epithelial damage which has been transmitted in an autosomal dominant manner with variable expression. Such damage, in fact, may have different clinical manifestations. However, it is possible that both the mother and her husband are carriers of a recessive trait and that the occurrence of unilateral retinitis pigmentosa in the mother is coincidental.

References

1. Noble KG, Carr RE. Pigmented paravenous chorioretinal atrophy. Am J Ophthalmol 1983;96:338–44.
2. Pearlman JT, Heckenlively JR, Bastek JV. Progressive nature of pigmented paravenous chorioretinal atrophy. Am J Ophthalmol 1978;85:215–7.
3. Nucci P, Mannitto MP, Piantanida A, Brancato R. Macular dysplasia and paravenous retino-choroidal atrophy. Ophthalmic Genet 1994;15:161–4.
4. Young WO, Small KW. Pigmented paravenous retinochoroidal atrophy (PPCRA) with optic disc drusen. Ophthalmic Paediatr Genet 1993;14:23–7.
5. Skalka HW. Hereditary pigmented paravenous retinochoroidal atrophy. Am J Ophthalmol 1979;87:286–91.
6. Traboulsi EI, Maumenee IH. Hereditary pigmented paravenous chorioretinal atrophy. Arch Ophthalmol 1986;104:1636–40.
7. Noble KG. Hereditary pigmented paravenous chorioretinal atrophy. Am J Ophthalmol 1989;1108:365–9.

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Sir,

Traumatic hyphaema and sickle cell retinopathy in a patient with sickle cell-haemoglobin E (HbSE) disease

Hyphaema following blunt ocular trauma generally resolves spontaneously and has a good visual prognosis. However, coexisting systemic diseases can adversely affect outcome.[1] We present a young man with sickle cell-haemoglobin E (HbSE) disease who developed multiple episodes of rebleeding, persistent elevation of intraocular pressure (IOP) and sickle cell retinopathy following traumatic hyphaema (TH). Spontaneous and complete reversal of retinal changes was observed on follow-up.

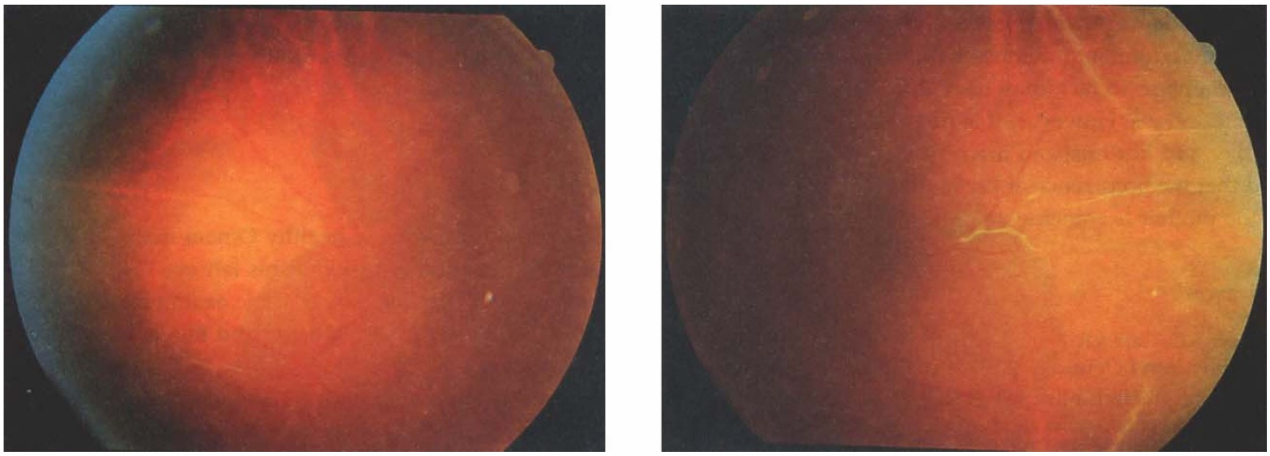
Our case reflects the high risk for complications when hyphaema occurs in sickle cell patients.[2] To our knowledge TH and sickle cell retinopathy have not previously been reported in association with HbSE disease. We emphasise the need for an aggressive therapeutic approach to the management of TH in HbSE disease with careful attention to the ocular and general condition.

Case report

A 23-year-old, previously healthy Omani man, presented with loss of vision in his left eye (LE) following blunt trauma. Ophthalmic examination revealed visual acuity limited to hand movements, a total hyphaema and IOP at 45 mmHg in the LE. The right eye (RE) was normal with a visual acuity of 6/6. The patient was hospitalised, advised strict bed rest in a propped-up position and commenced on acetazolamide (500 mg intravenously, followed by 500 mg q.i.d. orally), topical timolol 0.5% b.i.d. and topical dexamethasone 0.1% q.i.d.

Twenty-four hours later, the hyphaema had resolved and IOP was 28 mmHg. Haemoglobin electrophoresis revealed the presence of sickle cell-haemoglobin E (HbSE) disease (HbS, 66%; HbE, 33.5%; HbF, 0.5%). Fresh bleeding occurred the following day, filling half the anterior chamber, but IOP was normal at 16 mmHg. Due to recurrent bleeding, the hyphaema failed to resolve. Tranexamic acid was commenced on day 11 and subsequently a decrease in the level of the hyphaema to less than one-third of the anterior chamber was noted. However the IOP began to rise and was 40 mmHg on day 16. Attributing the increased IOP to a paradoxical effect of acetazolamide in sickle cell patients,[3] acetazolamide was replaced with oral glycerol initially and with intravenous mannitol later as the patient could not tolerate the former. Use of mannitol resulted in symptoms and signs of dehydration, necessitating its withdrawal. Acetazolamide was reinstated and administered along with intravenous fluids (0.9% dextrose saline with sodium bicarbonate supplements). Surgical intervention was contemplated at this stage but deferred, as control of IOP was achieved within 24 h. The hyphaema cleared up gradually over the next 1 week and patient was discharged after a hospital stay of 4 weeks, on topical timolol 0.5% b.i.d. and topical prednisolone 0.5% t.i.d.

Review 1 week later revealed normal visual acuity and visual fields and angle recession from 12 o'clock to 3 o'clock in the LE. IOP was 16 mmHg RE and 10 mmHg LE. Fundoscopy revealed occluded peripheral retinal vessels bilaterally, more in the LE (Fig. 1). Fluorescein angiography showed hypofluorescent columns in the retinal periphery, confirming peripheral vascular occlusion in the LE (Fig. 2a); no abnormality was observed in the angiograms of the RE. Based on the above, a diagnosis of bilateral sickle cell retinopathy, LE > RE was made. On follow-up, 8 weeks later, fundus examination showed normal retinal vessels in the previously affected area and fluorescein angiography revealed normal retinal filling patterns in both eyes (Fig. 2b).



(a) (b)

Fig. 1. *Photograph of the peripheral fundus of the (a) right eye and (b) left eye showing occluded vessels ('silver wire' arterioles), more in the left eye. Right fundus photograph also shows the long ciliary nerve.*

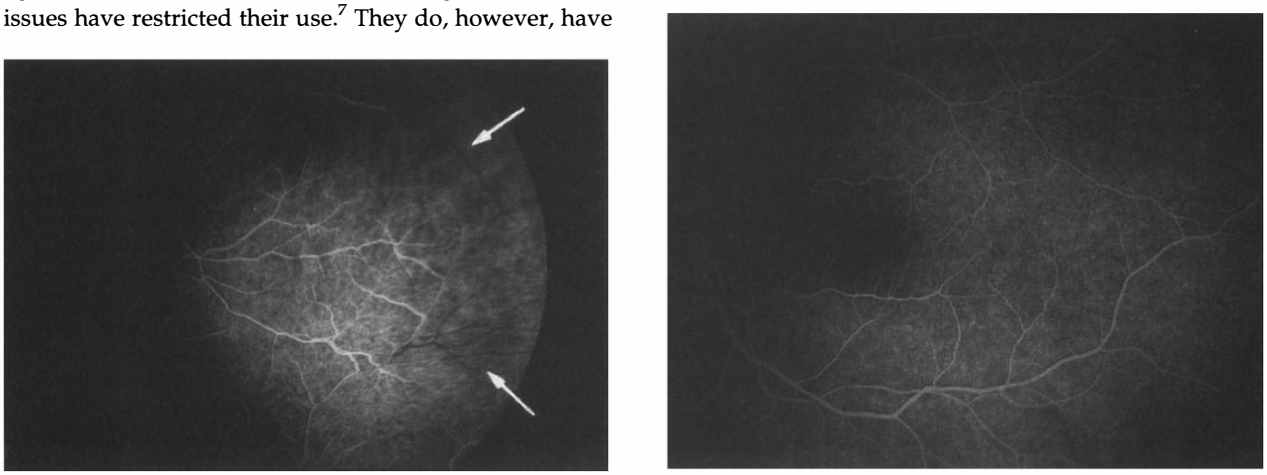
Comment

Haemoglobin E (HbE) is a variant of adult haemoglobin and is found predominantly in the South-East Asian population. Sickle cell-haemoglobin E (HbSE) disease refers to a double heterozygous state where HbE exists in combination with haemoglobin S (HbS).[4] Only isolated cases and small series of patients with HbSE have been reported.[4–6] The disease has a benign clinical course and most patients are asymptomatic with minor haematological changes despite large amounts of HbS in the circulation.[6] However, when patients with HbSE disease present with TH they pose special management problems just as those with other forms of sickle cell haemoglobinopathy (SCH), requiring modifications in therapeutic approach (Table 1). Our case report exemplifies this point.

Rebleeding is a major complication, predisposing to increased IOP and visual impairment.[2] Frequent rebleeding punctuated the course of our patient's illness, causing persistence of hyphaema. After introduction of tranexamic acid, however, the level of blood in the anterior chamber decreased. Although antifibrinolytic agents reduce the incidence of rebleeding, risk-benefit issues have restricted their use.[7] They do, however, have a definite role in patients with SCH, and tranexamic acid is preferable as it is 10 times more potent than aminocaproic acid and has fewer systemic side effects.[8]

Factors that cause elevation of IOP in patients with SCH, even with small amounts of hyphaema, as was seen in our patient, include (a) a propensity for erythrocytes to sickle in the stagnant environment of the anterior chamber[9] and (b) causation of higher and more prolonged elevations in IOP by hyphaemas containing deformed cells compared with those containing normal erythrocytes.[10] To add to the complexity of the situation, medications used to treat IOP elevations can themselves contribute to a pressure rise. Topical adrenaline (by decreasing aqueous oxygen tension) and dorzolamide (by reducing the pH of aqueous), systemic acetazolamide (by causing local as well as systemic acidosis) and hyperosmotic agents (by producing haemoconcentration) can all induce sickling.[3]

Moderate elevations in IOP may cause sight-threatening complications in sickle cell patients by decreasing perfusion pressure and inducing sickling of erythrocytes within vessels of the optic nerve and retina.[4,11] Elevated IOP therefore calls for intensive



(a) (b)

Fig. 2. *Fundus fluorescein angiograms of the left eye. (a) Initial study showing peripheral vascular occlusions (arrows). A hypofluorescent column beyond the vessels suggests a recent event. (b) Repeat study 8 weeks later showing a normal retinal vascular filling pattern.*

Table 1. *Suggested protocol for management of traumatic hyphaema in patients with sickle cell haemoglobinopathy*

- Hospitalise all patients
- Order bed rest in propped-up position
- Sedate the patient if he or she is apprehensive
- Perform investigations: full blood count, haemoglobin electrophoresis, coagulation profile and serum electrolytes
- Check level of hyphaema and intraocular pressure (IOP) daily
- Administer tranexamic acid 25 mg/kg 8 hourly orally for 5 days
- Commence topical steroids
- Commence topical beta-blocker if IOP > 24 mmHg
  Add, if required: methazolamide, hyperosmotic agents (monitoring fluid and electrolyte status)
- Consider intravenous fluids ± sodium bicarbonate
- Consider anterior chamber washout if IOP > 35 mmHg persists > 24 h

medical therapy. Methazolamide is preferred to acetazolamide as it increases aqueous humour pH and does not produce significant systemic acidosis.[3] If IOP remains persistently elevated, the role of medications in inducing this complication needs evaluation. We were compelled to use acetazolamide in our patient but were able to circumvent side effects by administering it along with intravenous fluids and sodium bicarbonate.

Surgical intervention is generally considered if an IOP of 50 mmHg or more persists for more than 4 days. However, in patients with SCH, evacuation of the hyphaema is recommended if IOP > 35 mmHg persists for more than 24 h.[1]

Central retinal artery occlusion[11] and peripheral retinal vascular occlusion[12] have occurred in sickle cell patients, due to high IOP following TH. Occluded peripheral vessels (non-proliferative sickle cell retinopathy) in patients with SCH usually manifest as 'silver wire' or chalky white arterioles, and these were seen in our patient. True sheathing of vessels is, however, considered to be rare.[13] Initial fluorescein angiograms of our patient showed the occluded vessels continuing as hypofluorescent linear columns. This feature signifies a recent occlusive event with a potential for reperfusion.[14] A subsequent angiogram, 8 weeks later, showed reperfusion of the previously affected area.

It is most likely that the bilateral retinal changes in our patient resulted from the dehydration and haemoconcentration induced by glycerol and mannitol. Greater involvement of the LE could be attributed to elevated IOP caused by the hyphaema. Retinopathy in sickle cell disease (HbSS), sickle cell-haemoglobin C (HbSC) disease and sickle cell thalassaemia have been extensively studied. Transient occlusions of peripheral retinal arterioles were observed in patients with HbSS and HbSC disease in the Jamaica Sickle Cohort Study.[14] Whether our patient had a similar, coincidental retinal vascular occlusion is debatable. To our knowledge, sickle cell retinopathy has never been documented in HbSE disease. Further, unlike patients with homozygous sickle cell disease, those with heterozygous SCH develop vaso-occlusion either in conjunction with a precipitating event or in the presence of coexistent systemic diseases such as diabetes or hypertension.[12,13] Our patient had a mild form of sickle cell disease (HbSE), was otherwise healthy and did not have any manifestations of vaso-occlusive disease prior to the onset of the present illness. In the absence of any precipitating factor other than trauma, we attribute the retinopathy to the raised IOP after TH and osmotically induced hyperviscosity.

To summarise, we have presented the case of a young adult with HbSE disease and TH who developed repeated bleeds into the anterior chamber, elevated IOP and bilateral reversible sickle cell retinopathy. The need for energetic therapy of the hyphaema in such patients is stressed, highlighting various underlying factors that can interact and adversely affect outcome.

References

1. Crouch ER, Williams PB. Trauma: ruptures and bleeding. In: Tasman W, Jaeger EA, editors. Duane's clinical ophthalmology. Philadelphia: JB Lippincott, 1993:1–22.
2. Nasrullah A, Kerr NC. Sickle cell trait as a risk factor for secondary haemorrhage in children with traumatic hyphaema. Am J Ophthalmol 1997;123:783–90.
3. Zimmerman TJ, Kooner KS, Sharir M, Fechtner R. Textbook of ocular pharmacology. Philadelphia: Lippincott-Raven, 1997.
4. Serjeant GR. Sickle cell disease. Oxford: Oxford University Press, 1992.
5. Vishwanathan C, Agarwal MB, Bichille LS, Bhave AB. Double heterozygosity for hemoglobin S and E. Indian Pediatr 1992;29:895–7.
6. Bird AR, Wood F, Liesegang F, Mathew CG, Ellis P, Hartley PS, et al. Hemoglobin E variants: a clinical, hematological and biosynthetic study of 4 South African families. Acta Haematol 1984;72:135–7.
7. Crouch ER Jr, Frenkel M. Aminocaproic acid in the treatment of traumatic hyphaema. Am J Ophthalmol 1976;81:355–60.
8. Deans R, Noel LP, Clarke WN. Oral administration of tranexamic acid in the management of traumatic hyphema in children. Can J Ophthalmol 1992;27:181–3.
9. Goldberg MF, Dizon R, Raichand M. Sickled erythrocytes, hyphema and secondary glaucoma. II. Injected sickle erythrocytes into human, monkey and guinea pig anterior chambers, the induction of sickling and secondary glaucoma. Ophthalmic Surg 1979;10:32–51.
10. Goldberg MF, Dizon R, Raichand M, Goldbaum M, Jampol LM. Sickled erythrocytes, hyphema and secondary glaucoma. III. Effects of sickle cell and normal human blood sample in rabbit anterior chambers. Ophthalmic Surg 1979;10:52–61.
11. Wax MB, Ridley ME, Margaral LE. Reversal of retinal and optic disc ischemia in a patient with sickle cell trait and glaucoma secondary to traumatic hyphema. Ophthalmology 1982;89:845–51.
12. Jackson H, Bentley CR, Hingorani M, Aclimandos WA, Thompson GM. Sickle cell retinopathy in patients with sickle trait. Eye 1995;9:589–93.
13. Goldberg MF. Sickle cell retinopathy. In: Tasman W, Jaeger EA, editors. Duane's clinical ophthalmology. Philadelphia: JB Lippincott, 1993:1–45.
14. Penman AD, Talbot JF, Chuang EL, Thomas P, Serjeant GR, Bird AC. New classification of peripheral retinal vascular changes in sickle cell disease. Br J Ophthalmol 1994;78:681–9.

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Sir,

Leukaemia manifesting as uncontrollable proliferative retinopathy in a diabetic

Bilateral proliferative retinopathy in an adult is nearly always due to diabetes mellitus. When the proliferation progresses, even following laser treatment, this suggests that the control of the diabetes is inadequate. We therefore present the following case as a reminder that there are exceptions to every rule and that other disease processes may give a similar clinical picture but require very different management.

Case report

A 61-year-old female insulin-requiring diabetic presented to the Eye Casualty Department with a 1 month history of blurred vision. She had been diagnosed as diabetic 10 years previously, and had required insulin for the last 5 years. Previously she had been monitored for ocular hypertension and 1 year prior to presentation she had been noted to have visual acuity (VA) of 6/5 right, 6/9 left and no significant retinopathy.

On presentation she was noted to have VA of 6/18 right, 6/12 left; examination of her fundi showed gross bilateral macular oedema with marked pre-proliferative retinopathy in all quadrants of both eyes. It was noted that she was normotensive and had recently managed to stop smoking. Her haemoglobin a1c (Hb_{a1c}) was elevated at 12.5%. She was receiving joint diabetic care from the diabetic physicians and her general practitioner. She was encouraged to improve her diabetic control and lost 13 kg over the following 6 months.

She received bilateral grid laser photocoagulation followed 1 month later by bilateral panretinal photocoagulation (PRP). Eight weeks later she had developed proliferative retinopathy in both eyes and received further PRP. Three weeks later, whilst on holiday elsewhere, she developed pain and photophobia. She was noted by a local eye unit to have rubeosis iridis with a left hyphaema, bilateral uveitis and raised intraocular pressures. The pressure rise and iritis were treated medically. Further PRP was recommended for which the patient elected to return home.

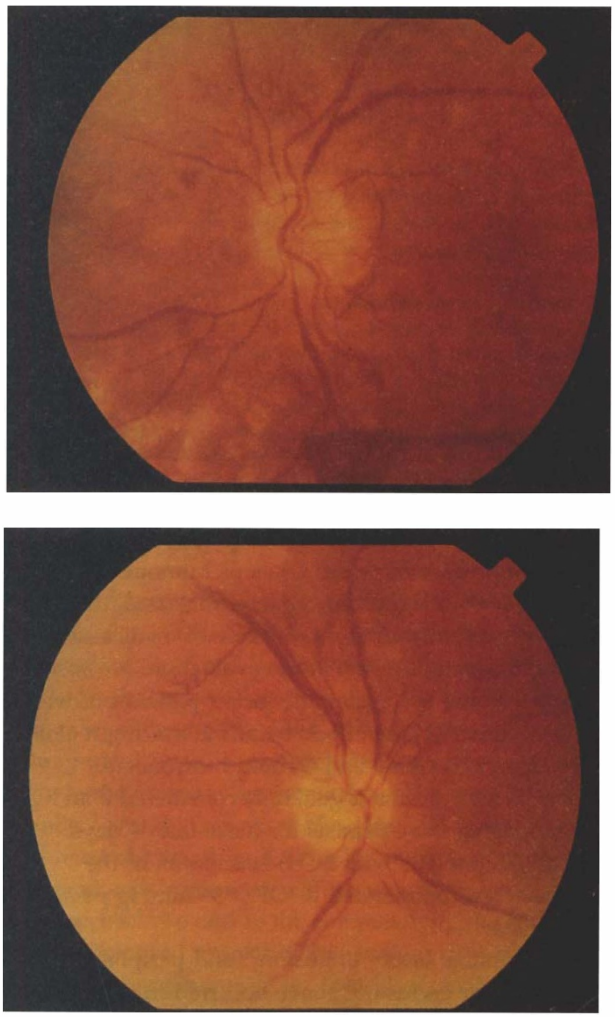

Fig. 1. *Fundus photographs demonstrating bilateral proliferative retinopathy.*

Twelve weeks later she was admitted under the care of the general surgeons with abdominal pain and was found to have splenomegaly and pleural effusions. A full blood count (FBC) showed haemoglobin 83 g/l, white cell count 243 10^9/l and platelets 543 10^9/l. Bone marrow aspirate and trephine biopsy were performed and the diagnosis of chronic myeloid leukaemia (CML) was confirmed by the detection of the Philadelphia chromosome. Hydroxyurea was commenced bringing about a reduction in her white cell count and regression of the pleural effusions.

The proliferative retinopathy responded to the combination of chemotherapy and the previous PRP. The vision continued to fall to a level of 6/18 right, 6/60 left, as a consequence of ischaemic maculopathy.

Comment

This patient progressed from background to proliferative retinopathy over a period of 1 year.

This was felt to be due to her poor diabetic control (Hb_{a1c} 12.5%) and that her subsequent weight loss was due to her tightening her diabetic control. It is likely, however,