

Letter to the Editor

Colour Test Indicating Potential Infusate Leakage Sites in Vein Walls

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Introduction

Reports of chronic ulceration after extravasation of adriamycin through vein lesions at sites of infusion [1, 2] suggest the lack of a reliable clinical test for indicating potential infusate leakage sites. Such a technique using methylene blue as tracer is presented.

Material and Methods

Methylene blue (methylene blue injection, Nord. P.) was dissolved in saline. Adriamycin (Doxorubicinchloride, Farmitalia Carlo Erba, Milano, Italy) was dissolved in distilled water (2 mg/ml). A 4 cm long segment of subcutaneous forearm vein was dissected from each of three fresh cadavers and cut into two halves, one of which was placed in saline and the other in adriamycin solution at room temperature. After 18 h one end of each segment was drawn over a catheter (o.d.: 1.5 mm), the connection was made watertight by a ligature. The other end was also closed by a ligature. By means of the catheters 0.06 ml methylene blue (5 mg/ml) was introduced into each of these veins and a pressure of 20 mm Hg was applied. Thus prepared the vein catheters were placed in separate glass vials with 20 ml saline. Samples of 200 µl thoroughly mixed liquid were taken from these vials at 2.5 min intervals for 10 min. The veins were then cut through and further samples were obtained immediately followed by the final ones 2.5 min later. The concentration of methylene blue was determined in an absorptiometer (2076 Calculating absorptiometer, LKB, Bromma, Sweden) at a wavelength of 611 nm. In three volunteers superficial forearm veins were cannulated and a needle (o.d.: 0.9 mm) was passed through the vein wall 2 cm central to the cannula in one of them. After applying pressure to this site for 5 min 2.0 methylene blue solution (1 mg/ml) was injected through the cannulae into the veins and the arms were inspected for discoloration.

Results

During the first 10 min of the in vitro study methylene blue became increasingly visible in the vein walls, but

no discoloration could be detected in the surrounding fluid. Similar observations were made in veins treated with adriamycin. After cutting the veins methylene blue passed rapidly into the solution. Figure 1 shows a typical result. At injection into a peripheral vein clearly outlined vein branches could be transiently discerned through the skin. At the site of the vein lesion a diffusely outlined discoloration was observed immediately after injection of the tracer. This discoloration was unchanged 10 min later and faded only slowly.

The Recommended Test. Two milliliters of methylene blue (1 mg/ml) is injected during 1–2 s. A vein lesion with a breach of continuity of the vein wall is shown by a diffusely outlined discoloration fading only slowly.

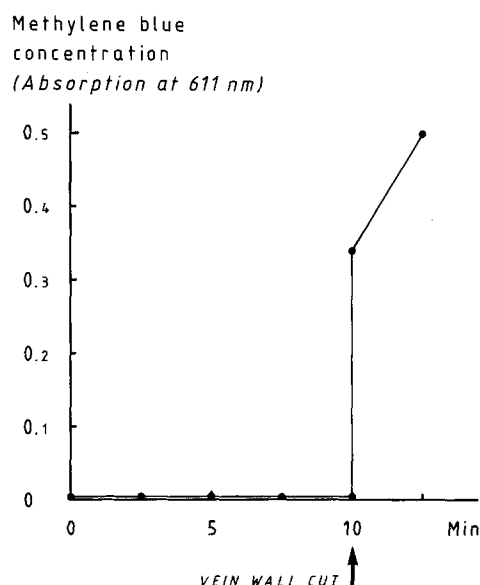


Fig. 1. Test of methylene blue passage through vein wall in vitro

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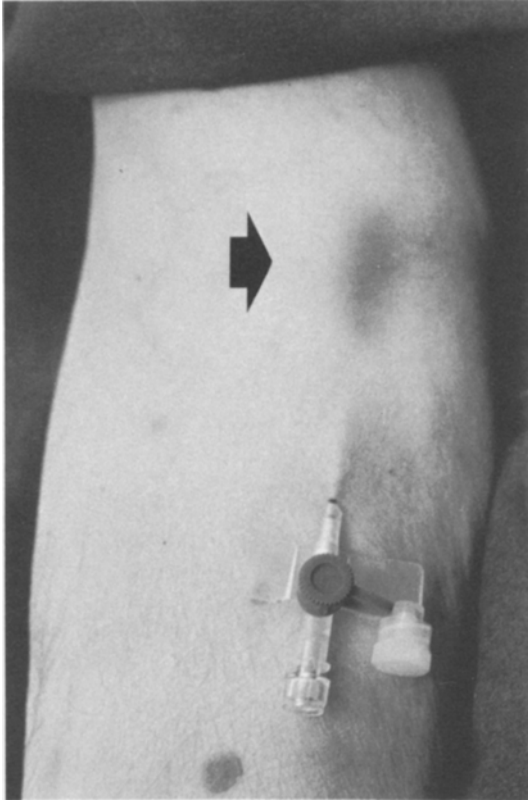


Fig. 2. Clinical case showing positive test result after intravenous injection of methylene blue

Use of Test. Since vein lesions are not always clinically apparent the test is useful when infusion into a peripheral vein of a strongly cytotoxic drug is contemplated. A case is shown (Fig. 2) where injection – and extravasation – of adriamycin was avoided after a positive test result.

References

1. Bowers DG Jr, Lynch JB (1977) Adriamycin extravasation. *Plast Reconstr Surg* 61: 86
2. Rudolph R, Stein SR, Patillo AR (1976) Skin ulcers due to adriamycin. *Cancer* 38: 1087

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