SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation

PROSTATECTOMY AND ITS POST-OPERATIVE MANAGEMENT

BY

SIR W. I. de C. WHEELER, M.D., F.R.C.S.I.

The success or otherwise of post-operative treatment depends upon the efficacy of pre-operative measures and upon the operative procedure. It will therefore be necessary to allude briefly to both the latter when discussing the former. It will not be possible to discuss the wide variations of treatment which are required after procedures such as the Harris complete closure operation, endoscopic resection, or operations performed through the perineal route. Attention will be directed to open operations of the orthodox type.

General Considerations

The surgery of the prostate gland as we know it had its birth in or about the year 1887. At this time McGill of Leeds read a paper on suprapubic prostatectomy. In those early days surgery was judged largely by the speed of operation. Onlookers in the operating theatre instinctively stood with one eye on the clock. Manual dexterity was of a high order, and in every department the Science of surgery was subordinated to the Art. Major amputations were completed in a few minutes. It was emphatically laid down that operations such as lithotomy must not occupy more than four minutes for the "first sitting." Prostatectomy was performed by pioneers such as Freyer with a celerity that has never been excelled. Speed must still be the watchword in conditions of danger and emergency, but the cost may be heavy in the form of post-operative complications, immediate and remote.

Elderly patients are not necessarily bad surgical risks. They tolerate well such major operations as amputations, gastrectomy, and colectomy. It is recognized, however, that those advanced in years require the most detailed care in the pre-operative and post-operative periods. This point is, I think, made clear by the statistical figures collected by the late Sir John Thomson-Walker and other authorities. Wide variations in results following operations by expert surgeons are reported. These variations can be explained only by assuming that some surgeons were in a better position than others to give close personal attention to pre-operative and post-operative care.

In a series of 472 cases in private practice Thomson-Walker's mortality was 5.2 per cent. Comparable statistics in hospital practice revealed a rise in this figure to 9.9 per cent. The figures obtained from hospitals further afield demonstrated a death rate as high as 20.4 per cent. following a single-stage operation, with a reduction to 17.4 per cent. when the two-stage operation was employed. Harris was insistent on the necessity for scientific pre-operative and post-operative care and upon asepsis of a high order.

He published a large series of cases with a mortality of only 2.7 per cent. In the Mayo Clinic, mortality following endoscopic resection approaches the figure of 1 per cent.

The results of his open plastic operation published by Harris are so impressive that his teaching is worthy of study. It has been fully published. His observations

concerning one fatal case illustrated the direction of his thoughts. "This last patient," says Harris, "had had a preliminary cystotomy six weeks before the prostatectomy. There had been a number of small pustules below the fistula which were slow to heal. These were touched with pure carbolic acid, and the area of skin containing them was excised during the skin incision. His wound broke down and he developed a general pyaemia. This is a valuable example of the inadvisability of ever carrying out a prostatectomy until all conditions are as favourable as they can be made." Harris attached great importance to the indigo-carmin test of renal function. Whatever other tests revealed, he would not operate unless a distinct blue coloration of the urine appeared within ten minutes of the intravenous injection.

There is one obvious pitfall where some of us have stumbled in dealing with cases of prostatic obstruction. It is not sufficiently realized that multiple pathology is the rule and not the exception in elderly patients. I have seen patients either alarmed or exhausted to such an extent from troubles with micturition that symptoms indicating the presence of disease elsewhere were concealed or forgotten. Apart from the large percentage of cases with cardiovascular disease resulting directly from prostatic obstruction, there are others with remote lesions such as cancer of the stomach or colon, disease of the central nervous system, glycosuria, active pyorrhoea, or other morbid conditions. If such escape recognition the treatment of urinary obstruction may be misdirected or futile.

Operation

The details of operative technique are outside the scope of this communication, but in Fig. 1 a simple manoeuvre is illustrated which lessens the chance of contamination of the operative field from the contents of the bladder. The latter is opened by the introduction of Kidd's trocar and cannula. Through this the terminal portion of a close-fitting aspirator is introduced. When the bladder is completely emptied by suction the trocar and cannula are removed and the opening in the bladder enlarged sufficiently for the completion of the operation. Kocher's goitre forceps (Fig. 2) has been found a convenient instrument for grasping the prostate during an open operation or when it lies free ready for removal from the cavity of the bladder.

Post-operative Management

The necessity for forcing fluids and thus promoting diuresis is accepted by all. During operation two to four pints of normal saline solution may be given into the tissues of the axilla by means of Lane's bag. The fluid is usually absorbed within an hour, during a period when it cannot conveniently be administered by any other route. If the patient has some distance to go from the operating theatre to bed it is well, in the transit, to protect his respiratory passages from the colder air by covering his face loosely with a warm blanket. The foot of the bed should be raised two feet, and $\frac{1}{4}$ grain of morphine given hypodermically.

Assuming the patient has not been unduly shocked, haemorrhage is the one serious complication to be feared at this stage. Bleeding after operation occurs more

often in patients with a low blood pressure, and the lower the blood pressure the greater is the possibility of thrombosis and pulmonary embolism. Haemorrhage is an infrequent occurrence after any of the modern one-stage operations, and it seldom gives trouble when the two-stage procedure is employed. If it does occur, then treatment must be prompt. Signs are unmistakable: the pulse rate rises, blanching is pronounced, restlessness increases, and

This is usually controlled by continuous irrigation, but if it persists and the patient appears to lose ground the prostatic cavity must be packed and a large suprapubic drainage tube reintroduced.

The danger of haemorrhage after prostatectomy is not finally passed until after the tenth or twelfth day. The bladder at this time is becoming stretched *pari passu* with the closure of the suprapubic wound. Once again it may become necessary to reopen the original drainage tract and, if the bleeding continues after this renewed drainage, the prostatic cavity must be packed. In severe bleeding transfusion may save life. An intramuscular injection of one or two ounces of whole blood may be given at once as a haemostatic, as no typing is required. I have never used the Hagner, Pilcher, or other haemostatic bag, but some surgeons employ one of these or the Andrews tube as a routine.

Uraemia

The patient may be potentially uraemic at the time of operation, as shown by laboratory tests of renal function or clinical signs. When pre-operative treatment has failed to restore good renal efficiency a two-stage operation is indicated. In such cases, however, simple suprapubic drainage may prove fatal unless catheter drainage is previously employed. Post-operative uraemia need not be feared when the urea-concentration test before operation gives a figure of not less than 2 per cent. If there are misgivings at the time of the operation as to the maintenance of renal function during the subsequent days it is best to take Time by the forelock and install an intravenous drip of 5 per cent. glucose solution into the internal saphenous vein in front of the malleolus. By choosing this vein the patient's arms are left free. As a precaution against a sudden jerk or flexion of the leg during sleep a clove hitch should be loosely applied round the ankle and tied to the end of the bed. Glucose solutions are employed not only for their diuretic properties but also because they act directly on the heart and supply glycogen to the liver. If uraemia is established or is still threatened, one of the most powerful diuretics is a solution of sodium sulphate (Dick, 1933-4). Dick recommends the solution, and prepares it by dissolving 42.85 grammes of Glauber's salt in one litre of water. Two litres are administered by the drip method, and are repeated if necessary.

Post-operative Collection of the Urine

The usual routine is to employ the Hamilton Irving box or one of its modifications over the suprapubic tube. The tubes from this apparatus are carried under the thighs to a bottle beside the bed. Crystals of boric acid are wrapped in gauze and placed within the box. The latter is removed and boiled each day, and is replaced after a liberal smearing of the skin in the suprapubic region with warm sterile petroleum jelly. The bladder is irrigated through the indwelling catheter once or twice daily with silver nitrate solution, weak permanganate solution, or sterile water. As already stated, continuous irrigation is indicated when bleeding is troublesome, but it may with advantage be employed in other cases, especially when infection is found difficult to control.

Suction Drainage

For many years I have not employed such appliances as the Hamilton Irving box. A water or steam suction tap is installed by the bedside of hospital patients, and a silent electrically driven suction engine (the Lovac) is employed in private work. After a little instruction and practice the average nurse becomes accustomed to this

FIG. 1.—A: Suction terminal and Kidd's trocar and cannula.
B: Suction terminal in position.

bladder spasms with the extrusion of red clots from the tube are continuous. In the presence of such signs and symptoms the prostatic cavity must be packed without delay. The drainage tubes are removed, and under gas-and-oxygen anaesthesia the bladder is quickly emptied of clots with gauze and forceps. The vesical end of the indwelling catheter (if used) is caught with the fingers and pulled well into the bladder. With this as a guide,

FIG. 2.—Kocher's goitre forceps, used for grasping the prostate.

iodoform gauze is packed into the prostatic cavity by aid of the first finger. The catheter is pulled down into position with the eye lying just above the centre of the gauze packing. The suprapubic tube is replaced, and a further injection of morphine given when necessary. Continuous irrigation of the bladder by a fast drip of silver nitrate solution (1 in 10,000) is indicated. The packing is removed in from twelve to twenty-four hours. Apart from alarming haemorrhage, continuous daily oozing of blood during the first week may give rise to anxiety.

method. Not only is the patient kept dry, but the bladder and the prostatic cavity are more effectively drained, and I believe that the incidence of many post-operative complications is reduced. A paper by Fish on mechanical drainage in surgical urology (Fish, 1931) described the advantages of suction over other methods as observed in

FIG. 3.—Suprapubic tube in position, with glass tube inserted for connexion with suction apparatus.

the Squier Urological Clinic in New York. The paper deals with a large series of cases treated with and without the use of post-operative suction. "In the suction group," says Fish, "the patient was dry and comfortable, to say nothing of a very considerable saving of dressings, linen, and nursing care." A bent glass tube, smaller in diameter and slightly shorter than the suprapubic drainage tube, is placed in the latter (Fig. 3). The glass tube is connected to an aspiration bottle, which is in turn connected to the water-tap

FIG. 4.—Giles's tube.

suction or electric engine. Open suction is thus maintained for about five days. The suprapubic tube is then removed, and suction is continued through a small metal tube (Giles's, Figs. 4 and 5). This latter does not enter the bladder; it passes through the more superficial portion of the fistula. Suction is continued through this tube for another five or six days. The suprapubic drainage is then discontinued, and the indwelling catheter is connected with a bottle at the bedside until healing is complete. Fig. 6 illustrates continuous suction by means of the electric engine. Continuous irrigation of the bladder is also shown, and glucose solution is seen entering the internal saphenous vein by the drip method. (The receptacles hang from a portable frame of the Balkan variety supplied by Messrs. Gardner of Edinburgh. The detachable cross-bars for suspension and traction in fracture work are omitted.) Thomson-Walker drew attention, in his Lettsomian Lectures in 1930, to the widespread belief that

an indwelling catheter and continuous irrigation after an operation are difficult measures to apply and will cause haemorrhage and epididymitis. His work and the experience of others have proved the contrary. These troubles, like many other complications, are attributable often to inadequate asepsis before, during, and after operation.

FIG. 5.—Giles's tube in position

FIG. 6.—Illustrating continuous suction, irrigation, and intra-venous drip

The Indwelling Catheter

The indwelling catheter is commonly employed from the time the patient leaves the operating theatre until the suprapubic wound is soundly healed. Some surgeons use it for both irrigation and subsidiary drainage. Suprapubic and catheter drainage employed simultaneously is, however, often irksome to the patient, and makes nursing more difficult. It is sufficient as a rule to close the end of the catheter with a spigot and to use it only for irrigation. When the suprapubic wound has almost healed catheter drainage for a few days will complete the closure. When the catheter is introduced before the patient leaves the operating theatre, it can be held in position in the manner which was originally suggested when describing an operation for ruptured urethra. It is the routine employed after the Harris operation. A silkworm-gut ligature is passed through the intravesical

portion of the rubber catheter near the eye, and anchored to the suprapubic wound across a piece of tubing. The penis, including the meatus, should be enveloped in a dressing of iodoform gauze and glycerin or paraffin, and the sterile spigot plugging the catheter should also be covered with sterile gauze. Before the suprapubic tube is placed in the bladder it is ascertained that the end of the catheter lies snugly in a position to ensure proper irrigation and drainage of the prostatic bed.

If the methods outlined above do not result in complete closure of the suprapubic fistula in the third week there is probably some obstruction in the prostatic bed to the passage of urine. Remnants of the prostate may have been left behind during enucleation, or excessive scar tissue may have formed following a severe infection. Post-operative infection is as disheartening to the surgeon as it is to the patient, for it indicates some serious breakdown in the management of the case. Sometimes this infection is difficult to avoid. If a number of infected cases have been admitted to the wards and are undergoing preliminary drainage, unless special precautions are taken the infection may be readily carried from one bed to the next.

In an average case the suprapubic wound should be dry on or about the sixteenth day. Post-operative obstruction may be treated by dilatation, following the methods employed for stricture, but, failing this, either an open operation to remove the scar tissue must be undertaken or a right-of-way for the urine obtained by endoscopic methods. Occasionally after complete removal of the prostate gland there is a regrowth from the periphery. I drew attention to a case of this kind (Wheeler, 1933). The prostate had been removed twelve years previously. The patient was free from symptoms throughout almost this entire period. The old signs and symptoms gradually recurred, residual urine was at a maximum, and by chemical tests renal destruction was almost complete. Gradual decompression and subsequent drainage for six months secured a sufficient return of renal function to permit a second prostatectomy by dissection. The final recovery was complete.

Pulmonary embolism is a catastrophe which follows prostatectomy with some frequency. There were twenty deaths from this cause in a series of 269 cases mentioned by Thomson-Walker. It comes without warning as a rule between the fifth and the twelfth days. The patient calls for the bed-pan, gasps for breath, and usually only survives ten to twenty minutes. Those who have to deal with the post-operative treatment after prostatectomy feel relief when the second week has passed. Pulmonary embolus and delayed haemorrhage are not likely to occur after the twelfth day.

Aperients and Urinary Antiseptics

An aperient may be given on the third day. Enemata should not be employed; they may be followed by haemorrhage. One of the best aperients is one ounce of castor oil given in the early hours of the morning. It is better to avoid purgatives at night time after any major operation; they may be the cause of a disturbed night. In the experience of many, urinary antiseptics are of little value during the days following prostatectomy. I have tried prontosil recently without much obvious result. It must be given with caution to elderly patients. During the early convalescent period infected urine is rendered sterile or improved by the administration of well-known mixtures such as sodium benzoate and hexamine in

10-grain doses. The former is sometimes found to be disagreeable to the patients, and in such cases acid sodium phosphate is substituted. There are many other drugs used as urinary disinfectants; one of the most powerful acidulants is acid. nitro-hydrochlor. fort. Four drachms of this acid are mixed with four ounces of water. The mixture is given in 1-drachm doses four times daily in a tumblerful of water.

REFERENCES

- Dick, L. (1933-4). *Trans. med.-chir. Soc. Edinb.*, **48**, 203.
Fish, G. W. (1931). *Amer. J. Surg.*, **11**, 58.
Wheeler, W. I. de C. (1929). *Brit. J. Urol.*, **1**, 126.
— (1933). *Surg. Gynec. Obstet.*, **56**, 257.

Reports of Societies

PLANT VIRUSES

At a meeting of the Royal Society of Tropical Medicine and Hygiene at Manson House on January 19, with the president, Colonel S. P. JAMES, in the chair, Dr. KENNETH M. SMITH read a paper on plant viruses.

Dr. Smith said that since 1892, when Iwanowsky discovered the first virus, a large number of plant and animal viruses had been described; of the former there were now no fewer than 163 viruses and virus strains on record. The symptoms of virus-affected plants were extremely varied, and almost the only point in common was the uniform distribution of the symptoms over most of the plant, due to the systemic nature of the infection. This was in contrast to the more localized lesions caused by other pathogenic agents. One of the commonest types of symptoms was that shown by the classical tobacco virus disease known as "mosaic": here the leaves were mottled with light and dark green, yellow, or almost white patches, giving a variegated effect. Another and less usual result was a general chlorosis or yellowing of the plant without a mottling effect, associated with various distortions. Distortions, malformations, and outgrowths of various kinds were characteristic of several plant virus diseases. Generally virus-diseased plants did not die.

Two kinds of intracellular inclusions were encountered. The first type, or X body, was a large, rounded, vacuolated mass generally situated near the cell nucleus and originating as a reaction of the cytoplasm to the virus. The second type consisted of crystalline plates such as those observed in tobacco mosaic. As suggested by Beal, these intracellular crystalline deposits might be the source of the virus protein.

Plant virus could be disseminated experimentally by direct inoculation, as by rubbing the virus over the abraded surface of the leaf or by grafting. Viruses were spread naturally by contact of infected and healthy plants through the agency of air, water, soil, or insects. The viruses of tobacco and potato mosaic were examples of spread by direct contact. Almost all insects which transmitted plant virus belonged to the order Hemiptera and sucked the sap by means of a piercing apparatus, which was inserted in the tissue. The mouth parts consisted of a beak in which slid two pairs of fine canalized needles, one of which was the salivary injection canal and the other the suction canal. When the insect fed saliva was injected and a mixture of sap and saliva was sucked up through the other canal. There was a general belief that the virus was swallowed with the sap, went into the gut, passed through the wall of the alimentary canal, entered the blood stream, and subsequently appeared in the salivary glands, whence it was injected into the plant. Though animal viruses multiplied in the insect vector, there was no evidence of such multiplication with plant viruses which might persist indefinitely in the alimentary canal, be injected only at intervals, or be destroyed by digestion