Fluorescence angiography of the iris

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Jensen and Lundbaek (1968) reported a technique of fluorescence iris angiography using a lens of 20 cm. focal length placed in front of the Zeiss fundus camera.

This technique, though attractive in its simplicity, has certain disadvantages, *i.e.* the image size of 24×24 mm. and distortion at the margins of the image. Furthermore it is necessary to use the maximum flash intensity (this requires a flash frequency of one per 1.5 — 2 sec.) and the high-speed films that must be used give coarse-grained pictures.

Bruun-Jensen (1969) and Baggesen (1969) reported a method of iris fluorescence angiography using a modified Zeiss photo slit lamp. This solves the problem of image size, in this case 24×36 mm. without marginal distortion. Certain modifications were deemed necessary, *i.e.* air-cooling of the flash-bulb and the fitting of a concave lens with a blue filter in front of the slit. Again a high-speed film was used, which required forced development.

A relatively simple and cheap technique of iris angiography is described below, in which a Zeiss fundus camera is used with an external motorized Nikon camera (Fig. 1).

FIG. 1 Attachment of motorized Nikon camera to Zeiss fundus camera.

Method

A modified Zeiss fundus camera is used, with a built-in Baird Atomic B4 interference filter, to supply the blue excitation light. A motorized Nikon camera F 36 was attached to the side of the fundus camera (Fig. 1). This Nikon camera was fitted with an extension ring set containing the yellow Schott GG 14 3.0 mm. filter. A Zeiss Luminar 1:4.5 lens with a focal length of 63 mm. was fitted to the extension ring and used at full aperture. This combination gives an enlargement of $\times 1.5$.

Focusing is achieved by changing the object distance and viewing the image on a Nikon plan mat focusing screen type D, specially designed for macrophotography.

The film, Ilford FP3 (125 ASA) was developed in Promicrol diluted 1:2. The flash unit was set at 740 watt/sec., which gives a flash frequency of 1–2 flashes per second.

The fundus camera is used only to supply the blue excitation light, and the Nikon camera is used to photograph the iris fluorescence.

Results

The description of the results in two patients will suffice as examples of this technique.

Case 1, a 30-year-old man, was used as a normal control subject to demonstrate a normal iris fluorescence angiogram: the iris seemed normal and the iris colour was light blue (Fig. 2). 10 sec. after an intravenous injection of fluorescein 10 per cent., several arteries coming from the annulus major were seen to fluoresce (Fig. 3).

FIG. 2 Case 1. Black and white photograph of a normal iris.

FIG. 3 Fluorescence photograph: 10 sec., arterial phase: arteries from annulus major fluorescing.

After 13 sec. the pupillary border was reached, where several collateral vessels were seen to fluoresce (Fig. 4). After 20 sec. a capillary network was fluorescing along the annulus major (Fig. 5). The annulus minor and the pupillary border were seen as a light border in the later phases (Fig. 6).

Case 2, a 45-year-old man, was admitted to the Eye Hospital with a large pigmented iris tumour, over which vessels were seen to course (Fig. 7, overleaf). Fluorescence angiography showed filling of some tortuous vessels within the tumour in the arterial phase 11 sec. after the injection (Fig. 8). In the venous phase after 20 sec. this fluorescence intensified and some very large vessels were seen to fill; some of these vessels even seemed to be thrombosed (Fig. 9). The later pictures showed a diffuse fluorescence with a leakage of fluorescein within the tumour (Fig. 10, overleaf).

At the site of the tumour it would seem that the conjunctival fluorescence is more intense

FIG. 4 *Fluorescence photograph: 13 sec., the pupillary border is reached where collateral vessels are seen to fluoresce.*

FIG. 5 *Fluorescence photograph: 20 sec., fluorescence of capillary network along annulus major.*

FIG. 6 *Fluorescence photograph: 78 sec., annulus minor and pupillary border are seen to fluoresce as a light border.*

than outside the tumour area. An examination of the histology of this tumour showed it to be a naevus iridis (Manschot).

Discussion

The advantages of this technique are twofold, provided that the photographic department is equipped with a fundus camera that has been modified for fluorescence angiography.

(1) No photo slit lamp is needed.

(2) The luminar lens is designed to photograph a flat surface, unlike the fundus camera which is specially corrected for a hollow plane such as the fundus, so that photography of a convex structure such as the outer eye results in distortion which is further augmented by the use of a 20 cm. lens in front of the objective.

Furthermore, in the technique described, high-speed film is not necessary, and the film used does not have to be force developed; this means that the enlargements show very little graining.

Last, but not least, the attachment of the motorized Nikon camera, including the extension ring set and the Luminar lens, is much less expensive than an extra flash unit and photo slit lamp.

FIG. 7 Case 2. Black and white photograph, showing a large pigmented iris tumour with vessels coursing over it.

FIG. 8 Fluorescence photograph: 10 sec., arterial phase: filling of some tortuous vessels within the tumour.

FIG. 9 Fluorescence photograph: 20 sec., venous phase: fluorescence intensifies, some large vessels are seen to fluoresce.

FIG. 10 Fluorescence photograph: 74 sec.: diffuse fluorescence with leakage of fluorescein within the tumour.

Summary

An iris fluoro-angiographic technique is described, using a Zeiss fundus camera to supply the blue excitation light. The fluorescence is photographed on an external motorized Nikon camera.

A fluoro-angiogram from a normal subject is compared with one from a patient with a naevus iridis.

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References

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