

## Ocular findings in a case of haemoglobin H disease

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**SUMMARY** A case is reported of a patient with known haemoglobin H disease who was found to have angioid streaks and retinal detachment. Angioid streaks have not previously been reported in cases of  $\alpha$ -thalassaemia, and the question whether this is a chance association or otherwise is discussed.

Angioid streaks, first described by Doyne (1889), appear on ophthalmoscopic examination as reddish brown or greyish striations, which usually form a network around the optic disc and radiate outwards. They may be single or multiple, are predominantly bilateral, but usually asymmetrical in the 2 eyes. Angioid streaks have been reported in association with certain systemic diseases, notably pseudoxanthoma elasticum (PXE) and osteitis deformans (Paget's disease) (Paton, 1972). They have also been reported in association with abnormal haemoglobins, particularly homozygous sickle cell anaemia (Condon and Serjeant, 1976). Angioid streaks do not appear to have been recorded in association with any variety of  $\alpha$ -thalassaemia.

This report describes a patient with haemoglobin H disease (HbH), an  $\alpha$ -thalassaemia, who was found to have angioid streaks and a retinal detachment.

### Case report

A 44-year-old Greek Cypriot was diagnosed as having HbH in 1968. Recurrent leg ulceration had led to several hospital admissions, the last being in 1976, when initial ophthalmoscopic examination was undertaken. Since childhood the patient had had a squint and poor vision in the left eye, but gave no history of trauma to either eye. He smoked between 20 and 40 cigarettes per day. The family history was not significant. His 3 children did not have HbH. On examination there were 3 ulcers on the right leg and some scarring over the left leg. Mild clubbing of the fingers and toes was also present. Liver and spleen were not enlarged. There were no dermatological stigmata of pseudoxanthoma elasticum, and skin biopsy was normal.

Examination of the eye revealed moderate scleral icterus, a left divergent squint, and visual acuities of 6/5 right eye and 2/60 left eye. The fundus of the right eye showed an angioid streak running from the optic disc towards the macula. The divergent left eye had a long-standing inferior half retinal detachment, in which only a small segment of flat retina was detected. The left fundus also showed considerable vitreous disorganisation and peripheral retinal degenerative changes, but no angioid streaks were seen. The peripheral retinal vessels in the left eye appeared normal in the upper half of the fundus, while those in the lower half appeared attenuated. No proliferative vascular lesions were noted.

Fluorescein angiography of the retina demonstrated the typical late hyperfluorescence of angioid streaks in the right eye. In addition to the angioid streak seen at ophthalmoscopy, fluorescein angiography also revealed 3 small streaks radiating superiorly from the upper border of the optic disc (Fig. 1).

Laboratory results were as follows: haemoglobin 9.5 g/dl, reticulocyte count 3.8%, normal white blood cell morphology, but red cells showed marked anisocytosis, poikilocytosis, target cells, and gross hypochromasia. Supravital staining with brilliant cresyl blue showed that all red cells contained numerous H bodies. HbH was confirmed on electrophoresis and comprised 23.5% of total haemoglobin, while carboxyhaemoglobin comprised 7.4% of total haemoglobin. Plasma bilirubin was raised at 40  $\mu$ mol/l.

Follow-up in May 1979 did not reveal any progression of the angioid streaks or change in visual acuity.

### Discussion

The above case records the association of angioid streaks in HbH, an  $\alpha$ -thalassaemia. Though they

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Fig. 1 Fluorescein angiogram of the right retina showing the typical hyperfluorescence of angioid streaks radiating from the optic disc (on the right) to the macula (on the left), and from the optic disc upwards.

were detected in only one eye, their presence in the other eye cannot be excluded, since adequate examination was hindered by the retinal detachment. Detachment of the retina has been observed in association with angioid streaks, often beginning at the site where several streaks intersect (Archer and Logan, 1977). However, in this patient no angioid streaks were evident in the left eye. Retinal detachment has been seen in sickle cell haemoglobin C disease (HbSC) (Goldberg, 1971), almost invariably in association with a proliferative vascular retinopathy and the pathognomonic 'sea-fan' lesion. Neither the sea-fan lesion nor proliferative vascular changes were seen in this patient, and though one may postulate other mechanisms—for example, retinal ischaemia—the cause of the retinal detachment is not evident. Other nonophthalmological features of this case are the absence of splenomegaly and the presence of leg ulcers. The latter have been described and discussed elsewhere (Daneshmend and Peachey, 1978).

Haemoglobinopathies in which ocular involvement has been reported include homozygous sickle cell anaemia (HbSS) (Goodman *et al.*, 1957; Condon and Serjeant, 1976), sickle cell trait (HbAS) (Gerde, 1974; Radius and Finkelstein, 1976), sickle cell haemoglobin C disease (HbSC) (Goldberg, 1971; Condon and Serjeant, 1972a; Ryan, 1974), sickle cell  $\beta$ -thalassaemia (HbS  $\beta$ -thal) (Goldberg *et al.*, 1971; Condon and Serjeant, 1972b), and haemoglobin C trait (HbAC) (Moschandrea *et al.*, 1974).

Angioid streaks have been noted in association with 4 of the above disorders, namely, HbSS (Geeraets and Guerry, 1960; Condon and Serjeant, 1976), HbAS (Gerde, 1974), HbSC (Condon and Serjeant, 1972a; Nagpal *et al.*, 1976), and HbS  $\beta$ -thalassaemia (Goldberg *et al.*, 1971; Nagpal *et al.*, 1976). Their incidence in association with haemoglobinopathies as a whole has been estimated at 0.94% (Paton, 1972). However, the incidence of angioid streaks in association with any particular haemoglobinopathy remains to be clarified. For example, in HbSS Geeraets and Guerry (1960) gave an incidence of 6%, but Nagpal *et al.* (1976) found angioid streaks in less than 2%, whereas Condon and Serjeant (1976) found them in more than 20% of their elderly group of patients.

Only 1 case has been reported of angioid streaks in HbAS (Gerde, 1974). Similarly angioid streaks have been found in only 2 cases each of HbS  $\beta$ -thalassaemia (Goldberg *et al.*, 1971; Nagpal *et al.*, 1976) and HbSC (Condon and Serjeant, 1972a; Nagpal *et al.*, 1976). Angioid streaks have not been reported in pure  $\alpha$ -thalassaemia or any variety of  $\beta$ -thalassaemia.

There is a profusion of unsatisfactory theories to explain the presence of angioid streaks in haemoglobinopathies. An elastic tissue defect was suggested by Geeraets and Guerry (1960), but routine skin biopsies show no evidence of this. Paton (1959) thought that vascular obstruction affecting the choriocapillary circulation may be a causative factor. However, 3 patients who developed posterior ciliary vessel obstruction and subsequent segmental chorioretinal atrophies did not develop angioid streaks (Condon *et al.*, 1973). More recently Paton (1972) has favoured chronic haemolysis leading to iron deposition in Bruch's membrane as a cause of degeneration and angioid streak formation. But patients with haemochromatosis or haemosiderosis have not been noted to have angioid streaks. The association of angioid streaks with a dozen other disorders (Hogan and Heaton, 1973) has not helped to clarify their pathogenesis. Thalassaemias, including HbH, are relatively common in Thailand, but Wasi (personal communication) has not so far noted angioid streaks. Therefore it seems probable that they are an unusually rare finding in HbH.

The importance of angioid streaks as markers of more significant underlying disease has been amply stressed in the past. In view of the secondary phenomena associated with them, namely, retinal haemorrhages and macular lesions (Archer and Logan, 1977), it is suggested that patients with a haemoglobinopathy have fundal examinations as part of their medical care. These observations may uncover the enigmatic aetiology of angioid streaks in diseases

without demonstrable connective tissue abnormalities.

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