CASE REPORT

Macular pseudohaemorrhage secondary to Allen Dot artefact

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SUMMARY

A 34-year-old highly myopic (−11.00 D) woman presented to eye clinic with a 3 day history of right eye paracentral blurring. Visual acuities were 6/6 bilaterally. Clinical examination was normal. Fundus photography showed the classic appearance of a macular haemorrhage. This is a recognised complication of high myopia and would have accounted for the patient's symptoms. However, further photography showed that the haemorrhage seemed to 'jump' around the fundus and was even present in the fellow eye. The apparent haemorrhage was revealed to be an imaging artefact. The 'Allen Dot' is a 6 mm black mask incorporated into retinal cameras to reduce reflection. Rarely, in highly myopic eyes, optical artefact can result. To the best of our knowledge, we are the first in the literature to report artefacts from the Allen Dot masquerading as ophthalmic disease. This case re-iterates the importance of clinical examination, especially in high myopes, given the current trend towards virtual clinics.

BACKGROUND

Retinal imaging is a crucial tool in the Ophthalmologist's armamentarium. Unprecedented advances in technology together with increasing demand and complexity of care have led to a trend towards virtual clinics, omitting clinical examination.

This report re-iterates the importance of clinical examination. It is paramount that clinicians are aware of the limitations of diagnostic medical devices, to avoid missing disease or, as in this case, the false detection of disease where none exists.

CASE PRESENTATION

A 34-year-old highly myopic (−11.00 D) woman presented to emergency eye clinic with a 3 day history of paracentral blurred vision in the right eye. Her visual

acuities were 6/6 bilaterally. Anterior segment, intraocular pressures, pupillary responses and dilated fundal clinical examination were all normal.

INVESTIGATIONS

The patient was subsequently referred to the retinal clinic for further evaluation, where she was photographed with the Topcon TRC50IX fundus camera (Topcon, Tokyo). The initial photograph (*figure 1A*) showed the classic appearance of a macular coin haemorrhage. This haemorrhage which would have accounted for the patient's symptoms, is a well-recognised complication of high myopia, and occurs due to spontaneous rupture of the retinal pigment epithelium (RPE)-Bruch's membrane (BrM)-Choriocapillaris complex. The patient therefore underwent a fluorescein angiogram (FFA). However, photographs during the FFA showed that the spot seemed to 'jump' around the fundus (*figure 1B*), and was even present in the fellow eye. Retinal examination failed to detect any macular lesions. The external camera lens was clean, and no marks that could account for the artefact were found. Furthermore, none of the other patients who had undergone photography that day had any such artefact.

DIFFERENTIAL DIAGNOSIS

Paracentral scotomas can be caused either by disease of the retina or by optic nerve dysfunction. Potential retinal causes include central serous chorioretinopathy, valsalva retinopathy, chorioretinitis and retinal dystrophies. Optic nerve causes include optic neuritis, glaucoma, compressive neuropathy and nutritional deficiencies.

TREATMENT

No treatment was necessary.

Figure 1 (A) Colour photograph showing a myopic fundus, and suggesting a macular haemorrhage secondary to a lacquer crack. (B) The haemorrhage seems to 'jump' suggesting camera artefact rather than true pathology.

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OUTCOME AND FOLLOW-UP

It became apparent that the dot imaged on fundus photography was an optical artefact, most likely due to the 'Allen dot' which is a feature incorporated into most retinal cameras to reduce reflection of light from the anterior segment of the eye. The Allen Dot only produces artefact during photography of highly myopic eyes. Owing to the absence of any clinical signs to indicate a diagnosis, no treatment was given. Her symptoms resolved spontaneously 1 month later.

DISCUSSION

High myopia, macular haemorrhage and Förster-Fuchs spot

Myopia is common and its aetiology is multifactorial. Beyond being a condition of suboptimal refraction, myopia can also be associated with significant changes in the ocular fundus, thought to be the result of stretch to the ocular tissues, especially if there is more than -6 dioptres of refractive error. Pathological myopia is characterised by degenerative changes secondary to anteroposterior elongation of the sclera, leading to a tessellated fundal appearance, markedly visible choroidal vessels, focal chorioretinal atrophy and a posterior staphyloma. Small linear ruptures, known as lacquer cracks, of the RPE-BrM-Choriocapillaris complex can lead to macular haemorrhage and choroidal neovascularisation. The resolution of the haemorrhage results in a raised, pigmented, circular scar on the retina known as a Förster-Fuchs spot.¹

Allen Dot

Fundus cameras have a specific range within which critical retinal focus can be achieved.² This specific range was defined by Lee Allen L as the 'free zone' and varies between patients according to the characteristics of the optical media.

When the original retinal camera was first released by Zeiss in 1954, it had a black dot painted onto one of the system's condensing lenses to cast a shadow through the anterior segment of the eye and prevent reflections from the cornea and iris from interfering with the retinal image.^{3 4} However, a single dot could not take into account the great variation in corneal curvature or depth of the anterior chamber between patients. A solution to this problem was described in a paper by Lee Allen in 1964.⁵ Allen manually cut a circular piece of black illustration paper and secured it into one of the aperture openings of a Zeiss fundus camera, thus widening and elongating the shadow of the Zeiss dot and enlarging the 'free zone'.^{3 4} The 'Allen dot' named after its inventor is now a standard accessory for most fundus cameras.

A major difficulty in imaging the fundi of highly myopic patients is that the point of critical retinal focus tends to lie outside the focusing range of fundus cameras. An auxiliary dioptre compensating lens is therefore used to counteract the high refractive error. However, this auxiliary lens also leads to imaging of the Allen Dot which produces a centrally located

darkened round spot in all images taken of the highly myopic fundus, as was found to be the case for our patient.^{2 6} This led to the erroneous first impression of a macular haemorrhage.

In our patient, the possibility of optical artefact was obvious because of the disparity between the clinical examination findings and the initial fundus image. If clinical examination had not been performed, as is the case in virtual clinics, then a misdiagnosis is likely to have occurred.

To our knowledge, this is the first report of the Allen Dot artefact masquerading as ophthalmic disease. The Allen Dot only produces artefact in highly myopic patients, which can be avoided either by use of the patient's contact lenses during photography, or by altering patient fixation, to move the dot away from the fovea or area of interest.²

Learning points

- ▶ Macular haemorrhage is a common complication of high myopia, and occurs due to lacquer cracks in the RPE-Bruchs membrane-Choriocapillaris complex.
- ▶ The Allen Dot is a small dark filter mask placed in the optical pathway of the fundus camera that absorbs scattered light from other ocular structures.
- ▶ In high myopes, the Allen Dot can cause optical artefact during fundus photography. In this report, the artefact gave the appearance of a macular haemorrhage on colour photography. The clinical examination was normal.
- ▶ It is important for clinicians to be able to recognise the limitations of diagnostic devices, and particularly be aware of artefacts that can masquerade as disease.

Contributors PA and RN were involved in the clinical management of the patient. PA obtained consent from the patient. LM and PA carried out the literature review and drafted the case report. All authors read and approved the final manuscript.

Competing interests None.

Patient consent Obtained.

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