Ocular complications of type 2 membranoproliferative glomerulonephritis

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Woman with metamorphopsia and blurred vision: Case report 1

In 1978 we examined a 35-year-old patient with chronic glomerulonephritis, partial lipodystrophy, and arterial hypertension. Her visual acuity was 20/20 in the right eye, and counting fingers in the left eye, which was amblyopic and had a prepupillary corneal scar. There were no retinal vascular abnormalities, but we noticed pigmenary changes and drusen (small round deposits beneath the retinal pigment epithelium). Fluorescein angiography confirmed the ophthalmoscopic findings of numerous small and large drusen and mild atrophic changes in the macula and in the periphery (Figure 1).

These abnormalities are generally observed in the elderly and are known to predispose to age-related maculopathy. In view of the relatively young age of our patient we assumed that the ocular lesions were caused by the renal disease, or by medication or some other trigger. In this patient proteinuria was detected at the age of 11 years and subsequently chronic glomerulonephritis was diagnosed. Renal biopsies revealed membranoproliferative glomerulonephritis (MPGN) with features of dense deposit disease (Figure 2, 3).

An eye examination in 1989 showed a slight progression of the retinopathy with more advanced atrophic changes. The vision, however, was not affected by the retinopathy up to 1993 when the patient presented...
with complaints of metamorphopsia and blurred vision.

Funduscopy and fluorescein angiography revealed in the right eye an active maculopathy with serous detachment of the retina and small haemorrhages caused by subfoveal choroidal neovascularization (Figure 4a, b). In the left amblyopic eye we observed a macular fibrovascular scar (Figure 4d). No laser treatment was performed. When last examined in January 1995 visual acuity was 20/80 in the right eye and the subretinal membrane was evolving to a fibrovascular lesion similar to the scar of the left eye (Figure 4e). Proteinuria had disappeared and renal function was limited but stable.

**Woman with abrupt loss of vision: Case report 2**

In 1974 we first examined a 26-year-old patient with nephrotic syndrome and chronic glomerulonephritis. She had no visual complaints and the only unusual ocular findings were drusen scattered in the posterior pole of each eye. Her medical history started with haematuria and oedema at the age of 8 years. Since the age of 16 years she had been treated with antihypertensive drugs. Later partial lipodystrophy became apparent. Renal biopsy at the age of 26 years revealed type 2 MPGN, which was treated with indomethacin and cyclophosphamide.

In 1990 we performed a fluorescein angiographic study of all our patients with biopsy-proven dense-deposit disease [1]. She and all other patients with a long history of renal disease displayed numerous small and large drusen and atrophic changes of the retinal pigment epithelium (Figure 5a, b). In contrast to several other patients she had no maculopathy and visual acuity was preserved in both eyes.

In 1994 at the age of 46 years she noticed an abrupt loss of vision of the right eye. Ocular examination revealed a large macular haemorrhage caused by a subretinal neovascular membrane (Figure 5c). The haemorrhage cleared, but a macular fibrovascular scar was left and visual acuity remained poor (Figure 5d). At the present time the changes of the retinal pigment epithelium are progressing slowly in the fellow eye and visual acuity is still 20/25. Renal function, however, is declining and renal transplantation is anticipated.

**Fundus changes in type 2 MPGN**

Type 2 MPGN (dense-deposit disease) is a systemic disease of unknown origin affecting mainly the glomerular basement membrane and the complex of choriocapillaris, Bruch’s membrane and retinal pigment epithelium. Electron-dense deposits are characteristically observed within the lamina densa of the glomerular basement membrane, and have been described in Bruch’s membrane and choriocapillaris by Duvall-Young and co-workers, who also made the first clinical reports of fundus changes with drusen-like deposits and mottled pigmentation [2,3]. Dense deposits are also found in the basement membranes of Bowman’s capsule, of the tubules, and of the spleen. The renal disease frequently shows a progressive course, with onset usually occurring in childhood. Type II MPGN almost invariably recurs morphologically in renal allografts. Other clinical features of type 2 MPGN include chronic hypocomplementemia with increased susceptibility for infections, partial lipodystrophy, and a higher incidence of diabetes mellitus.

Drusen and retinal pigment epithelium damage have been recognized as a feature of type 2 MPGN [1,3,4]. Mild changes are more easily detected with fluorescein angiography [1,5]. We performed fluorescein angiographies in 26 patients who had biopsy-proven type 2 MPGN and identified specific fundus lesions in 24 patients (92%) [6,7]. Only two adolescents with a history of renal disease of 13 months and 2 months had normal fundi. Small-sized drusen were observed in all 24 patients with a history of renal disease lasting for 16 months or more [6,7]. We have been able to demonstrate that early fundus changes are present in children and adolescents with type 2 MPGN [5]. In all 15 subjects with a history of renal disease of at
least 12 years, we noticed also larger drusen [6,7]. In all 11 patients with renal disease persisting for 18 years or more, drusen occupied most of the fundus and areas of geographic atrophy were seen as well [6,7]. Foci of choroidal neovascularization and fibrovascular scars were observed in six patients and this complication was bilateral in three patients [6–8]. The age of the patients at detection of the maculopathy was 25–50 years, mean 35 years; they all had renal problems for 15 years or more. Early detection of extrafoveal choroidal neovascularization and prompt treatment with laser may prevent further visual loss [8]. Most eyes that did not show choroidal neovascularization had normal or nearly normal vision and visual fields. Three patients, however, exhibited ocular symptoms, which were related to pronounced macular atrophic changes, hypertensive retinopathy, and cataracts [6]. The type of fundus lesions was statistically correlated \( P<0.0001 \) with the duration of the renal disease, but not with age, sex, or renal insufficiency [6]. Fundus changes between first and last visit as well as cross-sectional studies suggest a slow progression of retinal disease, which is probably independent of medical treatment and age of the patient [6,9]. The characteristic fundus abnormalities associated with type 2 MPGN were not observed in patients with other types of glomerular disease [4,6,10].

**Teaching point**

Drusen in the ocular fundus are a feature of type 2 MPGN. The identification of drusen in relatively young patients with chronic glomerulonephritis contributes to the diagnosis of dense deposit disease. The ocular changes associated with type 2 MPGN are a phenocopy of age-related degeneration, and in both conditions choroidal neovascularization may occur, and cause severe visual loss. Fluorescein angiography enables a more detailed analysis of the retinal pigment epithelial changes and is essential for the detection of mild lesions and for the identification of choroidal membranes. Patients with type 2 MPGN should have examinations of the ocular fundus on a regular basis,
Fig. 5. Case 2. Colour photograph (a) and fluorescein angiography (b) of the right eye at the age of 42 years: many drusen and atrophic changes of the retinal pigment epithelium. Four years later choroidal neovascularization induced a macular haemorrhage (c). Subsequently a fibrovascular scar became apparent (d).

and the follow-up should be conducted by an ophthalmologist who is aware of the presence of dense deposit disease and the inherent risk of choroidal neovascularization.

References


