PROFESSOR MACGREGOR: This is unusual in a patient developing an infection outside the hospital. He seems very ill indeed. I take it that you have added cloxacillin intramuscularly to his treatment.

DR. PALMER: In patients with severe—that is to say, life-threatening pneumonia such as is often seen in influenza epidemics—it is reasonable to prescribe penicillin and cloxacillin together from the outset until the organism and the sensitivity are known. This is because if the infection is caused by a penicillinase-producing staphylococcus the patient may be overwhelmed by the infection before the organism has been identified. If the staphylococcus is non-penicillinase-producing, penicillin G will be adequate, and when this is known cloxacillin can be omitted.

DR. HOWIE: Of course, ampicillin is not effective against penicillinase-producing staphylococci.

DR. WOOD: Furthermore, the fact that ampicillin is less effective than penicillin G against non-penicillinase-producing staphylococci is not widely understood. Methicillin is not being used much these days, presumably because it has to be given parenterally. But it does have some advantages such as being less bound to plasma proteins.

HOUSE PHYSICIAN: I will start oral penicillin and cloxacillin once there has been definite improvement. Incidentally, he is not allergic to penicillin. If he had been I would have prescribed erythromycin or bactericidal cephalosporins such as cephaloridine or cephalixin.

DR. PETRIE: Yes, erythromycin is effective against penicillinase-producing staphylococci and is a good alternative although organisms do develop resistance to it. Cephaloridine is not always as resistant to the action of penicillinase as it was thought to be. It cannot always be relied on. Cross allergenicity has been reported between penicillin and cephaloridine, and cephaloridine should be used cautiously in patients with a history of penicillin allergy. Cephaloridine must be given intramuscularly and has been associated with toxic effects on the kidneys and even with the development of renal failure.

Another cephalosporin derivative is cephalixin. It has not been clearly proven to be nephrotoxic. It can be given orally. It is resistant to staphylococcal penicillinase.

DR. HOWIE: Do you realize how expensive it is? A week's course costs over £4.

DR. WOOD: I appreciate that a staphylococcal infection can sometimes develop like this, but I would be most anxious to exclude an underlying lesion or disease, such as diabetes mellitus, which might lower the resistance to infection.

HOUSE PHYSICIAN: The investigations have shown a staphylococcal septicaemia and you will not be surprised to learn that he had some boils in the right axilla a fortnight ago—but he does not have diabetes mellitus.

PROFESSOR MACGREGOR: That is an important point. We saw a patient recently who presented with a staphylococcal septicaemia who turned out to have an IgG myeloma.

Part II of this article will appear in next week's B.M.J.

New Appliances

New Test for the Detection of Peripheral Arteriovenous Fistulae

Dr. S. SABRI, honorary senior registrar and lecturer in surgery, and Mr. L. T. COTTON, consultant surgeon and director, Department of Biomedical Engineering, King's College Hospital, London S.E.5, write: Congenital vascular anomalies of the limbs can be divided into two groups—venous malformations and arteriovenous fistulae.¹ The venous group is often referred to as the Klippel-Trenaunay syndrome.² The distinction is made either from evidence of arteriovenous shunting or by the predominance of venous abnormalities in the leg. Diagnosis of arteriovenous shunts rests on the presence of a raised oxygen saturation in venous blood, increased skin temperature, and angiographic evidence. Arteriograms show dilated major arteries, an increased number of arterial branches, and an abnormally rapid flow of contrast medium from arteries into veins. We describe a sensitive diagnostic test of arteriovenous shunting in which ultrasound is used. This can show arteriovenous communications of even microscopic size.

Method

The Parkes 802 Doppler instrument is used to measure blood velocity in major arteries through the intact skin. The method is painless and harmless and can therefore be used as often as required. A beam of ultrasound of 10 MHz is directed along an

artery by means of a probe held at an angle of 45° to the skin. The beam is reflected by red cells in blood and the reflected beam is detected by the probe. The flow pattern is one of many velocities and thus the back-scatter is one of many frequencies. The difference in frequency between the transmitted and reflected beams is detected by the noise heard through headphones, a permanent record of which can be made with a high-frequency recorder—for example, a phonocardiogram. The pitch of the audible tone is proportional to the velocity of blood flow; a high-pitched tone indicates a high blood velocity, whereas a low pitch suggests a low velocity.

The normal arterial sound transmitted from the probe to the headphone consists of a high-frequency vibration in which three sounds can be distinguished. A pictorial record obtained by feeding the electrical output of the probe into a recorder—for example, an electrocardiographic machine—shows that the blood velocity rises abruptly during systole (Fig. 1 A), corresponding to the first sound. Almost immediately there are two smaller peaks of blood velocity at the time of the second and

FIG. 1—Recording of normal arterial velocity wave form (A) and abnormal one in arteriovenous fistulae (B).

third sounds. The three sounds are very close together in time and there is a clear pause before the next pulse complex.

The normal arterial sound transmitted from the probe can be recorded by the phonocardiogram. A record of the sound over the dorsalis pedis artery is shown in Fig. 2.

FIG. 2—Phonocardiographic recording of normal arterial sound.

Investigation of Arteriovenous Shunts

Twelve patients known to have diffuse congenital arteriovenous shunts were examined. In all an abnormal arterial sound was recorded (Fig. 1 B). The first, second, and third sounds could be recognized, and in addition there was a fourth small peak in

FIG. 3—Phonocardiographic recording of abnormal arterial sound.

blood velocity, which possibly represented flow through arteriovenous fistulae. These differences are most easily recognized in ultrasound phonocardiograms (Fig. 3), in which the amplitude of the sound wave can be seen to be decreased and the duration is prolonged. Three other patients thought to have a purely venous malformation showed evidence of arteriovenous shunting with the ultrasound test (Fig. 4). Presumably the degree of shunting in these cases was too small to be detected by any other means.

FIG. 4—Phonocardiographic recording of arterial sound in normal leg (A) and abnormal leg (B).

Value of the Test

We use the method of Malan and Puglionise³ in selected cases of diffuse congenital arteriovenous shunts in which the arterial branches supplying arteriovenous fistulae are divided. Ultrasound records can be used to measure the effectiveness of such an operation.

It seems likely that the ultrasound test may also prove to be of value in the evaluation of other vascular diseases. For example, a typical record of arteriovenous shunting was obtained from cases of erythromelalgia. In varicose veins and Raynaud's disease the ultrasound tests gave normal results.

References

- ¹ Cotton, L. T., and Sykes, B. J., *Proceedings of the Royal Society of Medicine*, 1969, 62, 245.
- ² Klippel, M., and Trenaunay, P., *Archives Générales de Médecine*, 1900, 185, 641.
- ³ Malan, E., and Puglionise, A., *Journal of Cardiovascular Surgery*, 1965, 6, 255.

Removal of Corneal Foreign Bodies by Disposable Needle

Professor W. S. FOULDS, Tennent Institute of Ophthalmology, University of Glasgow, writes: The removal of an embedded corneal foreign body is a common emergency procedure in the casualty departments of general hospitals and eye hospitals. Most ophthalmologists agree that the removal of such foreign bodies is best undertaken with the use of a sharply-pointed foreign body needle, which can extract the foreign body with minimal damage to the cornea, and not by the use of the time-honoured spud, which, while appearing safe because of its bluntness, results in considerable corneal damage owing to the amount of tissue destruction which removal of the foreign body by this method entails.

The difficulty of always having a very sharp sterile corneal foreign body needle to hand has prompted many ophthalmologists to use a disposable serum needle for this purpose. Such a needle makes an imperfectly balanced instrument, however,

Handle with disposable serum needle attached.

and being short is difficult to manipulate easily. A simple solution is the handle that has been made for me (see Fig.), which consists of a light milled rod some 5 in (13 cm) long with a tapered end that will hold firmly a disposable hypodermic needle (No. 12 or 18). Such a needle can be extracted from its plastic container by inserting the taper of the handle direct into the needle in the same way as the needle is attached to a syringe. In practice it has been found that a handle of this sort greatly adds to the ease with which a serum needle can be used for the removal of a corneal foreign body, while the fact that the needle itself is disposable means that a uniformly sharp and sterile instrument is always readily available.

This handle was made by Keeler Instruments Ltd., 21/27 Marylebone Lane, London W1M 6DS.