abnormalities together with bilateral symmetrical branch retinal artery occlusions involving the maculae (Figure 1). There were no obvious carotid bruits, cardiac murmurs or neurological deficits. There was no evidence of endarteritic vaso-obliteration either at a retinal or systemic level.

All serological investigations were within normal limits. Fundus fluorescein angiography shows symmetrical occluded vessels (Figure 2). Carotid doppler studies revealed minor isolated atheromatous plaques in the right external carotid artery and in the bulb of the left internal carotid artery only, other areas of both carotid vessels being clear. An echocardiogram revealed no abnormalities.

## DISCUSSION

Branch retinal artery occlusion is most commonly caused by emboli. Carotid artery disease, hypertension and smoking are factors that predispose to embolic phenomena and were all present in this patient.

Bilateral branch retinal artery occlusions have been reported[1]. Symmetrical branch retinal artery occlusions suggest a possible predisposition in this patient's retinal vascular pattern.

Occlusions within branch retinal arteries crossing the maculae would be expected to cause sudden loss of central vision but this patient was asymptomatic and maintained 6/5 vision unaided in each eye. He only admitted to non-specific, transient 'shadowing' of vision. This strongly implies that the occlusions occurred gradually, preserving central vision with opening of collateral vessels.

## REFERENCE

1 Lusky M, Wysenbeek Y, Weinberger D, Kremer I. Idiopathic bilateral branch-artery occlusion in a young woman. *Ann Ophthalmol* 1989:**21**: 170–2

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# Delayed diagnosis of cystic fibrosis due to normal sweat electrolytes

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**The sweat test, if properly performed, is a reliable tool to assist in the diagnosis of cystic fibrosis. In practice, most errors arise from false positive results[1,2]. This case serves as a reminder that false negatives may also occur.**

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*Table 1* **Sweat tests results**

| Date | Sweat amount (mg) | Chloride (mmol/l) | Sodium (mmol/l) | Potassium (mmol/l) |
|---|---|---|---|---|
| 20.6.91 | 124 | 37 | 26 | 11 |
| 23.8.93 | 120 | 136 | 128 | 40 |
| 25.8.93 | 231 | 105 | 114 | 14 |

## CASE HISTORY

The parents of this patient are first cousins and originate from the Punjab area of Pakistan. Their first child presented with meconium ileus in the neonatal period, and a sweat test at 23 days' age confirmed the diagnosis of cystic fibrosis (CF). DNA analysis was performed but did not identify a recognized CF mutation. The second child, born at term, birthweight 2.98 kg, was screened for CF. The result of whole blood immunoreactive trypsinogen (IRT) taken on the second day of life was 73 μg/l (normal range (NR)<45 μg/l) suggesting CF, and a repeat test at 9 weeks of age was 88 μg/l. However, a sweat test performed at 4.5 months of age (Table 1) gave an unequivocally normal result and no other patient had a sweat test performed on the same day. The infant was thriving and asymptomatic. Accordingly the IRT results were regarded as false positives, and the child was regarded as normal.

Subsequently, it was noted that this child remained small: height, weight and head circumference were below

the third centile. He had no chest or bowel symptoms and his small size was thought to be genetic. He was first noted to have respiratory symptoms at the age of 2½ years. One month later, he was admitted to hospital with cough, fever, breathlessness and a chest radiograph showed hyperexpansion and diffuse shadowing extending from both hila into the lung fields.

A sweat test was performed (see Table 1) and because of the abnormal result, the child was referred to our hospital where a further sweat test result (Table 1) was unequivocally positive. The result of a 3 day faecal fat analysis was 5.1g fat/day (NR<3g fat/day at this age) and two random faecal chymotrypsin levels were 6 U/l and 1 U/l (NR>10 U/l) suggesting pancreatic insufficiency. Although it has not been possible to identify a CF mutation in either child, samples from the family were studied for IVS8CA polymorphism, an intragenic dinucleotide repeat sequence in intron 8 of the CF gene. Both parents had one gene with 16 dinucleotide repeats and one gene with 17 repeats. Both children were homozygous for the gene with 17 dinucleotide repeats, and this DNA analysis has confirmed that both children have inherited the same CF genes from their parents.

## DISCUSSION

A search of the literature has revealed only one case of CF in a child in whom there was an initial unequivocally negative sweat test at 6 weeks and then a clearly positive test when the child was 2½ years of age[3]. This child also had two raised immunoreactive trypsin levels on neonatal screening. The conclusion is that infants affected by CF may have unequivocally negative sweat tests on early testing yet positive sweat tests later on. This has important implications in the further investigation of infants who undergo screening and have high IRT levels. New approaches to DNA analysis, as illustrated above, may help to prevent future misdiagnosis.

## REFERENCES

1 David TJ, Phillips BM. Overdiagnosis of cystic fibrosis. *Lancet* 1982;**ii**:1204–5

2 Schwarz V, Sutcliffe CH, Style PP. Some hazards of the sweat test. *Arch Dis Child* 1968;**43**:695

3 Roberts G, Stanfield M, Black A, Redmond A. Screening for cystic fibrosis: a four year regional experience. *Arch Dis Child* 1988;**63**:1438

*(Accepted 12 April 1994)*