too late. Backache is a condition which may easily be hidden at pre-employment examination.

It is the duty of doctors to keep the working man fit and to restore him quickly to normal health if any illnesses or accidents occur, rather than to adopt the defeatist attitude implied in recommending a permanent change of work. At Stanton, so far as lower backache is concerned, we are trying to solve these problems by means of an efficient physiotherapy department, an educational campaign, and improved design and lay-out of plant.

Summary

This paper records the attempts made by a general practitioner and a physiotherapist to tackle the problem of lower backache in the face of very confused guidance from lecturers and literature.

Our treatment routine consists of infra-red therapy, massage, and (in most cases) manipulation, with occasional use of strapping and short-wave diathermy. In our opinion the treatment works. So long as the exact causes of backache remain so uncertain we feel thoroughly justified in employing empirical methods. We believe that prompt treatment of even trivial cases of backache by relaxation and manipulation reduces suffering and absenteeism.

Unfortunately the study has been made retrospectively, and we have been handicapped by the diversity of the statistics which have to be kept to meet the requirements of the Factory Inspectorate, Ministry of National Insurance, and our own management.

We wish to thank the managing director of the Stanton Ironworks Company Limited for permission to publish this paper. We are also indebted to the employees themselves, who willingly disclosed their histories and consented to publication.

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USE OF THE CEPHALIC VEIN IN INTRAVENOUS THERAPY

BY

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Continuous intravenous therapy by the "drip" method has established itself as indispensable in the surgeon's armamentarium. The technique, however, requires improvement.

The routine methods of using the peripheral superficial veins have certain inherent disadvantages, which are enumerated below. The chief of these is venospasm, as demonstrated in patients suffering from oligaemic shock, the amount of spasm depending directly on the degree of oligaemia. There is difficulty in locating collapsed veins and in introducing a cannula large enough to allow a rapid flow of the appropriate fluid, and even when this has been done it is not easy to maintain the rate of flow that is necessary to correct the low blood volume. A vicious circle is established (see Fig. 1).

The superiority of the cephalic vein over the other more dependent veins of the body was first noted in the treatment of shock following burns, and later in shock due to massive blood loss in trauma or during intra-thoracic operations (Gordon *et al.*, 1954). Unimpeded

flow was maintained through the cephalic drip, while simultaneous "drips" in the more dependent sites—for example, cubital fossa, wrist, or above the ankle—ceased to function or only an inadequate flow could be maintained with the aid of "positive pressure."

Many procedures have been employed for rapid transfusion in these emergencies, among them being positive pressure, multiple intravenous drips, and intra-arterial and intra-aortic transfusions. They all have their disadvantages. As spasm affects all peripheral veins, multiple drips are subject to the same disadvantage. Intra-arterial transfusion, though useful as a "heroic" measure, has all the disadvantages of heroic procedures. It is not practicable as a routine prophylactic measure in all cases where massive haemorrhage may occur. It has to be undertaken as an emergency operation, it needs a complicated apparatus for its working, and it is not altogether free from the danger of air embolism.

A large cannula introduced into a wide vein, which is not affected in the generalized peripheral venospasm, at a site which does not hinder the operative procedure and is convenient for the anaesthetist, is the ideal requirement for rapid replacement.

The cephalic vein fulfils these requirements. It has several additional advantages over other veins of the body not only for rapid but also for routine intravenous therapy.

As the capacity for spasm of any vein depends on the amount of musculature in its wall relative to its lumen, transverse sections of the veins at the sites normally used for intravenous therapy were compared with those of the cephalic vein in the delto-pectoral groove and the external jugular vein from the same cadaver. The veins selected for study were the saphenous vein at the ankle and the groin, and the cephalic vein at the wrist and at the cubital fossa.

The sections show the following points: (a) The amount of musculature in the vein wall relative to its lumen varies directly with the hydrostatic pressure in the vein (in the erect posture), being most marked in the internal saphenous vein at the ankle, and least in the cephalic and external jugular veins. This is not surprising, as the venous pressure in the dependent veins is higher in the erect posture and the musculature counteracts the effects of gravity. (b) The dependent veins have a considerable amount of white fibrous tissue in their walls. This is replaced by yellow elastic fibres in the cephalic and external jugular veins. (c) The sections, being from the same cadaver, show that the absolute lumen of the cephalic and external jugular veins is much larger than that of the more dependent veins. (d) It has been found that the musculature in the cephalic vein at the elbow is considerably greater, in relation to its lumen, than at the level of the shoulder.

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Anatomy of the Cephalic Vein in the Arm (Delto-Pectoral Groove)

While the larger superficial veins of the body run to a definite pattern they nevertheless are subject to some variations. The cephalic vein in the delto-pectoral groove is

FIG. 1

constant in its situation in all cases. This has evident advantages during its exposure. It lies deep to the deep fascia of the arm. The groove can be felt even in the most obese patient by active flexion of the shoulder. The lower border of the pectoralis major, which forms the anterior fold of the axilla, can be traced to its termination in the delto-pectoral groove. The vein then arches upwards before penetrating the clavipectoral fascia and entering the axillary vein. At the apex of the arch, which lies just below the clavicle, it is joined by smaller unnamed tributaries descending from the neck, behind the clavicle.

Surface Marking.—The patient is asked to raise the arm a few inches off the bed during this procedure. This helps to demonstrate the delto-pectoral groove, which is the landmark. It is therefore preferable to perform the operation under local analgesia with the co-operation of the patient.

Method

The assistant stands by the head of the patient and compresses the vein proximally with a finger while holding a retractor with the other hand. The vein being large in diameter but thin-walled, it is the size of a fine cord when empty, but when distended stands out as a large blue column under the deep fascia and is easy to identify. Except in the very obese patient, it can be felt under the skin and can often be seen (see Fig. 2).

A transverse incision is made over the groove at the level of the lower border of the anterior axillary fold: this is the site of choice. The incision is deepened to the deep fascia. As the vein is under the deep fascia much time will be saved by not dissecting at a more superficial level, where smaller veins

may be mistaken for the cephalic. If necessary, the finger may be used in the wound to palpate the groove in an obese subject. With adequate retraction the vein will be seen under the fascia, lying in the groove, as a blue cord.

A wide-bore cannula is essential when rapid replacement is required. No. 4 "polythene" tubing (as supplied by Allen and Hanburys) mounted on a sawn-off wide-bore needle is used routinely. I have experienced no difficulty in introducing this size of cannula in the cephalic vein in patients above the age of 12 years.

FIG. 2.—Photograph showing the cephalic vein.

A relatively smaller cannula—for example, No. 3 polythene tubing—is used in younger individuals. Unfortunately, the above technique involves ligation of the vein and obviates its further use. Where a prominent vein has been present a West Middlesex type of cannula has been introduced into the vein with equally successful results.

It was at first thought to be an advantage to insert the polythene tubing up to the axillary vein. This was found to be hazardous if not impossible because the joining of the tributaries at the apex of the arch made by the vein resulted in kinking of the vein. It was, however, noticed that just as efficient a flow could be established by introducing the cannula no further than 1 to 1½ in. (2.5 to 3.8 cm.) above the lower border of the anterior axillary fold; this is the length

now employed. Longer lengths produce kinking of the vein against the end of the cannula when the position of the shoulder is changed.

Using the above technique, I have encountered no particular difficulty in exposing the vein or in inserting a cannula into it.

Results

The cephalic vein has been used for intravenous therapy on 41 occasions—in cases of shock from burns and shock due to trauma, also in patients undergoing major thoracic operations or requiring routine intravenous therapy for prolonged periods.

The youngest patient was aged 5 years. The patients have varied from very thin individuals with prominent veins to very obese subjects. In the former the vein has been successfully "needled" without resort to the "cut down" technique. Failure to establish a satisfactory drip, apart from the normal difficulties of bad illumination and lack of fine instruments, has been due to: (a) Mistaking small superficial veins for the cephalic. This can be avoided if it is borne in mind that the cephalic vein lies under the deep fascia of the arm. (b) Thrombosis of the vein from previous use at the cubital fossa. If this has happened recently, a soft clot is found to fill the lumen of the vein. This can be picked out easily with fine forceps and a cannula inserted without difficulty. (c) Introducing too great a length of polythene tubing into the vein. As stated previously, this difficulty has been overcome by introducing no more than 1 or 1½ in. (2.5 or 3.8 cm.) of cannula above the anterior axillary fold. In this position the vein cannot be kinked against the end of the cannula in any position of the arm.

Rapid Infusion.—The ease of flow and minimal amount of spasm have been appreciated in all cases. These are most marked in the shocked patient with peripheral venospasm. As no occasion has yet arisen to necessitate the use of positive pressure, the maximal rate of flow has not been recorded. The following case illustrates the efficiency of the drip for rapid replacement.

A married woman was operated on for chronic empyema. Cannulae had been tied in the saphenous vein at the ankle and in the cephalic vein at the shoulder prior to operation. Sharp haemorrhage during the decortication of the lung resulted in an estimated loss of about 5 pints (2.8 litres) of blood in about 15 minutes. The saphenous drip, which had been satisfactory up to this time, ceased to flow owing to venospasm, and would flow only at a very slow rate with the aid of positive pressure. There was no difficulty in flow of the cephalic drip, and the aid of positive pressure was not necessary. The rate of flow was timed for a period, 100 ml. of blood a minute being recorded. Undoubtedly this could have been increased by the use of positive pressure.

Prolonged Intravenous Therapy

While with prolonged infusion there is a danger of upsetting the fluid and chemical balance of the body, it nevertheless has to be employed in certain cases—for example, paralytic ileus. It is common knowledge that with drips in the distal superficial veins there is often a difficulty in obtaining a continuous flow after the first 48 hours. The "red line" appears along the course of the vein; the drip gets slower and finally stops. The cause of this phenomenon still remains unexplained. While some reactions are undoubtedly due to infection, this cannot account for the majority of cases. Irritation of the vein either by the nature of the intravenous fluids or by the metal sheath of the cannula will set up a process of "aseptic inflammation." This in turn evokes spasm in the musculature of the vein wall, with resultant stoppage of flow.

That no difficulty has been encountered in the prolonged flow in over 20 cases is probably due to the absence of spasm in the cephalic vein. It is also a significant factor that polythene is less irritant than a metal cannula to the vein wall.

The effectiveness of the cephalic vein drip for prolonged intravenous therapy is demonstrated by the following personal communication from Dr. W. Waldie: "The cephalic drip has been used successfully on 15 occasions. The method

has proved very useful for prolonged intravenous therapy, and two drips have been maintained for 12 days without trouble. Another cephalic drip, not carried out personally, ran freely for 15 days, although the patient was very restless; about 50 litres of fluid was transfused through the drip during this time."

In three cases following prolonged intravenous therapy the vein was examined at necropsy. The sheen of the intima was lost, but there was no evidence of thrombosis. In no case has any adverse effect been noticed on prolonged use of this vein for infusion. It has also been observed that the drip can be stopped for over an hour without any interference with the subsequent flow.

Drips in the distal peripheral veins necessitate immobilization of the limb. Besides the dangers of immobilization—for example, deep vein thrombosis—prolonged immobilization of the limb is very uncomfortable for the patient and interferes with the nursing care. The cephalic vein drip needs no more immobilization than two strips of adhesive strapping round the upper arm. In no way does it interfere with the free use of the arm, and the patient can feed himself, attend to toilet requirements, read, or pursue any other activity he wishes. It has been particularly appreciated by the nursing staff that the patients can actively co-operate in the nursing care.

The External Jugular Vein

This vein, like the cephalic, has a wide internal diameter with a minimal amount of musculature in its walls. I have used it on several occasions with success. Unfortunately it has the following drawbacks: (a) it is not constant in position or size; (b) it is more difficult to expose; (c) a cannula in the neck is not as comfortable as in the upper arm; and (d) the vein passes through a tunnel of deep fascia which holds the walls apart; it is therefore liable to air embolism, as proved in the case reported by Sir Bernard Spilsbury.

Summary

The cephalic vein, in the delto-pectoral groove, has been used for intravenous therapy on 41 occasions.

The superiority of this vein over the other veins of the body has been appreciated in rapid transfusion, in "shock," and in prolonged intravenous therapy. That this depends on the relation of the internal diameter of the vein to the musculature in its walls has been shown by histological studies.

Though this vein has undoubtedly been used for intravenous therapy before (as have all other superficial veins of the body), I can find no specific mention of it in the literature. The significance of the above finding has probably not been appreciated.

ADDENDUM.—Since this paper was written Mr. E. G. Dolton (1955) has used the method for massive blood transfusion. He states that the vein is absent in some cases and that this is indicated by the presence of minor superficial veins in the delto-pectoral groove. I have since found this to be true. I have had a recent case in which 500–750 ml. of 50% glucose was given daily through the cephalic vein for five days without any evidence of thrombosis. This is significant, as, lately, workers have advocated the insertion of a polythene catheter into the inferior vena cava to introduce this highly irritant fluid: venous thrombosis has sometimes followed.

I wish to thank Dr. W. Waldie for giving this method a trial at the Royal Victoria Infirmary, Glasgow, and for his co-operation in preparing this paper; Mr. I. M. Orr and Mr. R. C. Shaw, of the Preston Royal Infirmary, and Mr. E. G. Dolton, of the Royal Hospital, Wolverhampton, for permitting me to give this method a trial on cases under their care; and Mr. A. Robinson for the photograph.

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INFANTILE VISCERAL LEISHMANIASIS IN THE MALTESE ISLANDS

BY

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The main purpose of this paper is to record the decline in the incidence of leishmaniasis in the Maltese Islands over the past eight years, to comment on the literature perused during its preparation, and to review the insecticide residual technique used against the vector. It will also serve as an introduction to a later paper which will deal with epidemiological figures relating to the part played by the sand-fly in transmission of the disease. The clinical picture is not given, as Debono's (1947) description of the illness is not to be improved upon.

Historical Data

Leishmaniasis must have been endemic in these islands for a long time. Its first mention in Maltese medical records was in 1909; however, the figures published by the medical and health authorities in the first 25 years of this century reveal an extraordinarily high incidence of deaths in children under 1 year from chlorosis, anaemia, splenomegaly, splenic anaemia, and leucosplenic anaemia. That most of these cases must in reality have been due to unidentified kala-azar is shown from the yearly increase in incidence of deaths in children from that disease and the corresponding decline when leishmaniasis became known to have an entity of its own.

The occurrence of splenic anaemia in young Maltese children was first identified with visceral leishmaniasis by A. Critien as early as 1909; a year later he discovered the disease in the dog—work that was later carried out by V. Mifsud and A. Bernard. However, it was not till 1931 that leishmaniasis began to be investigated thoroughly. Early in that year Dr. S. Adler asked the Government of Malta for facilities to continue the investigations on kala-azar which, with his colleague Theodor, he had been carrying out in Catania the year before. They were trying to establish whether the sand-fly, which their research in Sicily indicated as the most important carrier of the disease, would be found to play here the same part in transmitting the disease. Two years later kala-azar was again mentioned in the principal medical officer's report, which dealt extensively with the first International Congress of Mediterranean Hygiene, held in Marseilles in the same year. It is therefore rather strange that leishmaniasis as a cause of death does not figure before the year 1938, when it was bracketed with "other disease due to protozoa."

In 1946, on my return from postgraduate training in the United Kingdom, leishmaniasis was, at my suggestion, made notifiable for the purpose not only of collecting full data on the epidemiology of the disease but also of starting a campaign against the vector by the insecticide residual technique. Mention should here be made of Dr. Francis Jaccarini, of Senglea, who was the first doctor in Malta to diagnose leishmaniasis in the adult.

Incidence

One peculiar characteristic of the clinical manifestation of the disease in comparison with other countries in the Mediterranean area is that we never encounter the cutaneous