The 'poor man's' Landers lens

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SUMMARY A clinical application of the technique of 'autoindirect ophthalmoscopy' in a gas-filled, phakic eye is described. Peroperative photographs obtained by this technique are demonstrated and the optics described.

Recently an interesting observation¹ was made of a real, aerial, inverted image anterior to the cornea in a gas filled phakic eye. The final comment in that article alluded to the clinical usefulness of the phenomenon. This paper describes its use at vitrectomy.

Vitrectomy is often accompanied by gas exchange to treat posterior-pole lesions and tamponade bleeding points. The timing of the fluid-gas exchange varies with the procedure, but it is often necessary to visualise the retina through the gas for endophotocoagulation, 'fluting' of subretinal fluid, and a variety of other therapeutic procedures. In this unit a biconcave, irrigated contact lens (90 dioptres) is generally

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used to obtain a right-way-round image of the retina for these procedures, the Landers lens² (Figs. 1A, B, 2A, B).

Occasionally the view through such a lens is so distorted that the lens is removed, the operating microscope elevated about 2 cm, and an indirect view of the retina is obtained (Figs. 3A, B). This image can be utilised for further therapeutic manoeuvres (the 'poor man's Landers lens'). The technique varies from that described by Thaller¹ because the source of illumination at vitrectomy is often the intraocular fibreoptic. As described,¹ the cornea/aqueous/lens complex acts as +100 dioptres condensing lens while there is gas in the vitreous cavity (as compared with +58.64 dioptres in a normal eye), forming an image I at distance V from its nodal point N₁ (Fig. 4).

1A

1B

Fig. 1A, B The Landers lens: a biconcave irrigated contact lens.

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2A

Fig. 2 A: Photograph of retinal image formed through Landers lens. B: Optic disc (D), haemorrhage overlying disc (H), and vessels (V). Also shown are the edge of the lens (LL) and its handle (HL).

2B

3A

Fig. 3 A: Photograph of retinal image as formed by the method shown in Fig. 4. B: Optic disc (D), haemorrhage overlying disc (H), and vessels (V). Note the image inversion as compared with Fig. 2.

3B

K.T.

Fig. 4. Diagram to show formation of the retinal image in a gas filled phakic eye utilising endoillumination. The 'lens/aqueous/cornea' complex acts as a 100-dioptre converging lens for light rays coming from the gas filled vitreous cavity. I=image. O=object. U=object distance. V=image distance. N_1 and N_2 =image and object nodal points respectively.

In keeping with the theoretical optics described, for myopic eyes the microscope needs to be elevated less than for emmetropic ones. This fact relates to the object distance U being greater in longer, myopic eyes. In fact, the microscope's coaxial light can be used to obtain an image as described by Thaller,¹ but owing to bright 'Purkinje image' reflections its use is limited. However, in the performance of very anterior peripheral endophotocoagulation—for example, just postorally—even this method is occasionally used.

The quality of the pictures obtained suffers from the long exposure times necessary, especially when using light from inside the eye. The image produced by the photo slit-lamp benefits from flash source exposure. The view obtained at surgery is adequate

owing to the 'variable film speed' of the surgeon's retina.

The observation that indirect funduscopy can be performed with a gas filled phakic eye does have clinical and therapeutic application.

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References

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- 2 Landers MB, Stefansson E, Wolbarsht ML. The optics of vitreous surgery. *Am J Ophthalmol* 1981; **91**: 611–4.

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