# HAMILTON BAILEY'S

# EMERGENCY SURGERY

EDITED BY

T. J. McNAIR, M.D., F.R.C.S. (Edin.), F.R.C.S. (Eng.)

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# PREFACE TO THE EIGHTH EDITION

EMERGENCY SURGERY has been revised. The unfortunate death of the author has necessitated a new editor, and I am conscious of the responsibility this entails. An effort has been made to retain the style and the intention of this book. It is not intended—and never has been—for the well-trained young surgeon working in a well-equipped modern hospital with a well-stocked library at hand for reference and an experienced senior available to give advice. Rather is it written to help the less-experienced surgeon working, often alone, under conditions that may be far from ideal, who is expected to possess a far wider knowledge of medicine than is the modern specialized surgeon. In the circumstances in which I envisage this book being used the emergency surgeon is unlikely to have either the time or the facilities to consult references. For such reasons, and after much consideration, the reference lists have been omitted from this edition. The reader is reminded that most large medical libraries will willingly prepare an up-to-date reference list on any given subject on request, and will transmit copies of selected papers by mail.

I am indebted to Mr. L. G. Owens, B.Sc., of John Wright and Sons Ltd., for his advice, forbearance, and patience with one inexperienced in authorship. I am indebted also to those who have revised or rewritten many chapters and offered much helpful advice.

As with Hamilton Bailey I am indebted most of all to my wife, not only for her secretarial and medical work but also for her patience and encouragement.

T. J. McNAIR

*March*, 1967

# FROM THE PREFACES TO PREVIOUS EDITIONS

SURGICAL emergencies arise at any hour. Especially at night, such emergencies are wont to fall to the lot of a junior surgeon. Obviously well-indexed, reliable information on each and all of the contingencies that may be encountered in this way should be right to hand.

Every emergency surgeon must realize that the omnipotent Reaper who eventually garners us all stands near at hand more often than in any other branch of medicine or surgery. Disappointments, therefore, are many, and some of them are inevitable.

I have pictured a patient stricken with an acute surgical emergency and the comparatively isolated surgeon called upon to carry out appropriate treatment. Should these pages help the latter to save the former, their main object will be fulfilled.

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*Archives of Diseases of Children.* (*Figs.* 839 and 840.)
*British Medical Journal.* (*Figs.* 23, 24, and 718.)
*Canadian Journal of Surgery.* (*Fig.* 1150.)
*Clinical Orthopædics.* (*Fig.* 1127.)
*Clinical Radiology.* (*Fig.* 1246.)
*Journal of Bone and Joint Surgery.* (*Fig.* 1199.)
*Journal of the Faculty of Radiologists.* (*Fig.* 969.)
*Journal of the International College of Surgeons.* (*Figs.* 430, 1131, and 1132.)
*The Lancet.* (*Figs.* 50 and 725.)
*South African Journal of Clinical Science.* (*Fig.* 812.)
*Southern Medical Journal.* (*Fig.* 1000.)
*Surgery, Gynecology, and Obstetrics.* (*Fig.* 842.)
*Surgical Clinics of North America.* (*Fig.* 573.)

# CONTENTS

# EMERGENCY SURGERY

## *CHAPTER* 1

## ARMAMENTARIUM

*Suppress every manœuvre and every instrument which is not absolutely indispensable.* (Doyen.)

ONLY a few suggestions will be offered on this subject, as each surgeon will use the instruments with which he has become familiar at his teaching school, with appropriate modifications to meet his particular requirements. Doyen's sound advice (given above) concerning economy of movement and of instruments should be borne in mind.

**Spencer Wells Forceps.**—Spencer Wells forceps, for the sake of convenience, will be described as hæmostats in the chapters which follow. The pattern of the forceps which is illustrated throughout this work has a gentle curve on the flat and a tapering point.

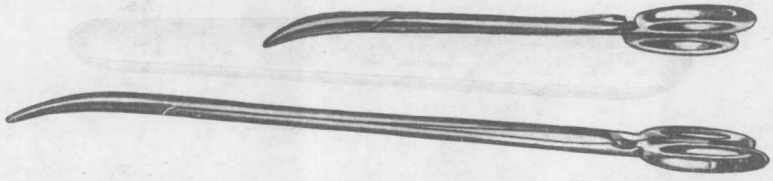

*Fig.* 1.—Spencer Wells forceps. These will be referred to in the text as long and short hæmostats.

The ratchet has four teeth. They are of two sizes (*Fig.* 1). These will later be referred to as the long and short hæmostats.

When operating it is well to avoid an accumulation of instruments on the towels about the wound ; a disorderly mass of tangled instruments on the towels which cover the patient's thighs is too often seen. Great help in keeping a clear and orderly field is to have a little bracket table which is lowered over the patient's legs when everything is in readiness for the operation. This table is used to hold artery forceps, scissors, etc. and is within easy reach of the surgeon himself. In general the operation will proceed in a more orderly fashion if bleeding points are ligated as they occur. After each bleeding point has been tied off, the assistant should return the hæmostat to the special table, and should not leave it lying on the towels.

**Retractors.**—

*London Hospital retractors* (*Fig.* 2) will be seen in use in several of the illustrations in this work. These retractors are made in two sizes, large and small.


*Fig.* 2.—Retractor (London Hospital pattern).

*Wound Hooks* (*Fig.* 3).—A pair of large wound hooks (Liverpool pattern) are very useful, and are referred to at some length in the section dealing with the upper midline abdominal incision.

*Sargent's depressor* (*Fig.* 4) is almost an indispensable instrument. The uses to which it may be put are legion. Many references will be made to it in the text. A good alternative is a malleable spatula cut to a similar shape from a sheet of copper.

*The mechanical retractor* shown in *Fig.* 5 is of great service. It can be used as a rib spreader and is very effective in a lumbar kidney wound, in addition to its duties in the anterior abdominal wall.

**Dissecting Forceps.**—Jeans' pattern (*Fig.* 6) combines strength with delicacy. Of substantial proportions, the large holes help to make the instrument comparatively light to handle.

**Wayne Babcock's Tissue Forceps** (*Fig.* 7) are extremely atraumatic, and are used to grasp friable structures.

**Walton's Model of Watson Cheyne's Dissector** (*Fig.* 8) is a handy instrument with many uses. There is a dissector at one end and a probe at the other. The fluted handle

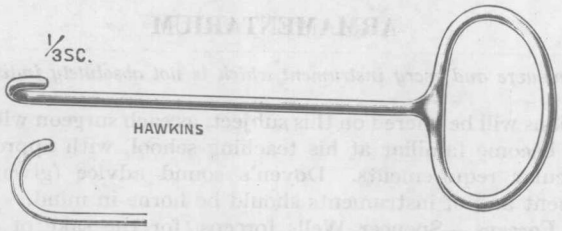


*Fig.* 3.—Abdominal wound hooks (Liverpool pattern).


*Fig.* 4.—Sargent's depressor.

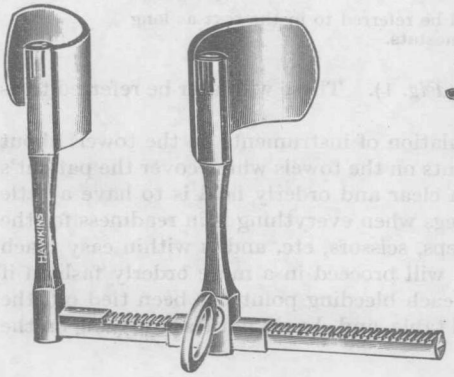


*Fig.* 5.—A universal mechanical retractor. Blades of various sizes are interchangeable.

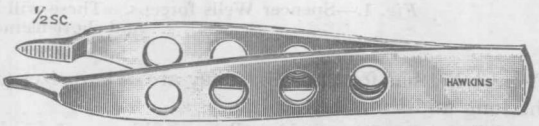


*Fig.* 6.—Jeans' dissecting forceps.

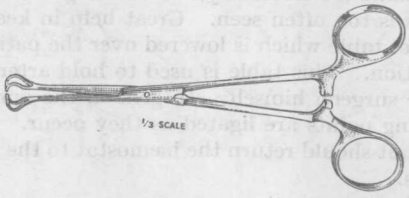


*Fig.* 7.—Wayne Babcock's tissue forceps.

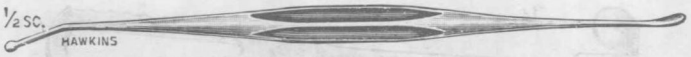


*Fig.* 8.—Walton's model of Watson Cheyne's dissector.

may be passed beneath a large vein or tendinous structure (as, for example, the inner end of the inguinal ligament in Hey Groves's operation) prior to its ligation or division as the case may be.

**Lahey's Swab.**—A piece of gauze $2\frac{1}{2} \times 1\frac{1}{2}$ in. (6 × 4 cm.) is cut from an ordinary flat swab, and is folded to the size of a peanut and mounted on a long hæmostat (*Fig.* 9). The Lahey swab is most useful for gauze dissection, especially in the depths of a cavity.

**Needles.**—Each surgeon will prefer certain needles. Cutting needles may be straight or curved and are used for skin sutures or for through-and-through sutures. Curved round-bodied needles suffice for almost all other purposes but a selection of sizes is necessary. The

larger needles are held in the surgeon's hand, the smaller in needle holders : the trend of fashion is now towards the latter method. In recent years an increasing selection of pre-sterilized atraumatic needles (in which the suture material is fixed into the end of an eyeless needle) has been made available by the various ligature manufacturers : such sutures are convenient and are easily stored.

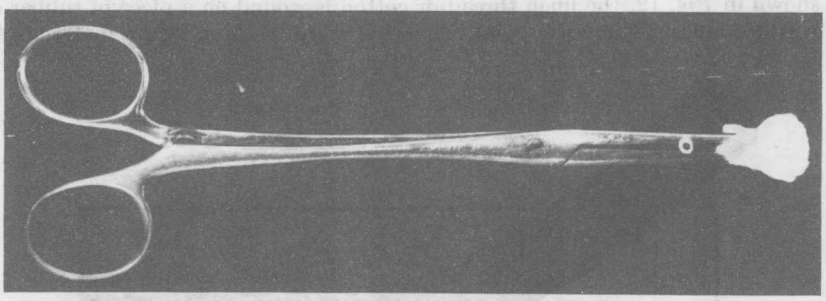

*Fig.* 9.—Lahey's swab.

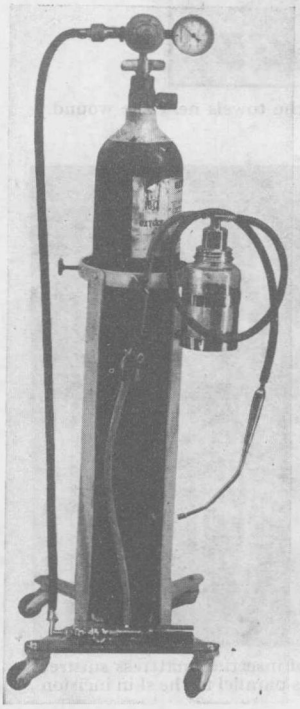

*Fig.* 10.—Sucker operated by oxygen. (Medical and Industrial Equipment Ltd.)

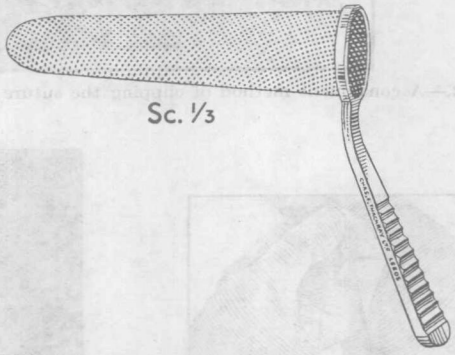


*Fig.* 11.—Denis Browne's sump.

**A Sucker.**—To be provided with a mechanical sucker is a boon in a number of emergency operations, notably those where there is fluid to be removed from the peritoneal cavity. The sucker operated by oxygen (*Fig.* 10) is very efficient and comparatively portable. It is unlikely to get out of order, whereas the electrically-operated suckers, unless efficiently serviced, are liable to break down, often when needed most.

The speedy removal of peritoneal exudate is constantly hampered by the end of a sucker coming in contact with intestine or omentum. In relevant cases the sucker becomes blocked by blood-clot. Denis Browne's sump (*Fig.* 11) greatly enhances the efficacy of a sucker by allowing its end to be in contact only with fluid.

**Sterilization of the Patient's Skin.**—Seventy per cent spirit coloured with flavine, or some other colouring agent, is efficient, comparatively non-irritating, and the area that has been painted is evident. Various proprietary preparations are available containing more modern disinfectants such as hexachlorophane but these are more expensive : some surgeons still prefer dilute solutions of iodine. Adhesive skin paints may be used, a sheet of plastic or gauze being glued to the skin in order to exclude the skin surface from the operative field : in such circumstances the incision is made through the protective covering and skin as one layer, and separate wound towels are not required.

## LIGATURES AND SUTURE MATERIALS

*Catgut.*—Can be employed for ligatures and buried sutures. Nothing thicker than No. 0 or No. 1 catgut is advised. If greater strength is required, two strands are used together.

*Linen Thread or Cotton.*—Barbour's linen thread No. 70 or Coates's No. 24 black cotton can be used for ligatures and as suture material for nearly every purpose except uniting mucous membranes.

As shown in *Fig.* 12, the linen thread or cotton is wound on a piece of rubber drainage tube in a single layer. From the point of view of sterility these suture materials are quite

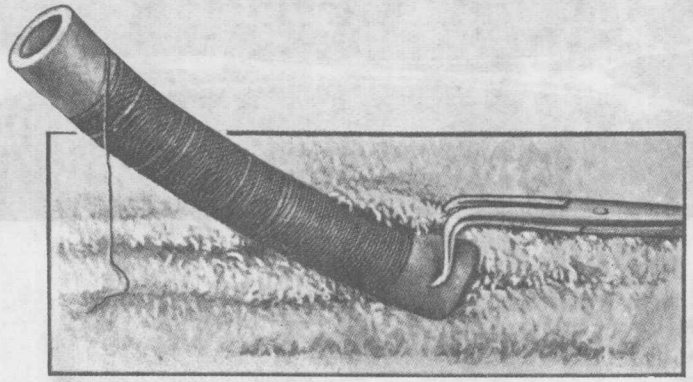

*Fig.* 12.—A convenient method of clipping the suture container to the towels near the wound.

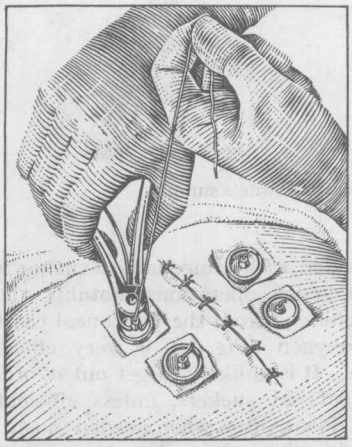

*Fig.* 13.—Emesay buttons being used for retaining sutures in place. Note the squares of petroleum-jelly gauze beneath the buttons.

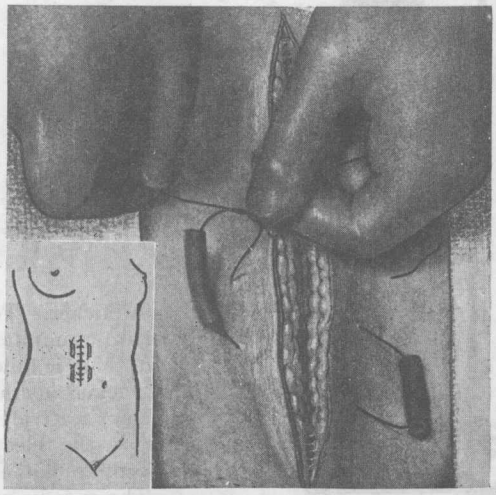

*Fig.* 14.—Method of inserting mattress sutures so that rubber tubing lies parallel to the skin incision and not across it.

safe if they have been boiled for twenty minutes, but most theatre sisters boil them for forty minutes, and store them in carbolic solution.

It is convenient to clip the loaded rubber tube to the towels near the wound, so that a continuous supply of ligature material is at hand. The assistant must be instructed to cut linen or cotton ligatures much closer than when catgut is employed.

In all cases where unabsorbable sutures are used, they must be interrupted. If additional strength is required, double threads can be employed. In cases where speed is indicated a continuous *catgut* suture is recommended. Never employ a continuous unabsorbable buried suture.

*Nylon* is rather brittle, and tends to snap. It is more liable to give rise to sinus formation than cotton or thread. It is not recommended for buried ligatures or sutures.

*Through-and-through Sutures.*—Stout nylon or silkworm gut is employed. While through-and-through sutures for the upper abdominal midline incision (*see* p. 393) are most satisfactory, in the lower abdomen they tend to cut in, and appear to favour local infection. For these reasons it is recommended not to employ through-and-through sutures that cross the incision, but to resort to one or other of the following expedients :—

*a.* Emesay buttons with squares of petroleum-jelly gauze beneath each button (*Fig.* 13). If the petroleum-jelly gauze or several layers of tulle gras are not used the buttons tend to cause skin necrosis.

*b.* Mattress sutures, combined with accurately cut pieces of $\frac{1}{8}$-in. (3-mm.) rubber tubing inserted as shown in *Fig.* 14. These are very efficient, and can be recommended in those cases where the surgeon feels that additional suport to the wound is desirable.

*Skin Sutures.*—Black cotton is excellent material for suturing the skin : alternatively, silkworm gut, silk, or nylon can be used.

## SWABS AND ABDOMINAL PACKS

The leaving of a swab or pack in the operative field is an ever-present hazard for both patient and surgeon. Each operating theatre will have its own routine for avoiding such mistakes, but the following points should be noted :—

1. Dissecting swabs, such as Lahey's (*Fig.* 9), must never be detached from the instruments which hold them whilst on the operating table.

2. Wound swabs should be of large size and should, if possible, contain a radio-opaque marker such as a metallic thread : if such swabs are lost in the course of an operation, emergency X-ray examination will reveal their location before the completion of the operation.

3. Packs should have tapes attached to them : the tape should be left outside the wound.

4. All swabs and packs must be counted before the operation commences and the figures noted on a special board. At the conclusion of the operation the counts must match.

5. Throughout the operation soiled swabs and packs must NOT be removed from the theatre but should be hung on an appropriate rack or laid out on the floor in trays.

6. The surgeon must ask for the swab count at the end of the operation and must be satisfied that it is correct.

7. If a swab is reported lost it must be searched for by the surgeon : when a swab is reported lost it must be assumed to be in the wound until proved otherwise. It is the height of folly to accuse the theatre nurse of an inaccurate count.

*CHAPTER 2*

# INFUSION AND TRANSFUSION

## INTRAVENOUS TECHNIQUES

For an emergency surgeon there is hardly a more important accomplishment than to be able to cannulize a radicle of the venous system expeditiously and effectively.

In every walk of life skilled technicians take pride in their tools. The tools for tying a cannula into a vein are few and simple, yet in some hospitals relatively large hæmostats and clumsy-toothed dissecting forceps are put out for this delicate operation. The essential

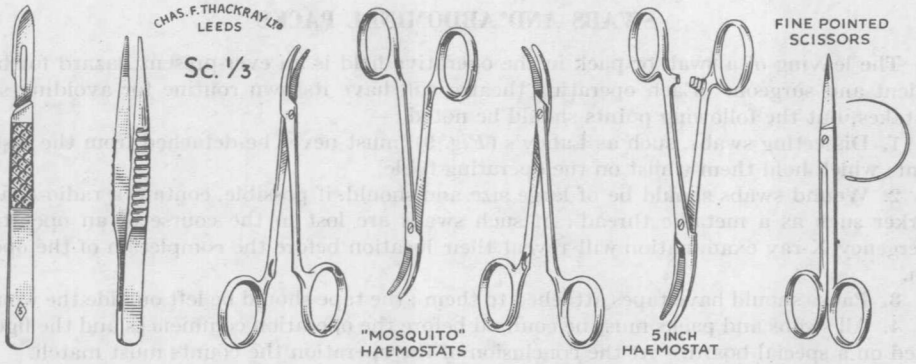


*Fig.* 15.—Instruments for cutting down upon a vein in order to tie in a cannula. The rather larger hæmostat is used for clearing the vein from subcutaneous tissues in the manner shown in *Fig.* 20.

equipment is shown in *Fig.* 15 ; it includes three pairs of really delicate hæmostats—the so-called mosquito type is ideal. The only other indispensable instrument is a pair of dissecting forceps with fine serrated points. Really fine-pointed scissors that cut at the points are most desirable.

The metal cannulæ formerly advocated have now been replaced by plastic cannulæ of polythene or nylon tubing. It is a wise precaution to keep one of the older metal cannulæ

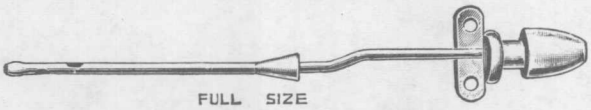


*Fig.* 16.—Hamilton Bailey's gold-plated cannula.

(*Fig.* 16) in the ' cut down ' set for the occasion when the plastic types are not available or have been damaged in sterilization.

*Polythene Tubing* (*Fig.* 17).—A most suitable cannula can be made by mounting a length (usually about a foot (30 cm.) ) of polythene tubing on a hollow needle, which has been sawn off by a metal file $\frac{3}{4}$ in. (18 mm.) from its shoulder. The hollow needle must, of course, be of such a size to fit the tube tightly, otherwise leakage will occur at the junction.

In practice, No. 2 is the size which will be required most often for veins of the forearm.

The tubing, with its attached needle (*Fig.* 18), is sterilized by boiling for fifteen minutes. It is essential that the lumen should be full of water at the time of the boiling ;[1] consequently,

[1] This is the only safe method of sterilizing polythene tubing as usually supplied, and the details should be observed with especial care. Several cases of septicæmia following inefficient sterilization of polythene tubing have been reported.

before sterilizing, water must be injected into the lumen of the tubing by means of a hypodermic syringe. After boiling, rapid cooling is necessary to restore the required stiffness of the tube. Polythene tubing must not be autoclaved. This form of tubing is believed to reduce the incidence of thrombosis and phlebitis, but no conclusive proof of this has yet been forthcoming.

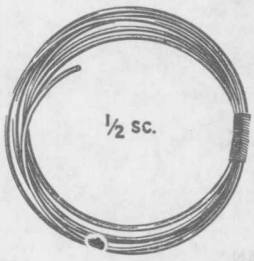


*Fig.* 17.—Polythene tubing for cannulizing a vein.

STERIVAC[1] POLYTHENE TUBING

| No. | INTERNAL DIAMETER | WALL THICKNESS | EXTERNAL DIAMETER | LUMEN FITTED BY NEEDLE |
|---|---|---|---|---|
| 1. | 0·5 mm. o | 0·25 mm. | 1·0 mm. | 25 S.W.G. |
| 2. | 1·0 mm. o | 0·25 mm. | 1·5 mm. | 19 S.W.G. |
| 3. | 1·5 mm. O | 0·5 mm. | 2·5 mm. | 17 S.W.G. |
| 4. | 2·0 mm. O | 0·5 mm. | 3·0 mm. | 14 S.W.G. |

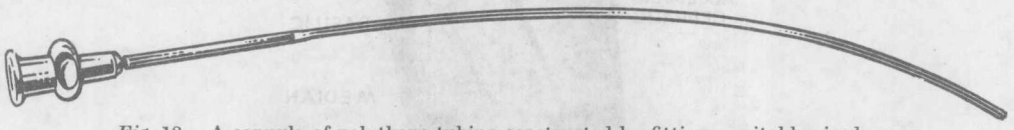

*Fig.* 18.—A cannula of polythene tubing constructed by fitting a suitably-sized, sawn off, hollow needle into the butt end of the tubing.

*Flexible Nylon Tubing*[2] is an alternative to polythene tubing. Its great advantage is that it can be sterilized by autoclaving, as well as by boiling. It is only a little less flexible than polythene.

*Giving Sets.*—Many varieties of plastic disposable blood transfusion giving sets (or intravenous giving sets without filters for crystalloid solutions) are now available (Capon Heaton, Baxter, and Abbott are examples) and have replaced the red-rubber and glass sets formerly used. Apart from their advantages of being disposable, these sets have resulted in a decreased incidence of thrombo-phlebitis (M.R.C. Report). Each disposable set consists of the piercing needle and air inlet, filter, drip chamber, drip regulator, giving needle, and connecting tubing. While individual surgeons may favour one particular manufacturer, in an emergency the type available at the time will be the deciding factor.

**Choice of a Vein.**—The veins of the arm provide avenues for infusion and transfusion in 90 per cent of cases. Unless a patient is collapsed and a vein is difficult to locate, it is best not to select a large vein ; one just a little larger than the cannula or needle is most suitable. For this reason, although prominent veins at the elbow are inviting, the tendency should be to employ one of the veins of the forearm (*Fig.* 19). Cannulization of a vein of the forearm will therefore be considered first, and other sites discussed afterwards.

**Technique of Inserting a Cannula.**—A venous tourniquet of rubber tubing is applied to the upper arm. Alternatively a sphygmomanometer cuff is inflated to 50 mm. Hg. The radial pulse is checked to ensure that the arterial supply has not been occluded. Venous blood is milked upward so as to make the veins prominent. In a conscious patient the overlying skin is anæsthetized by injecting a few minims of 1 per cent procaine. A short transverse incision is made over the vein, and the beak of a small hæmostat introduced into the wound, and its jaws are opened widely (*Fig.* 20). When this manœuvre has been carried out three or four times the vein will be cleared from the subcutaneous tissues better than by a painstaking dissection, and there is no fear of tearing even a delicate vein. The entire circumference of the vein must be freed over a distance of about 1 cm. Two fine cotton ligatures[3]

[1] Allen & Hanburys Ltd., Bethnal Green, London, E.1.

[2] Portex intravenous catheters, Portland Plastics.

[3] Fine cotton or silk is recommended for ligation of the vein, because catgut sutures tend to loosen after a few days and allow leakage of fluid from the vein. Catgut is favoured by some surgeons in the hope that absorption of the ligature will subsequently allow the vein to recanalize.

are passed beneath the vein. There is no need to use an aneurysm needle ; the beak of the hæmostat is passed under the vein and the ligatures are grasped therewith. The distal one is tied and its ends caught in a hæmostat. Traction on the proximal ligature will prevent loss of blood when the vein is opened. The vein wall is picked up in dissecting

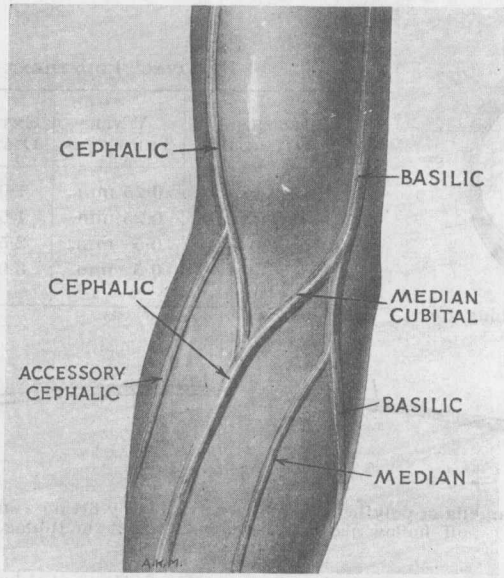


*Fig.* 19.—The veins of the forearm.

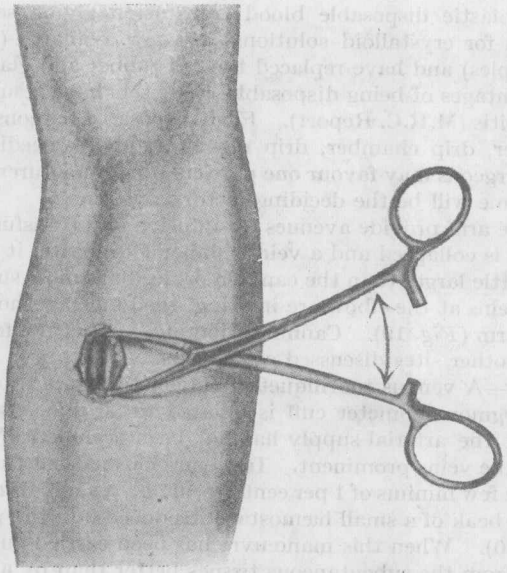

*Fig.* 20.—A rapid and efficient method of displaying a subcutaneous vein through a small transverse cutaneous incision.

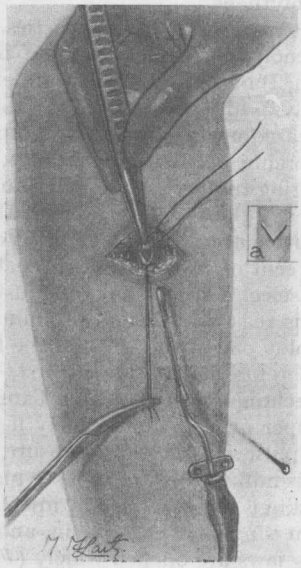

*Fig.* 21.—Ready for the insertion of the cannula. Inset shows the incision in the vein.

forceps, and with one snip of the fine-pointed scissors a triangular flap is raised (*Fig.* 21 inset). The apex of the flap is grasped in a hæmostat or by dissecting forceps (*Fig.* 21). If it appears that there will be difficulty in inserting the cannula, it is a good practice to place a hæmostat on each side of the incision in the vein, but this method is impracticable unless really fine mosquito hæmostats are available. Employing this technique a cannula slightly larger