endocrine balance. Loeser's (1959) suggestion, that the good results of Watson and Turner (1959) were primarily due to the large doses of testosterone used, could go a long way towards explaining the poor results in the present series. Another reason for failure might be the relatively small doses of thiotepa used, though larger doses probably would have been hazardous. Hall *et al.* (1960) emphasized that cytotoxic agents should be tested not only in differing doses but by different routes of administration. It is probable that the future of chemotherapy in malignant disease lies with drugs with a greater cytotoxic action on tumour cells and bone-marrow cells (a higher "therapeutic index") than thiotepa; with regional transfusion (Abel, 1960); or with measures deliberately designed to produce severe bone-marrow depression followed by bone-marrow (Brit. med. J., 1960) or foetal cell (Kay and Constandoulakis, 1959) infusions. Bridges *et al.* (1960) report the case of a patient with disseminated breast carcinoma who received 225 mg. of thiotepa intramuscularly over 18 days. Severe pancytopenia ensued, but the patient recovered after infusion of foetal liver cells. A remarkable improvement in the patient's condition was reported, with a remission at that time lasting to five months.

One more factor deserves comment. The one benefit obtained in all patients by the use of thiotepa has been that on morale. Both the patients and their relatives feel that something is being done, and hope is retained.

Summary

Thiotepa has been used as a palliative measure in 12 patients with advanced carcinoma of the breast, who were deteriorating in spite of bilateral adrenalectomy and oophorectomy. In only two patients has a palliative effect been seen.

The possible reasons for the failure of thiotepa in these patients are discussed.

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REFERENCES

- Abel, A. L. (1960). *Brit. med. J.*, **1**, 952.
 Bridges, J. B., Bridges, J. M., Edelstyn, G. J. A., Lyons, A. R., and Nelson, M. G. (1960). *Lancet*, **1**, 629.
Brit. med. J., 1959, **2**, 818.
 ——— (1960). **1**, 1189.
 Hall, B. E., Willett, F. M., and Hales, D. R. (1960). *Ann. intern. Med.*, **52**, 602.
 Kay, H. E. M., and Constandoulakis, M. (1959). *Brit. med. J.*, **1**, 575.
 Loeser, A. A. (1959). *Ibid.*, **1**, 1589.
 Rider, W. D. (1960). *Ibid.*, **1**, 1501.
 Watson, G. W., and Turner, R. L. (1959). *Ibid.*, **1**, 1315.

An exhibition of disposable hospital equipment, attended by nearly 1,100 visitors, and organized by the Salford Group Hospital Management Committee, was held recently at Hope Hospital. The idea of holding the exhibition arose partly because the Group are actively concerned with the development of a central sterile supply department, and partly because of the recommendations of the nursing advisory committee that certain items in the disposable field be introduced on a Group basis. Hospital management committees in the Manchester and Liverpool regions, the medical officers of health of the local and neighbouring districts, and the voluntary organizations were invited. Thirty-two exhibitors displayed their products during the two-day exhibition.

PROSTATECTOMY BY THE VESICO-CAPSULAR METHOD

BY

R. E. B. TAGART, M.Ch., F.R.C.S.

Surgeon to the Newmarket and West Suffolk
General Hospitals

Freyer (1920) reported a series of 1,625 prostatectomies, with a mortality rate of 5.3%. At intervals since then reports have appeared showing that, while methods have varied, the mortality has remained in the region of 5% (Harris, 1934; Stewart, 1945; Hey, 1945; Galbraith, 1948; Millin *et al.*, 1949; Riches, 1949; Jacobs, 1951; Wells, 1953). From the published reports it is difficult to deduce the operability rates for the various series, since there are so many variable factors which influence this, but it is probably safe to say that over the past 40 years the operability rate has risen steadily. The result of this is that permanent suprapubic cystostomy is now a rare operation—a minor surgical revolution which, in terms of human well-being, is the equal of other more spectacular advances.

The situation in large centres, from which most of the published reports have come, is reasonably satisfactory, but doubts are often expressed in private, and occasionally in public (*Lancet*, 1956), about whether the picture in the country as a whole, and particularly in the smaller non-teaching hospitals, is quite so pleasing. The junior surgical staff in these places may be relatively inexperienced, and many suffer from a shortage of nurses. The patients in the present series were treated in the general surgical wards of non-teaching hospitals of about 200 beds each. They suffer from a shortage of nurses, and the surgical first assistants are of registrar or junior house officer grade. It has been my experience that, under these conditions, what is lost in quantity of care is more often than not made up by the quality of individual performance.

The vesico-capsular method of prostatectomy described by Ogier Ward (1948), and later by Bourque (1954) and Watts (1956), is simple to perform and has given excellent functional results. A slightly modified version of this operation was used in the present series. The method of post-operative care is as important as the type of operation. The present one is based on a closed bladder irrigation system, which has been found to be effective and easy to manage. In the 120 consecutive operations reported here the mortality rate was 4.2%.

Selection of Cases

The total number of patients referred as possible cases of prostatic obstruction in the relevant period was 188. Of these, 18 (10%) were diagnosed clinically as carcinoma and were treated with hormones with or without a transurethral resection. In 24 (12%) patients the symptoms were not severe enough to warrant surgery or were transient. In this latter group are included patients with a single episode of prostatic haematuria, those with temporary inflammatory swelling of the gland, and those in whom retention of urine was the result of confinement to bed during an illness, but who passed urine normally once they were ambulant. Five (3%) were ill with another disease, which was shortly to be fatal, and suffered from acute retention of urine as an incident in this illness. These conditions were myeloid leukaemia, carcinoma of a bronchus with

skeletal metastases, carcinoma of the pancreas with jaundice, cerebral thrombosis, and carcinoma of a bronchus with mitral stenosis. These did not have a prostatectomy and are not included in the series. They were treated by suprapubic cystostomy, limited transurethral resection of the bladder neck, or an indwelling Foley catheter. Two patients (1%) with acute retention of urine refused any treatment other than a suprapubic cystostomy and a permanent Foley catheter respectively. In 15 patients (8%) the prostate gland, although obstructive, was so small as to be most suitably treated by transurethral resection.

This left 124 patients, 66% of the original total, for whom open prostatectomy was indicated. Four of these (3%) were thought unfit for operation and were treated with a permanent indwelling Foley catheter. The reasons for the rejection of these cases were senility and mental confusion, their ages being 89, 88, 83, and 78 years. None of them lived long, but while they did, the catheter of 18 F bore was changed at fortnightly intervals. The patient was encouraged to drink freely and, if possible, he took sulphadimidine 1 g. three or four times a day. Under these circumstances he remained fairly comfortable.

This operability rate of 97% is compared in Table I with those of other workers. Comparison between different series in this respect is likely to be fallacious, but from these figures it is probably fair to deduce that for an average population a rejection rate of a little under 5% represents a reasonable mean between timidity and foolhardiness.

TABLE I.—Operability Rate in Prostatectomy

Ellis and Leatherdale (1958)	94%
Freyer (1920)	100%
Harris (1934)	97%
Hey (1945)	98%
Jacobs (1951)	97%
Stewart (1945)	86%
Present series	97%

Age.—The mortality for prostatectomy rises steadily with age. In a series of 757 cases Millin *et al.* (1949) found that below 70 years the mortality was less than 2%, while at 80 years and over it was nearly 20%. Fig. 1 shows the age distribution in the series where the %

FIG. 1.—Age distribution in three series of prostatectomies, showing the marked effect of age upon the mortality rate. —, Present series (mortality 4.2%)., Millin *et al.* (mortality 4.6%). - - - -, Ellis and Leatherdale (mortality 10.7%).

information is given and in the present series. The comparatively high mortality in the series of Ellis and Leatherdale (1958) is explained by the greater age of their series as a whole and also, as is shown below, by the high incidence of acute urinary retention among their patients.

Acute Retention of Urine

Acute retention of urine is a serious complication of prostatic obstruction and is associated with an increased operative risk. There are two reasons for this. The first, and less important, is that whatever means, short of immediate prostatectomy, are employed to relieve the retention some degree of urinary infection is inevitable. While it may be argued that post-operative urinary infection is also inevitable, whatever the type of operation, it is nevertheless true that the risks from post-operative infection, both in the wound and in the urinary tract, are increased when the urine is infected before operation. However, careful aseptic technique in the passing of catheters and careful attention to the means whereby interiors of catheters, tubes, and drainage-bottles are kept sterile, greatly reduce the degree of post-operative infection in the urinary tract, so that the increase in operative risk is small.

The second consideration is less direct but more serious. Most of the mortality from prostatectomy is due to causes outside the urinary tract, the cardiovascular system heading the list. Not infrequently the reason for the onset of acute retention of urine is that the patient has been partly or completely immobilized by some cardiovascular, respiratory, or other complaint. The existence of this underlying condition adds greatly to the risk of the operation which may have to be undertaken in order to restore normal urinary function.

In small hospitals, with barely adequate staff, immediate prostatectomy is not feasible as a routine procedure in the treatment of acute urinary retention, and it has not been used in the present series. Pain is relieved by the passage of a urethral catheter, which is left in place. (The Gibbon instrument has been found to be satisfactory and to cause very little urethritis and infection. Its disadvantage is that, however carefully it is secured, it tends to fall out when the patient gets up and walks about. For this reason a Foley catheter made of latex is often preferable.) Prostatectomy follows within a few days provided that observation has revealed no serious impairment of renal function or disease in other systems.

While the bladder is being drained a urinary antiseptic is given and drainage is into a closed bottle, the interior of which is kept sterile by the vapour from a 40% solution of formaldehyde. With these precautions operation may, if necessary, be deferred for a considerable time. Old men can be relieved of fear and confusion, a failing heart can be restored with the help of suitable drugs, and a rising trend in the level of blood urea reversed. One patient in this series was found to have, in addition to acute urinary retention, bilateral pleural effusions of 1,500 ml., each due to congestive heart failure. He was given an indwelling Foley catheter.

TABLE II.—Acute Retention and Mortality

Author	Incidence of Acute Retention	Mortality Rate for Whole Series
Ogier Ward (1948)	12%	4%
Wells (1953)	23%	3%
Present series	44%	4.2%
Ellis and Leatherdale (1958)	75%	10.7%

which was spigoted and released at two-hourly intervals by day. It was allowed to drain freely into a bottle at night. Eighteen months later, after his cardiac condition had been brought back to somewhere near normal, his prostate was safely removed.

Table II shows the incidence of acute urinary retention in the series where the figure is given and the associated mortality rates.

Mortality

Severe renal damage from prostatic obstruction is not common at the present time, most patients presenting themselves before this has had time to occur. Nevertheless, in patients with a rising blood urea and dilatation of the ureters the urinary infection which inevitably follows any method of prostatectomy may cause progressive pyelonephritis, and this may be very dangerous. This danger can be reduced by a period of preoperative bladder drainage, the patient's general condition and demeanour being a more reliable indication of his fitness for surgery than the figures for the blood-urea level.

Associated disease of other systems is the most serious menace after prostatectomy. Cardiovascular accidents head the list of causes of mortality, and even if a bad-risk case survives the operation there is a danger that the patient may be left half paralysed from a stroke or crippled by a coronary thrombosis.

Some selection of cases is inevitable, but if the rejection rate is to be kept below 5% some very unhelpful prospects will have to be accepted for surgery, among whom will be patients with known coronary arterial disease, those recently in heart failure, and those with minor degrees of cerebral thrombosis. Severe mental confusion, as shown by the inability to carry on a rational conversation, is a very serious prognostic sign and is the most important single factor which may make a patient unfit for operation.

Reports of Fatal Cases

Details of the five fatalities in this series of 120 operations are given below.

Case 1.—Man aged 75. Chronic retention of urine with bladder distended to the umbilicus. Blood urea, 25 mg./100 ml. Vesico-capsular prostatectomy. Uneventful convalescence at first, but on the eighth post-operative day the blood-pressure fell and he died in a short while. Necropsy showed left heart failure, pulmonary oedema, and syphilitic mesaortitis.

Case 2.—Man aged 81. Acute retention of urine, relieved with an indwelling catheter. Blood urea, 55 mg./100 ml. There was a previous history of angina pectoris, and he had been confined to bed for a year before with a "heart attack." Vesico-capsular prostatectomy seven days after admission. Operation and progress uneventful until 36 hours after operation, when he complained of sudden severe pain in the chest, developed signs of congestive heart failure, and died within 12 hours. The cause of death was thought to be coronary thrombosis. Permission for necropsy was not given.

Case 3.—Man aged 71. Acute retention of urine relieved with an indwelling catheter. Blood urea, 45 mg./100 ml. Auricular fibrillation was present on admission to hospital and he was coughing up purulent sputum. Seven years previously he had been in hospital five weeks with a coronary thrombosis, and there had since been several episodes of heart failure. The bladder was drained with a catheter for 23 days, during which time his cardiac state gradually improved. Digoxin and mercurial diuretics were given. After vesico-capsular prostatectomy his progress was normal for 36 hours, but he then developed acute congestive heart failure and died in a few hours.

Case 4.—Man aged 75. Acute retention of urine relieved with an indwelling urethral catheter. Blood urea, 18 mg./100 ml. Vesico-capsular prostatectomy five days later. Recovery complicated by reactionary bleeding, clot retention of urine, and a suprapubic urinary leak. He had been nursed through all this when, on the fifteenth post-operative day, he passed a very large melaena stool and his blood-pressure became unrecordable. In spite of transfusions his blood-pressure did not rise and he died on the seventeenth post-operative day. Necropsy revealed, on the posterior wall of the first part of the duodenum, a large chronic ulcer in the floor of which was an eroded artery.

Case 5.—Man aged 84. Acute retention of urine relieved with an indwelling urethral catheter. Blood urea, 88 mg./100 ml. Rather confused mentally but physically active. Two days after admission vesico-capsular prostatectomy with excision of a diverticulum from the left side of the bladder. Progress was satisfactory at first, but he then developed a left ureteric urinary fistula and, despite irrigations and the use of urinary antiseptics, the urine became more and more heavily infected. The blood urea rose to more than 200 mg./100 ml., and he died in coma on the forty-seventh day after operation. The cause of death was thought to be uraemia due to ascending pyelonephritis.

Comment

Three of these five deaths were directly attributable to cardiovascular disease, two from coronary sclerosis, and one from syphilitic mesaortitis.

The death due to bleeding from a duodenal ulcer is worthy of comment. The association between bleeding from a peptic ulcer and prostatectomy is too frequent to be fortuitous. It may be accounted for by the fact that the patient's regular feeding habits are likely to be completely upset in the first few days after operation, emphasis being laid on fluid rather than on solid food intake. History-taking should include direct questioning about indigestion, and if a peptic ulcer is found to be present special attention will need to be given to diet in the immediate post-operative period.

In Cases 4 and 5, failures in surgical technique—namely, reactionary bleeding and damage to a ureter—interrupted the patients' post-operative progress and led eventually to their deaths.

In operations on old and frail patients the balance between success and failure is inevitably precarious. Death may appear to be due to a cause far removed from the operation, but not infrequently the first link in the fatal chain of complications is a surgical mishap.

The Anaesthetic

My personal preference is for low spinal or epidural anaesthesia. The blood-pressure is maintained as near normal as possible throughout the operation by the use of pressor agents. Old unfit men seem to tolerate this anaesthetic technique better than any other, and a great advantage is the absence of restlessness during recovery. The patient who strains or throws himself about in the immediate post-operative period is liable to start fresh bleeding in the prostatic bed and may require heavier sedation than is desirable. In certain cases, where cardiac function has been very bad, we have felt that the changes of position necessary for the induction of low spinal anaesthesia were undesirable and a general anaesthetic has therefore been substituted.

General anaesthesia has been used for an appreciable proportion of this series because it was the method preferred by the anaesthetist concerned. There is no numerical evidence to show that the results by this

method are worse than with the spinal or epidural technique. Nevertheless, the impression that one of the latter is preferable for the poor-risk patient remains strong.

The Operation

After cystoscopy the retropubic space is opened, a Millin self-retaining retractor inserted, and the prostatic capsule cleared of veins and fat.

The upper border of the prostate gland is palpated, and, with this as its centre, a vertical incision about 5 cm. long is made through the prostatic capsule and the lower part of the anterior wall of the bladder.

A finger inserted into the bladder enters the internal urinary meatus. The prostate gland is enucleated intra-urethrally. If the gland is fibrous, scissor dissection is used to help separate the gland from the false capsule. The initial break in the mucosa is best made on the right or left of the midline posteriorly. Each lateral lobe is then extracted separately and, by this means, a strip of mucosa running down the centre of the posterior wall of the prostatic cavity is left intact. The middle lobe is cut out with scissors. A small self-retaining retractor* is placed in the vesico-capsular incision and a good view of the prostatic bed is obtained. This space is inspected and loose tissue or separate small adenomata are cut away with scissors. A wide wedge is then cut out of the fibromuscular tissue which forms the posterior edge of the bladder neck. If possible, the trigonal mucosa is separated from the underlying tissue before this is done and is preserved. This mucosa is fixed to the posterior part of the prostatic false capsule by a central midline stitch, the ends of which are left long. The prostatic arteries are controlled by posterior and postero-lateral sutures. It is most important that these haemostatic stitches should be passed along the radial lines of the circle formed by the bladder neck. If they lie tangentially or as chords, cutting off segments of the circle, the bladder neck may be seriously narrowed so that there is a possibility of post-operative stricture formation.

A 22F whistle-tipped catheter is then fixed in the urethra in a special way. Before the catheter is passed a nylon thread is secured to it in the same way as the horsehair is attached to a violin bow (Fig. 2). The ends

FIG. 2.—Bowstring method of securing a catheter in the bladder, showing how a length of thread or nylon is attached to the catheter.

of the knot on the midline trigonal suture having been left long, one of these is passed between the "bowstring" and the catheter and the ends are tied in a loose knot. This fixes the catheter firmly in the region of the bladder neck and ensures that the eyes will not slip down into the prostatic bed. When the time comes to remove the catheter the bowstring is cut, and as the catheter is pulled out the nylon thread slips easily through the catgut knot on the trigone. For extra security the catheter is sutured to the foreskin where it emerges from the external urinary meatus.

The material of which the catheter is made is most important. The best so far, in my view, is "simplastic

hard quality" made by J. G. Franklin and Sons, of London. This catheter appears to cause the minimum of urethritis; it has a good lumen in relation to its outside diameter, and is stiff enough not to become obstructed by kinking but flexible enough to lie comfortably in the urethra. Its rigidity allows a powerful negative pressure to be exerted in the lumen without the walls collapsing.

The vesico-capsular incision is closed with a continuous catgut suture. The retropubic space is drained with a tube of plastic material. If the bladder is badly infected before operation or if bleeding from the prostatic bed has been inadequately controlled, the bladder may be drained by a suprapubic cystostomy. This, however, is very seldom necessary and is not desirable, since it adds to the amount of apparatus attached to the patient, limiting his mobility and delaying his convalescence.

Table III shows details of the operative findings in the series. With carcinomatous glands, where no plane of cleavage exists between the obstructing tissue and the false capsule, radical removal is not attempted, but as much as possible of the neoplastic tissue is cut away. The vesico-capsular incision is closed as usual and heals normally.

TABLE III.—Operative and Pathological Findings in Present Series

Benign hyperplasia	..	..	..	107 cases (89%)
Carcinoma	..	..	..	11 " (9%)
Large prostatic abscess	..	..	..	1 case (1%)
Chronic prostatitis	..	..	..	1 " (1%)

Post-operative Care

In a ward with a mixed surgical population and an overworked staff cross-infection occurs very easily. In order to prevent this, wounds are sealed and kept covered, while all drainage is by sterile tubing into sterile corked bottles.

Immediately on the patient's return to the ward the retropubic drain is connected to an underwater seal. Disinfectant is added to the water and a constant slight negative pressure is maintained in the drainage-tube by milking its contents down into the disinfectant whenever necessary.

The urethral catheter is connected to a closed irrigation system of the type shown in Fig. 3. The bladder can be washed out as often as desired, and, ideally, this apparatus is not disconnected until the catheter is removed, the danger of cross-infection thus being reduced to a minimum. Sterile physiological saline is used for the irrigations, and the reservoir, C, holding 100 ml., enables the size of the washout to be regulated. Small clots can be sucked out of the bladder by milking the rubber tubing. The vapour from a 40% solution of formaldehyde in the receiving bottle helps to keep the interior of the drainage system sterile (Riches, 1954).

This regime is popular with the nursing and resident staffs and has been found to reduce post-operative urinary infection to a minimum. In the early cases of the series, streptomycin and chloramphenicol were given prophylactically in the post-operative period. The use of these has now been abandoned except in cases of established serious infection. There has been no resulting increase in the amount of post-operative urinary infection. The prevention of this depends on the avoidance of cross-infection and on the fact that frequent small irrigations do not allow urine to stagnate in the bladder.

*Messrs. Allen and Hanburys, of Vere Street, London, have made to my specification a small self-retaining retractor which works on the same principle as a Joll thyroidectomy retractor.

Early ambulation is very important, not only in order to reduce the incidence of venous thrombosis but also from the point of view of morale. Patients usually get up on the second or third day. The urethral catheter is removed as soon as the urine is macroscopically free of blood, which is between the third and fifth days. The retropubic drain is removed 48 hours later.

Intravenous Therapy.—Every patient is given a blood transfusion during the operation, blood being replaced as it is lost rather than after it has been shed. The intravenous infusion is maintained with electrolyte solutions for about 48 hours after operation. This is the period when a copious diuresis is essential, but it is also a time when, in old unfit men, absorption from the intestine may be unpredictable and variable. The only way to be sure of an adequate urinary output in all cases is by the routine use of intravenous fluids. As soon as it is clear that the intestine is functioning normally the patient is encouraged to drink freely.

Most patients are ready to leave hospital as soon as their skin sutures are removed on the seventh day, but

none are discharged before the tenth day, in case secondary haemorrhage should occur. For old men a further week's rest in hospital is often desirable.

Post-operative Complications

Reactionary haemorrhage from the prostatic bed in the first 48 hours after operation is not a very serious problem if the haemostatic sutures are carefully placed. However, it does occur at times, and frequent bladder irrigations may be necessary. The closed irrigation system enables these to be given easily and without danger of introducing infection. Most clots can be cleared from the catheter by "milking" the rubber tubing, but, rarely, it is necessary to disconnect the catheter and aspirate the blood clot with a syringe. This is a most undesirable necessity, as by it the dangers of cross-infection are greatly increased.

Secondary Haemorrhage.—Since urinary infection has been reduced to a minimum, secondary haemorrhage has been rare. Clot retention from this cause has occurred twice in the present series and the bladder has had to be evacuated under general anaesthesia through a resectoscope. The bladder neck is then inspected and the bleeding-points are coagulated (Dawson-Edwards, 1956).

Epididymo-orchitis has been as rare as secondary haemorrhage. If the bladder is seriously infected before operation the vasa are tied, but not otherwise.

Obstruction in the prostatic bed as a late complication has occurred twice. In one patient it caused temporary dribbling of micturition, but this disappeared after a sound had been passed. In the second case a fibrous bar formed across the bladder neck and had to be cut down with a resectoscope six months after the first operation.

Post-operative Incontinence.—In old men this may be troublesome for some weeks after the operation, but it has been permanent in only one case. The patient was a man of 61 with tertiary syphilis, fixed flexion deformities of both hips, and a very low mental capacity. He never regained full control over micturition and finally had to be transferred to a hospital for the chronic sick.

Wound Infection.—Minor degrees of infection have formed the most troublesome and most frequent complication of this series. In two cases it was more than merely a nuisance. The retropubic space became infected and one patient was in hospital for 110 days after his operation owing to a persistent discharge of pus from his wound. As soon as it becomes clear that pus has collected deep to the rectus muscles, the wound must be reopened in its whole length and a large drain inserted. This was done in the second case and the cavity healed in two weeks, the final union being sound.

Pubic osteomyelitis has not been seen in this series.

Suprapubic urinary leakage has been rare. It was associated with primary or secondary haemorrhage and clot retention of urine. The bladder must be adequately emptied and drained with a urethral catheter. Once this has been done the fistula closes very quickly.

Terminal Urethral Stricture.—Some degree of narrowing in the urethra about 1 cm. proximal to the external urinary meatus has been noted in a few cases. This type of stricture has responded easily and without recurrence to the passage of a sound.

Routine follow-up cystoscopy has shown that, with this operation, it is about eight weeks before the

FIG. 3.—Apparatus used for post-operative bladder irrigation.

prostatic cavity is completely epithelized. Cystoscopy before this time shows deposits of fibrin, surface sloughs, and pieces of unabsorbed catgut in the area of the operation. It is surprising how these appearances are generally associated with the passage of a good, well-controlled stream of clear urine.

Summary and Conclusions

A series of 120 consecutive prostatectomies performed in two small non-teaching hospitals is described. Ogier Ward's vesico-capsular operation has been used. There was no undue selection of cases, and the results are comparable with those which have prevailed in large centres for many years.

Cardiovascular accidents are the most serious menace after prostatectomy, and this is probably the reason why the mortality rate rises steadily with the age of the patients. Acute retention of urine also raises the mortality rate, the reason probably being that the retention is often precipitated by some cardiovascular or other complaint. Where acute retention has occurred preliminary bladder drainage with an indwelling urethral catheter is maintained until the patient is fit for operation. If necessary, it may be continued for many months.

In the absence of obvious systemic disease the patient's mental state is the most important single factor in the assessment of the operative risk. Old men with senile cerebral degeneration are very poor risks, while the patient whose mind is clear will probably survive prostatectomy whatever his age.

About 90% of patients who need prostatectomy can be operated upon with safety. There is a hard core of a little under 10% (represented in this series by a preoperative rejection rate of 3% and a mortality rate of 4%) which constitutes a very serious problem not yet satisfactorily solved.

Low spinal or epidural anaesthesia is thought to be the best form for the bad risk.

The vesico-capsular operation is described.

Post-operative management is described. It is based on a closed bladder-irrigation system. Every effort should be made to avoid cross-infection, which occurs very easily.

Post-operative urinary infection has been reduced to a minimum, but wound infection was not uncommon and has been the most troublesome complication in the series.

The prostatic cavity is not healed until about eight weeks after the operation, but good function has usually been achieved well before this time.

REFERENCES

- Bourque, J.-P. (1954). *J. Urol.*, 72, 918.
 Dawson-Edwards, P. (1956). *Lancet*, 2, 332.
 Ellis, H. and Leatherdale, R. A. L. (1958). *Ibid.*, 2, 1189.
 Freyer, P. J. (1920). *Clinical Lectures on Enlargement of the Prostate*. Baillière, London.
 Galbraith, W. W. (1948). *Proc. roy. Soc. Med.*, 41, 73.
 Harris, S. H. (1914). *Brit. J. Surg.*, 21, 434.
 Hey, W. H. (1945). *Ibid.*, 33, 41.
 Jacobs, A. (1951). *Lancet*, 1, 1088.
Lancet, 1956, 2, 343.
 Millin, T., Macalister, C. L. O., and Kelly, P. M. (1949). *Lancet*, 1, 381.
 Riches, E. W. (1949). *Proc. urol. Soc. Aust.*, No. 3, 39.
 — (1954). *Ann. roy. Coll. Surg. Engl.*, 15, 128.
 Stewart, H. H. (1945). *Brit. med. J.*, 2, 724.
 Ward, R. Ogier (1948). *Lancet*, 1, 472.
 Watts, G. T. (1956). *Brit. med. J.*, 2, 1283.
 Wells, C. (1953). *Modern Trends in Urology*, edited by E. W. Riches. Butterworth, London.

PANCREATIC LITHIASIS A FOLLOW-UP STUDY OF 17 CASES*

BY

R. MAHADEVAN, M.S., F.R.C.S., F.R.C.S.Ed.

Formerly Professor of Surgery, Madras Medical College;
 Surgeon, General Hospital, Munnar, South India

A follow-up study of 17 cases of pancreatic lithiasis showed that the calculi gradually disappeared after operations mainly directed towards relief of the severe pain characteristic of this condition. In some cases the pancreatic involvement was total, and it was thought that total pancreatotomy would ultimately become inevitable. Yet the hundreds of calcified areas in calcareous pancreatitis and the numerous calculi in the ducts gradually but almost completely disappeared.

Pancreatic lithiasis, while not a common condition, is commoner than is generally thought. Many cases are missed because a plain radiograph is not taken routinely in cases of recurrent abdominal pain.

FIG. 1.—Case 4. Barium-meal radiograph of patient with recurrent attacks of severe colicky abdominal pain.

FIG. 2.—Case 4. Plain radiograph showing almost entire calcification of pancreas with myriads of calcified areas. These were almost completely hidden by the barium.

Barium-meal series alone may hide even large and multiple calculi (Figs. 1 and 2), or the calculus shadows may pass unrecognized in the confusion caused by the barium shadows. Eliason and Welty (1948), by subjecting pancreatic glands removed at necropsy to radiographic studies, showed that the incidence of calcification was 1 in 20. Calcification occurs in approximately half the cases of chronic pancreatitis (Allbritten and Pressly, 1950).

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