

Sir,  
**Spectral-domain optical coherence tomography of Roth spots in multiple myeloma**

We present a case of Roth spots in multiple myeloma and describe optical coherence tomography (OCT) findings that have not previously been published.

*Case report*

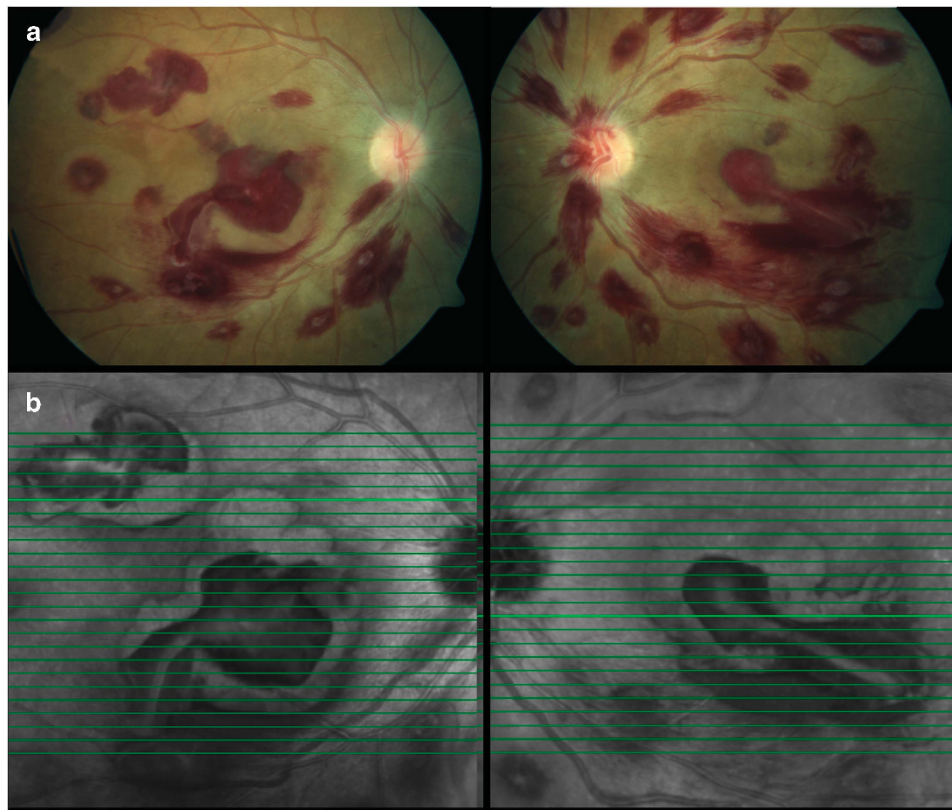
A 42-year-old woman with multiple myeloma presented with 'inability to see faces'. Her best-corrected visual acuity was counting fingers in the right eye and 20/200 in the left eye. Although the anterior segment was unremarkable, fundus examination showed bilateral, white-centered hemorrhages, and subhyaloid hemorrhages in both the maculae (Figure 1a). Spectral-domain OCT (SD-OCT) confirmed the location of the subhyaloid hemorrhage and showed a unique finding of cystic spaces surrounding the hemorrhages, more evident on near infrared images (Figure 1b). The greatest 'shadowing effect' seen centrally on SD-OCT corresponded to the area of the 'white centers' in Roth spots. The SD-OCT also showed small cystic spaces within the outer plexiform layer (Figure 1c, left). Laboratory testing revealed WBC 123.8 (4.5–11.0), RBC 10.7 (4.20–5.40), hematocrit 10.6 (37.0–47.0), and platelet

22 (140–440). Serum creatinine and calcium were within normal.

**Comment**

Multiple myeloma, a neoplastic plasma cell dyscrasia, is considered symptomatic when it causes tissue dysfunction including hypercalcemia, renal insufficiency, anemia, and bone disease.<sup>1</sup> Retinal manifestations include intraretinal and flame-shaped hemorrhages, some of which contain white centers<sup>2</sup> (Roth spots), microaneurysms, signs of hyperviscosity syndrome, and serous/exudative retinal detachment.<sup>3,4</sup> Myeloma-related retinopathy has been significantly related to lower hemoglobin and platelet levels, as in our patient. The Roth spots are commonly seen in subacute bacterial endocarditis, trauma, blood dyscrasias, acute lowering of intraocular pressure, anemia, and anoxic conditions.<sup>5</sup>

The flame-shaped hemorrhages in the nerve fiber and ganglion cell layers correlate with the location as shown in the SD-OCT. The unique finding of large cystic spaces just adjacent and surrounding the subhyaloid hemorrhage suggests the presence of possibly 'serum' in those cystic spaces, which decreases in size as the hemorrhage is resolving (Figure 1d). The SD-OCT also identified cysts in the outer plexiform layer, which have not been reported before. Based on our literature review, this is the first description of Roth spots as visualized



**Figure 1** Color fundus photograph (a) of both eyes (left and right panels) from a patient with multiple myeloma showing intraretinal and subhyaloid hemorrhages with Roth spots; near infrared images (b) in the corresponding areas of both eyes—also showing the section for the SD-OCT images (c) obtained at baseline in both eyes (c) and at 2-weeks follow-up (d) in the right eye only.

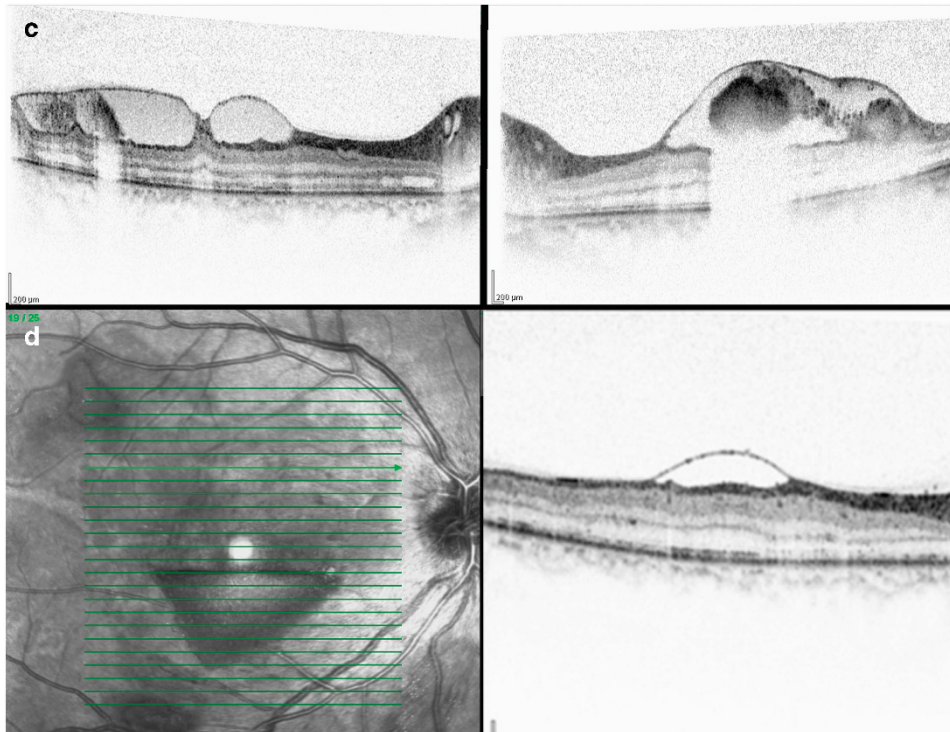


Figure 1 (Continued).

by SD-OCT, providing us more insight into the pathophysiology of the condition and serve as an excellent tool in monitoring these hemorrhages.

#### Conflict of interest

The authors declare no conflict of interest.

#### References

- 1 Palumbo A, Anderson K. Multiple myeloma. *N Engl J Med* 2011; **364**: 1046–1060.
- 2 Holt JM, Gordon-Smith EG. Retinal abnormalities in diseases of the blood. *Brit J Ophthalmol* 1969; **53**: 145–160.
- 3 Knapp AJ, Gartner S, Henkind P. Multiple myeloma and its ocular manifestations. *Surv Ophthalmol* 1987; **31**: 343–351.
- 4 Carr RE, Henkind P. Retinal findings associated with serum hyperviscosity. *Am J Ophthalmol* 1963; **56**: 23–31.
- 5 Pomeranz HD. Roth spots. *Arch Ophthalmol* 2002; **120**(11): 1596.

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#### Sir, Corneal birefringence measurements in normal Indian eyes

Studies investigating the corneal birefringence measurements are largely restricted to Caucasian population.<sup>1–3</sup> We therefore evaluated the corneal birefringence measurements in normal subjects of Indian origin.

#### Case report

In a cross-sectional study, 140 eyes of 73 subjects of Indian origin (37 men and 36 women) underwent corneal birefringence measurements with scanning laser polarimetry (GDxPRO, Carl Zeiss Meditec Inc., Dublin, CA, USA). Inclusion criteria were best-corrected visual acuity of 20/30 or better, spherical refraction within  $\pm 5.0$ D and cylinder correction within  $\pm 2.0$ D. Subjects were excluded if they had any ocular surface, corneal or macular pathology, or a history of previous corneal or intraocular surgery. Measures of corneal birefringence obtained were corneal polarization axis (CPA) and corneal polarization magnitude (CPM).<sup>4</sup> Corneal scans were retaken if the quality score was  $< 8$ . Central corneal thickness was measured using the ultrasound pachymetry.

Table 1 and Figure 1 show the distribution of CPA and CPM. Median CPA was  $3^\circ$  nasally downwards with 85% of the eyes having a CPA value between  $9^\circ$  nasally downwards and  $5^\circ$  nasally upwards. The mean CPM was 96 nm (95% CI: 92.4–99.0). There was a significant