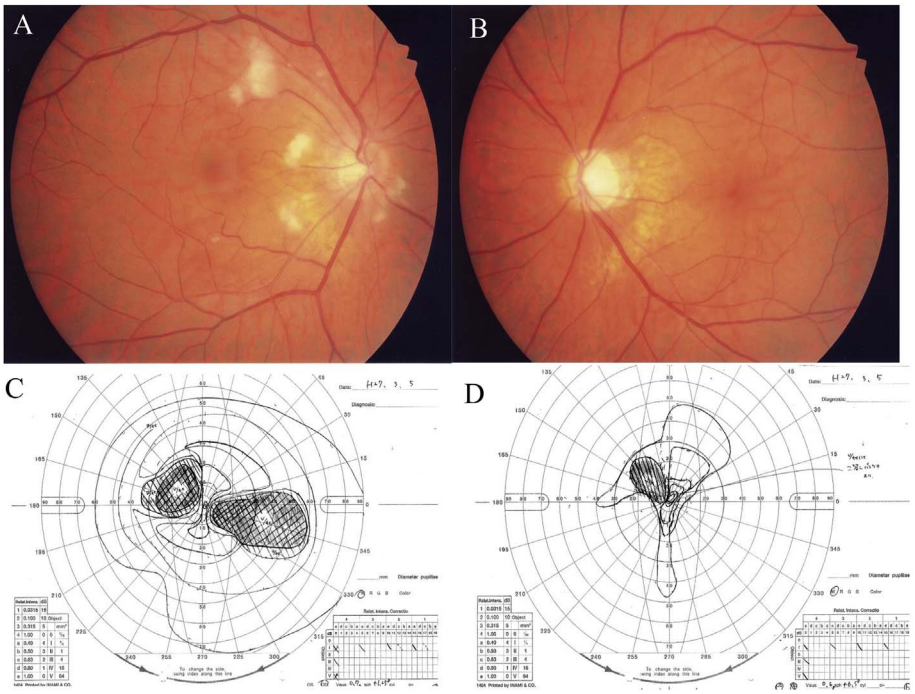

Fig. 4. Fundus photographs of Patient 4 showing many patches of retinal whitening around the optic nerve head in the right eye at the initial visit (A). The optic nerve head of the left eye appears pale (B). Paracentral scotomas are present bilaterally at 3 months after the initial visit (C and D). The left visual field was severely constricted.

after a pipeline embolization procedure for a cerebral aneurysm, visual field defects in the left eye, and diplopia. She was diagnosed with left oculomotor nerve palsy because of limited eye movements except for adduction, blepharoptosis, and dilated left pupil. The photographs of the fundus obtained by a wide-viewing scanning laser ophthalmoscope showed many retinal whitening and pre-retinal hemorrhages in the left eye (Fig. 3B). The optic nerve head of both eyes appeared pale. The BCVA was reduced to 20/1000 OD and 20/400 OS. Kinetic perimetry showed a central scotoma in both eyes (Fig. 3C and D). The prothrombin (PT) activity was increased to 145% beyond the normal range (Table 1). The vision recovered to 20/500 OD and 20/100 OS at 1 month after the initial visit.

Patient 4 complained of decreased vision in both eyes one day after artificial blood vessel replacement surgery for an acute aortic dissection. The BCVA was decrease to 20/300 OD and 20/200 OS. Ophthalmoscopic examination revealed many retinal whitening patches in the posterior pole (Fig. 4A). The optic nerve head of the left eye appeared pale (Fig. 4B). Blood examinations demonstrated an abnormal increase in the level of fibrinogen (Table 1). The inner retinal whitening disappeared with restoration of vision to 20/20 OD and 20/25 OS at 3 months after the initial visit. Kinetic perimetry showed paracentral scotomas in both eyes at that time (Fig. 4C and D). The left visual field was severely constricted (Fig. 4D).

Patient 5 visited us complaining of blurred vision in the left eye

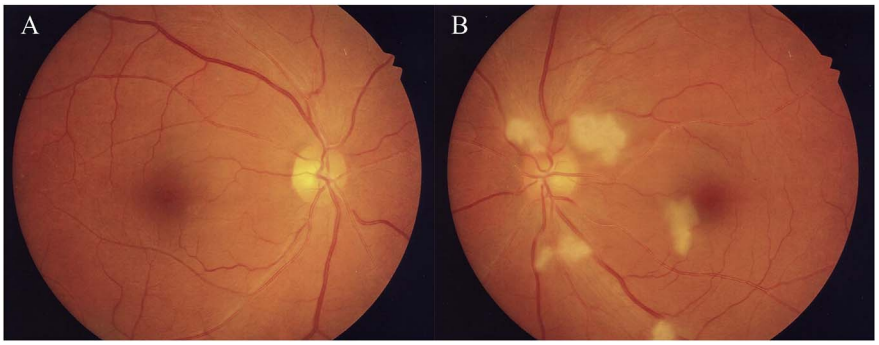

Fig. 5. Fundus photographs of Patient 5 showing retinal arteriolarsclerosis in both eyes and multiple patches of retinal whitening around the optic nerve head and macula of the left eye (A and B).

which developed 3 days after endovascular coiling surgery for a cerebral aneurysm. The BCVA was 20/16 OU. Ophthalmoscopy showed many patches of whitening of the retina in the posterior pole of the left eye (Fig. 5B) and sclerotic retinal arterioles in both eyes (Fig. 5A and B). The white patches started to be resolved 1 month later.

3. Discussion

Our results showed that Purtscher-like retinopathy developed in 5 cases following major cerebro- or cardiovascular surgery, and the ocular alterations and visual symptoms and signs subsided during the follow-up period. In all of our cases except for Patient 5, blood examination suggested a hypercoagulable state. Because coagulopathy is one of the complications that develop during and after vascular surgery, antithrombotic strategies are important issues.[11] The hypercoagulability may have caused occlusions of the retinal capillaries which resulted in the retinal whitening and bleeding. The retinal whitening was located exclusively around the optic nerve head and vascular arcades where the radial peripapillary capillaries nourish the inner parts of the nerve fiber layer.[12] Henkind found that the radial peripapillary capillaries rarely anastomose with each other[12] which could explain why this region was predominately affected by the retinal infarctions.

All of the patients had medical histories of vascular disease including hypertension, diabetes, hyperlipidemia, and brain infarction that could cause arteriosclerosis. In fact, Patient 5 had signs of retinal arteriosclerosis. These pre-existing diseases may have affected the microvasculature in the retina predisposing the patients to develop Purtscher-like retinopathy after the major vascular surgery.

In some cases, such as Patients 3 and 4, the optic nerve heads appeared pale at the first visit, and visual field defects were seen even though retinal whitening was not seen in the funduscopic examinations. This suggested that the circulation of the optic nerve was also affected. In these patients, recovery of the vision was limited indicating that the involvement of the optic nerve is an important prognostic factor for determining visual recovery.

This is not the first case series that suggested a relationship between cardiovascular disease and Purtscher-like retinopathy. Katayama et al.[10] examined the ocular fundus of patients with acute myocardiac infarction treated with reperfusion therapy and found transient funduscopic findings resembling Purtscher-like retinopathy. This suggests that even minimal surgical intervention or cardiovascular disease alone can give rise to microinfarction in the ocular fundus.

Patient 2 did not complain of any visual symptoms indicating that non-symptomatic cases of Purtscher-like retinopathy exist. This suggests that ocular examinations are recommended after cardio- or cerebrovascular surgery even in the absence of visual symptoms and signs.

One of limitations of our case series is that we have included patients following various surgical procedures. The clinical presentations and incidence of Purtscher-like retinopathy may vary depending on degrees of surgical invasion. To examine this in more detail, we need prospective studies examining the ocular fundus of large numbers of patients following cerebro- or cardiovascular surgery.

4. Conclusions

Our results indicate that cerebro- or cardiovascular surgery can give rise to Purtscher-like retinopathy. Therefore, ocular examinations are recommended after these surgeries even though patients do not complain of any visual symptoms. Specific anatomical structure of the retinal peripapillary capillaries and hypercoagulable state may play important roles in the pathogenesis of this disease.

4.1. Patient consent

Informed consent was obtained in writing from all patients for the use of their information in this manuscript. Institutional Review Board of Dokkyo Medical University Koshigaya Hospital approved this case report (protocol #1671).

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Conflicts of interest

The following authors have no financial disclosure: EO, SM, TN and MS.

Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

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