COMPLICATIONS

Postoperatively there were very few serious complications. In view of the fact that the patients were of the older age group chest infections were surprisingly rare. The most common complication was wound infection, which occurred in 7% of the cases. This was never serious and in all cases cleared within four or five days.

Although two cases of secondary haemorrhage occurred neither needed re-exploration, and no patient was returned to the theatre for evacuation of a clot. One patient developed jaundice and haemolytic anaemia. This was thoroughly investigated and was finally regarded as being due to sulphonamide therapy. Medical treatment was instituted and the patient improved dramatically within three days. He eventually left hospital with a haemoglobin level of 89%.

Mild congestive heart failure occurred in several of the elderly patients. All recovered well and in no case did this prolong the patient's stay in hospital. One patient developed a massive haematemesis, which responded to medical measures. Full investigations did not determine any causative factors. He was subsequently seen several times as an outpatient and never had any recurrence or new symptoms. All investigations remained negative.

At the routine follow-up three patients were found to have developed a stricture, but as these take some years to develop this is probably a low figure.

Discussion

Debenham and Ward[2] described their anaesthetic and operative procedure in which hypotension was used to reduce haemorrhage in retropubic prostatectomies. Many of their patients did not require a catheter, and this was associated with a lower incidence of postoperative urinary infection. Since then several series have been published to confirm the results, but the technique is still not widely used.

Salvaries[5] showed that more than 80% of deaths occurring after prostatectomy followed some pronounced degree of hypotension during the operation. Sheppard,[1] however, clearly showed that controlled hypotension was a safe procedure, and of the series published the mortality of hypotensive prostatectomies compared favourably with that of prostatectomies performed with a normotensive technique.

The main advantage to the patient of this technique is the freedom from a postoperative catheter, which enables easier nursing[6] and is a psychological advantage. Bruce and Quirk[7] stated that recatheterization in these patients is uncomfortable, but in 36 patients in the present series in whom this procedure was performed this was not so. Blood loss was never excessive. In fact, most of the patients who had transfusions had them for preoperative anaemia.

Stricture formation cannot be truly commented on at such an early stage in this series. Only three patients had a slight stricture when seen at follow-up for their routine passage of sounds. The indications are, however, that the number of strictures will be low. Postmeatal stricture is the commonest site for a urethral stricture and is aggravated by the presence of a urethral catheter. When no postoperative catheter is used this will be an obvious advantage in lowering the incidence, which has been quoted as 6% by Caine.[8]

The other site of stricture formation is the bladder neck. An excision of a wedge of bladder neck has been recommended to overcome this complication. We do not perform this manoeuvre, as the thickened bladder neck is sutured down to the prostatic cavity to give a smooth posterior wall. Under these circumstances we have yet to see any complication. In our view there are no contraindications to performing a non-catheter prostatectomy under hypotension. In fact this procedure is used as the method of choice in teaching registrars the technique of retropubic prostatectomy. It is the only method whereby the operator is able to see the structures in their true state instead of performing a blind operation.

I would like to thank Mr. S. Glaser for allowing me to review patients under his care and for his encouragement and help in the preparation of this paper. I would also like to thank Dr. M. Watson and Dr. G. Neill, who were responsible for most of the anaesthetics.

References

[1] Sheppard, N. L., *Proceedings of the Royal Society of Medicine*, 1961, **56**, 1127.
[2] Debenham, L. S., and Ward, A. E., *British Journal of Urology*, 1960, **32**, 178.
[3] McAlister, C. L. O., *Journal of Urology*, 1964, **92**, 517.
[4] Lee, J. A. H., Morrison, S. L., and Norris, J. N., *Lancet*, 1957, **2**, 785.
[5] Salvaries, M., *Medical Journal of Australia*, 1960, **1**, 370.
[6] Greaves, M., *Nursing Times*, 1962, **58**, 1518.
[7] Bruce, A. W., and Quirk, J., *Journal of Urology*, 1964, **92**, 523.
[8] Caine, M., *British Journal of Urology*, 1954, **26**, 205.
[9] Bodman, R., *British Journal of Anaesthesia*, 1959, **31**, 484.
[10] Grace, A. H., *Proceedings of the Royal Society of Medicine*, 1961, **54**, 1130.
[11] Bodman, R., *Proceedings of the Royal Society of Medicine*, 1964, **57**, 1184.
[12] Spencer, J., *British Journal of Surgery*, 1967, **54**, 340.

New Appliances

New Electronic Metal Locator

British Medical Journal, 1972, **2**, 157–158

Dr. J. Watson, department of electronic engineering, University of Wales, Swansea, and Mr. H. J. HAMBURY, consultant orthopaedic and traumatic surgeon, Morrison and Singleton Hospitals, Swansea, write: The search for and removal of small penetrating metallic foreign bodies is one of the most time-consuming and indeed occasionally dangerous procedures that has to be carried out in busy casualty departments or operating theatres of accident units. In a few departments large and cumbersome electronic instruments are used to help detect such foreign bodies but their use has not become more widespread because of their difficult tuning characteristics, their clumsiness, and their cost.

A new, small metal locator (Fig. 1) has been developed which is powered by two 9-volt dry batteries. It has a pencil-sized transducer probe which can be immersed in sterilizing liquid. When the tip of the probe is within a short distance of a metal object an audible alarm operates so that the surgeon can concentrate his attention on the position of the probe rather than on a visual indicator. The instrument has been used successfully in eight cases of metallic foreign bodies embedded in soft tissue, four of which are shown in Fig. 2. It is now in use in three different hospitals.

Range and Sensitivity

The range of the instrument is the maximum distance from the metal object to the probe at which the alarm will operate.

This range has been designed not to exceed 1 cm for the largest expected metal objects. For small objects, such as a ¼-in (6-mm) piece of sewing needle, the range will be only 1 to 2 mm. This enables precise location of the object in even the most difficult circumstances, such as when a piece of needle lies within a tendon sheath and so cannot be felt with a rubber-gloved hand. An added advantage of the limited range is that the probe can be used within a wound without detecting any retractors or other adjacent surgical instrument.

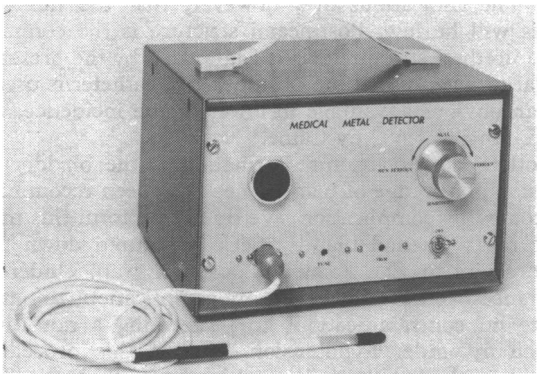

FIG. 1—Metal locator, cable, and probe.

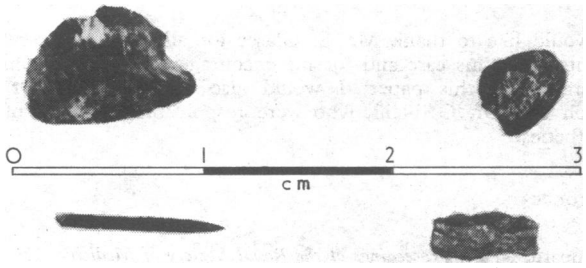

FIG. 2—Metallic foreign bodies found in tissues with the metal locator.

The sensitivity of the instrument is closely connected with the range, in that at its most sensitive setting the range is at its greatest. It is possible to adjust the control so that the locator is most sensitive to *either* ferrous *or* non-ferrous metals. This is because the instrument operates on the principle of phase-shift detection, and the phase will shift one way for ferrous and the other way for non-ferrous metals. That is, the sensitivity and range are greatest when either magnetic or good conducting metals are to be located. This includes iron, steel, copper, brass, and aluminium. The instrument is insensitive to stainless (non-magnetic) steel and metals of poor conductivity such as lead.

Probe

An inductive transducer is secured into one end of a nylon tube the shape and size of a pencil and is connected to the instrument by 6 ft (183 cm) of twin-screened cable and a plug and socket (Fig. 1). The cable-to-tube joint and the transducer end of the tube are sealed with a Hellermann heat-shrinkable tube and end-cap respectively. This enables the complete assembly to be soak-sterilized in nitromersol (Metaphen) or alternatively suspended in formaldehyde vapour, and it is envisaged that several probes would come with each instrument so that a sterile one would always be available.

Operation and Performance

The only control apart from the on-off switch is the sensitivity knob. When this is at "null" no sound will be heard. It is then rotated clockwise or anti-clockwise depending on whether the metal to be detected is ferrous or non-ferrous. Eventually the alarm operates, whereupon the knob is reversed until the alarm ceases. The metal detector is then at its most sensitive and is ready for use.

The instrument has been designed particularly for the accurate detection of small pieces of metal. It does not therefore compete with the larger and more complex inductive devices such as the Roper-Hall locator.[1] Further, it needs no balancing before use and does not require visual observation.

Fraser-Moodie[2] stressed that needles are among the commonest objects found in the tissues and cardiovascular system. The present instrument is particularly suited to the location of needles or parts of needles, and Fig. 2 (bottom left) shows such a fragment which was located in the hypothenar eminence of a left hand. At the bottom right of Fig. 2 is shown a fragment of nickel which was detected in the intermetacarpal space between the fourth and fifth fingers of a right hand. At the top of Fig. 2 are shown two pieces of steel from shattered bearings found embedded in a calf and arm respectively.

Unlike Fraser-Moodie localizers the probe utilized with the present instrument is inactive. That is, it does not depend on the flow of an electric current through tissue. Its outer envelope is entirely of non-conducting plastic, and it may therefore be used during major surgery after sterilization. As Fraser-Moodie[2] pointed out, "to carry out an exploratory operation without the assistance of pilot needles, accurate localisers, or an electric or electronic locator, is to invite failure, and probably cause much unnecessary operative trauma."

We acknowledge the invaluable help of Mr. A. Z. Drybanski, who did much of the actual work involved in the development of the metal locator; Mr. R. Barratt, Mr. K. Arnold, and Mr. D. Whale, who built the prototype; and Mr. R. Edwards and Mr. P. Morris, who produced the photographs. The initial work was supported by the University College, Swansea.

Inquiries about instruments for trial or for use should be directed to Messrs. Cosmocord, Waltham Cross, Herts.

References

1 Gibson, R., *Journal of Laryngology and Otology*, 1965, **79**, 23.
2 Fraser-Moodie, W., *British Journal of Oral Surgery*, 1966, **4**, 102.