Non-Painful Vascular Staining Following the Injection of Sodium Fluorescein

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Abstract: Eight cases of non-painful vascular staining of extremities distal to injection sites for fluorescein angiography are reported. These responses, which are possibly associated with previous vascular inflammation, do not represent intra-arterial injection or extravasation, and do not affect the photographic results of the procedure.

Reactions to intravenous injection of sodium fluorescein are common. They may be systemic (nausea, vomiting, and hives) or localized reactions at the injection site. Extravasations are typically associated with pain. Skin necrosis has also been reported at the injection site by Schatz in 1978, 1 by Kratz, Mazzoco, and Davidson in 1980, 2 and by Elman, et al., 3 in 1987. 4 Pain and skin discoloration may be present if an intra-arterial injection has occurred.

We herein report the observation of eight cases of what appears to be benign staining of an extremity after intravenous injection of sodium fluorescein for angiography. The finding is specific in that there is staining in a vascular pattern stemming from the injection site but which produces no pain. The patients typically have a history of previous venipuncture, and the majority are elderly.

After a review of the ophthalmic literature on the subject of non-painful vascular staining following the injection of sodium fluorescein, two previous references were found. Thrombophlebitis at the site of the injection was reported by Krill at the annual Association for Research in Ophthalmology meeting in 1969. 5 Rosen, Ashworth, and Jarpe reported a case, also in 1969, in which a quantity of dye escaped around a patient’s vein, and non-painful yellow “tramlines” ascending from the cubital fossa to the shoulder were observed. 6

We are presenting case reports for two of our patients and providing photographic documentation for three.

Patients and Methods

Over a fifteen-month period, eight cases were gathered from The Wilmer Eye Institute Photographic Department and the Photographic Department of the Retinal Vascular Center at Wilmer. These patients’ ages ranged from 59 to 82 years; seven were white and one black. All cases typically showed the finding of non-painful vascular staining of the extremity from a distal fluorescein injection site. Upon questioning, seven of the eight patients revealed that they had suffered a related injury from a needle venipuncture within the previous six months (six patients) or twelve months (one patient). The case history of the remaining patient is unknown.

Five patients received intravenous lines during prior hospital stays. The hospitalization periods ranged from one day (two patients) to one week, two and one-half weeks, and four months. One patient’s venipuncture was the result of a blood test, the other two patients’ venipunctures resulted from fluorescein angiograms. The same arm or hand of each patient was involved in both the present fluorescein angiogram and the previous needle sticks.

Initially the vascular staining pattern was visible in room light, but the best view was obtained by illuminating the injection site through a blue filter. Photographs were taken on Ektachrome 100 film using a Nikon FG camera with a Nikon 105 mm lens and a Nikon SB through-the-lens (T-T-L) flash. To enhance the view of the vascular staining, a blue filter (Kodak Wratten 47) was placed over the flash. The blue filter acts as an excitor filter, but because it decreases the intensity of the flash, a yellow barrier filter cannot be applied at the time of the photographic documentation. In order to gain higher contrast of the vascular staining pattern and to filter out excess blue, the blue-filtered slides were re-photographed on an Emby Slide Duplicator. The slides were then exposed through a yellow No. 15 Nikon G filter on Kodak E-6 Duplicating Film No. 5071. The yellow barrier filter was introduced at this time to filter out excess blue and to highlight the vascular staining.

Hundreds of elderly patients in both of our photographic departments have been similarly injected with fluorescein without clinically exhibiting the fluorescent pattern seen in these eight cases. To test the possibility that this vascular response might occur more frequently, the injection sites of ten randomly-selected fluorescein angiography patients, aged 35-80 years, were photographed under blue light. Although no clinical evidence of a reaction or vascular staining was visible, photographs of the injection sites were taken to see if a pattern would be evident on film. The photographs failed to demonstrate vascular staining.

Case Reports

Case 1. A 79-year-old white woman was seen at The Wilmer Eye Institute for an evaluation concerning macular degeneration. Two months earlier the patient had been hospitalized for four months due to a digestive disorder. During part of the hospital stay, the patient was comatose. The patient subsequently received numerous venipunctures during her stay.

To assist in her ophthalmic evaluation, a fluorescein angiogram was performed. The patient was injected with 5 cc of 10% Funduscin® (sodium fluorescein). After the injection, the patient exhibited a vascular staining pattern extending up the arm, which was not in a pattern of localized extravasation (Fig. 1: A and B). This pattern was typical of that seen in the other seven cases we report.

The patient denied pain and was observed for twenty minutes. There was no localized swelling, redness, or clinical sign of an acute localized inflammation at the time of the fluorescein angiogram. The staining was still apparent twenty minutes after the fluorescein injection.

Case 2. The case history is unknown but is represented graphically (Fig. 2: A and B).
Fig. 1: Patient 1: Volar surface of right forearm.

Fig. 2: Patient 2: Hand and wrist.

Fig. 3: Dorsum of left hand.
A: White light external photograph.  B: Blue-filtered external photograph (see figures in color on front cover).
Case 3. A 72-year-old lightly-pigmented black man was seen at The Wilmer Eye Clinic for an evaluation concerning macular edema. The patient’s last reported venipuncture occurred twelve months earlier when he received an intraocular lens at Wilmer. The intravenous line was placed in the patient’s left hand before surgery.

A fluorescein angiogram was requested and performed at the time of his twelve-month post-operative examination. The patient was injected with 5 cc of 10% Funduscein® (sodium fluorescein) in his left hand. The findings immediately following the injection of fluorescein dye were significantly similar to those in case 1: non-painful vascular staining stemming from the injection site on the back of the hand (Fig. 3: A and B).

Discussion

We herein report the observation of eight cases of what appears to be benign staining of an extremity after intravenous injection of sodium fluorescein for angiography. In patients who had exhibited thin subcutaneous tissue, the staining could typically be seen to represent selective large venous channels of the extremity. All eight patients showed signs of mild bruising in the involved area. It is also very important to note that in each case a bolus of dye was administered without resistance, and the arm-to-retina circulation time was the normal eight to twelve seconds.

These non-painful vascular staining patterns may indicate localized injuries in the past ranging from one week to one year. This phenomenon is in contrast to intra-arterial injections and localized extravasations, both of which may be associated with a mild to moderate amount of localized pain, and which present with different patterns than that reported herein.

A possible loss of tight junctions of venous endothelial cells could account for such a pattern and thus stain the vessel walls. The fact that there consistently was a history of an injury or venipuncture (ranging up to as long as twelve months) in our patients indicates that there may be chronic endothelial changes in the peripheral venous system. This staining pattern may thus indicate a previously unrecognized local phlebitis of that extremity.

This is an important finding to be aware of for two reasons:

1. The photographer should be aware of the benign nature of the staining and lack of effect on both the fluorescein angiographic procedure and the patient’s well-being.

2. The pattern appears to indicate chronic loss of endothelial integrity and is possibly associated with some previous phlebitis.

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References


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Key words: non-painful vascular staining; venipuncture; fluorescein angiography