OEDEMA AND CYANOSIS OF THE HAND FOLLOWING INJECTIONS INTO A VEIN ON THE DORSUM OF THE HAND

A Case Report

BY

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SUMMARY

A case is described in which cyanosis and oedema of the hand and wrist followed injections into a vein on the dorsum of the hand. This was treated with intra-arterial procaine and block of the stellate ganglion. Possible causes for this reaction are venous spasm followed by thrombosis, leakage, reflex arterial and venous spasm and histamine release.

It is generally considered that the dorsum of the hand is the safest site for intravenous injections of potentially irritant drugs. Baillie (1958), Stace (1958) and Forrester (1959), however, have described difficulties which may arise in this site, and the following case provides a further example.

CASE REPORT

The patient, aged 50 years, was admitted for cholecystectomy. She had a history of angina pectoris with reduced exercise tolerance, but no actual cardiac failure. There was a history of sensitivity to pethidine which was said to cause vomiting, and to morphine, which produced palpitations. She was premedicated with atropine 0.6 mg and promethazine 50 mg intramuscularly 45 minutes pre-operatively. On arrival in the operating theatre she was extremely nervous; a Mitchell needle was inserted into a vein on the dorsum of the left hand and 5 ml of a "lytic cocktail" mixture (containing 12.5 mg each of chlorpromazine, promethazine and pethidine) was injected. This produced adequate sedation until anaesthesia was induced approximately 10 minutes later.

Anaesthesia was induced by means of 2.5 per cent thiopentone (150 mg). Suxamethonium 50 mg was then given through the Mitchell needle to facilitate endotracheal intubation. When spontaneous respiration had returned, d-tubocurarine 15 mg was given, followed by a further 10 mg. Anaesthesia was continued with a mixture of nitrous oxide and oxygen (6 l./min and 2 l./min). A Barnet ventilator was used for artificial ventilation of the lungs. A further 5 ml of the "lytic cocktail" mixture was given at this time, when no obvious abnormality of the hand was present. The hands were placed across the chest without constriction or pressure. Towards the end of the operation, which took 60 minutes, the hand was noticed to be discoloured and swollen. Procaine (10 ml of 0.5 per cent) was injected before removing the needle but there was no obvious change in the condition. At the end of the operation, curarization was reversed with atropine 1.2 mg and neostigmine 2.5 mg, given into a vein on the other hand. The affected hand and 2 inches of wrist were a dark blue colour, swollen and cold; the capillary return in the nail bed was slowed, but a radial pulse was palpable. Procaine (4 ml of 1 per cent) was injected into the brachial artery with improvement of the radial pulse, and nail bed capillary return. A stellate ganglion block was performed with further improvement and a Sonopulse microphone attached to a finger pulp showed good pulsation. Eight hours later, the hand had returned to a normal colour with a satisfactory circulation, the only pain being at the site of the injected vein, which appeared thrombosed. The patient, sleeping peacefully under the effects of the "lytic cocktail" knew little of the medical worry which had occurred. No postoperative vomiting occurred and the patient returned home after fourteen days with no untoward sequelae.

DISCUSSION

Cyanosis or pallor followed by necrosis, has been described on a number of occasions after intra-arterial injections of thiopentone (Cohen, 1948; Baillie, 1959; Stace, 1958; Forrester, 1959) when injections into veins of the antecubital fossa or into veins on the dorsum of the hand were attempted. Similarly, intra-arterial and peri-arterial injections of promazine and chlorpromazine have led to gangrene (Hodges, 1959; Deacon, 1961; Opinsky, Serbin and Rosenfold, 1958; Shell, McIntyre and Castellano, 1959). There are also described in the literature a number of instances when arterial spasm, often accompanied by gangrene, has followed intra-arterial injections of oxophenarsine (Walsh and Wyatt, 1945), mephenesin (Ogilvie, Penfold and Qendon, 1948), various contrast media (Wagner, 1944), quinine, and Hartmann's solution (in babies—Cohen, 1948). Stace (1958) described...
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a type of case in which intravenous injections of thiopentone into the dorsal veins of the hand produced local pain. He suggested that this was due to retrograde flow of the drug into the local capillaries, and hence into the tissue spaces; one case of localized superficial necrosis of the skin occurred. Forrester (1959) states that examination of a normal anatomical specimen of the back of the hand will demonstrate branches of the dorsal carpal arterial arch, and perforating branches from the deep palmar arterial arch running relatively superficially where they may be damaged during an attempted intravenous injection. Baillie (1958) described one case in which this had happened and another patient who had a palpable and visible artery on the dorsum of her hand. In most cases pain is an initial symptom, but rarely, as described in a medico-legal report in the British Medical Journal (1951), there is no pain.

The dramatic vascular changes in the patient's hand may have been due to venous spasm, followed by venous thrombosis due to the irritant nature of the drugs injected. This condition might be aggravated by the pressure of the spring clip on the Mitchell needle, producing venous stasis. The picture of oedema and cyanosis following venous thrombosis would parallel cases described by Cohen (1948) and Dundee (1956).

Alternatively, leakage from the vein into the interstitial tissues, either directly from the vein or by a mechanism similar to that described by Stace (1958), may have occurred, producing the local reaction. Direct leakage would be favoured by the use of a Mitchell needle.

A less likely possibility is that reflex arterial and venous spasm may have occurred due to the irritant agents injected. Against this is the fact that dilute solutions were used and no pain occurred at the time of injection.

There may have been an exaggerated histamine release reaction due to the curare. There were, however, no systemic signs of histamine activity.

CONCLUSIONS

From a review of the literature concerning inadvertent intra-arterial injections of drugs, it would appear that if the veins on the dorsum of the hand are used, there is less chance of permanent serious injury occurring, but even this area is not completely safe. Irritant agents should be used in dilute solution. This is especially true of thiopentone, as there do not seem to be any reports of permanent damage after using 2.5 per cent thiopentone (Wylie and Churchill-Davidson, 1961).

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REFERENCES


British Medical Journal, Medico-legal notes (1951), 1, 707.


OEDÈME ET CYANOSE D'UNE MAIN APRÈS INJECTIONS DANS UNE VEINE DORSALE DE CETTE MAIN

SOMMAIRE

Description d'un cas de cyanose et d'oedème de la main et du poignet suivant des injections i.v. dans la face dorsale de la main. Le traitement consista en injection intra-artérielle de procaine et blocage du ganglion stellaire. Les causes possibles de cette réaction — consistant en spasme veineux, suivi de thrombose, perméabilité des parois vasculaires, spasme artériel réflexe (et même veineux) et libération d'histamine.

BOOK REVIEW


The second edition of Professor Willis's Principles of Pathology including Bacteriology is a worthy contribution to medical literature. His clear and definite style is refreshing and important subjects in general pathology are adequately described and illustrated. The chapters on tumours, Professor Willis's special field of study, are particularly commendable. A stimulating chapter on antenatal pathology forms a sound basis to further reading on the subject.

The list of Greek roots and affixes in Appendix A should be helpful to modern readers not schooled in classics; examination candidates should read and students institute the precepts outlined in Appendix C.

No book on pathology can be free of criticism. It is difficult for one author to have a deep interest in all aspects of pathology; comparison of the section on malignant disease with that on haemotology emphasizes this, e.g. β-thromboplastin would hardly be recognized by a haematologist and his classification of anaemia on p. 392 is quite inadequate. Again, the very brief descriptions of vitamin deficiency diseases on pp. 358 et seq. and fungal diseases in Chapter 17 are too brief to be useful. The description of tuberculosis is hardly fitting to the disease now seen in the present "antibiotic era" and one felt that B.C.G. vaccination was too faintly praised.

Nevertheless the book can be recommended confidently to undergraduate students; for postgraduate students it forms a useful basis of knowledge. Bacteriology is covered scantily, but probably adequately for students studying for Primary Fellowship examinations. Additional information on genetics and metabolic diseases must be sought elsewhere.

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