So far I have assumed that the prostate has been of the ordinary adenomatous type, but when dealing with small fibrous glands one has to adopt a slightly different procedure. These glands lie entirely outside the bladder, so that the enucleation must be carried out from the urethra. In addition, the internal meatus is usually fibrous, and it may be difficult or even impossible to dilate it with the finger. In this case the bladder retractor should be inserted and a small incision made through the sphincteric ring with the point of the knife. It is immaterial in which direction this incision is made, but I usually make it anteriorly, as it then leads directly to the point where enucleation is commenced. The incision need not be more than a quarter of an inch deep. The finger is then inserted into the urethra and the plane of cleavage is found immediately under the floor of the bladder. It is usually supposed to be extremely difficult to enucleate prostates of this type, but I have never found it so. The prostate appears to peel off from the inner surface of the sheath and soon is completely detached from it, except in the apex, where it is held by the urethra. It is advisable not to attempt to tear through the urethra, as by so doing one may easily remove too much of it. The patient should be placed in the Trendelenburg position and the bladder retractor reinserted. The prostate is caught in a pair of dissecting forceps and pulled upwards, while the urethra is divided at its apex by means of a long pair of scissors curved on the flat. In removing these small glands it is most important to cut as large a V as possible from the posterior lip of the internal meatus. If this is not done secondary recontraction is very apt to occur. The bleeding is usually slight and easily controlled by a few stitches.

AFTER-TREATMENT

The Marion's tube inserted at the time of the operation is left in the bladder for four days. The urine drains into a bottle placed between the patient's thighs and held in position by a knee pillow. This is, I think, more satisfactory than drainage into a vessel placed on the floor, as the long tube easily becomes kinked by movement. On the fifth day the Marion's tube is replaced by a number 34 to 36 White's pattern de Pezzer tube, which is left in position for a week. When this is removed, about the eleventh or twelfth day, a catheter is tied into the urethra, where it remains until the suprapubic sinus is healed. During the time that the bladder is drained, whether by a tube or a catheter, it is irrigated twice a day with two pints of solution of nitrate of silver (1 in 10,000). The front of the abdomen is painted over with 2 per cent. solution of picric acid in spirit, either every day or every second day.

I believe that frequent irrigation is the only method of keeping the bladder and the prostatic cavity free from infection. Its action is largely mechanical, as blood clots and debris, in which organisms can multiply, are washed away. Suction may keep the wound dry, but it is exceedingly difficult to remove solid particles in this manner. I prefer to keep the suprapubic sinus open for a fortnight after the operation. So long as the bladder is efficiently drained the pressure in it is kept at zero. If the intravesical pressure rises there is a risk of secondary haemorrhage. This usually occurs when the drainage tube is removed early, or when it is allowed to become kinked or blocked. The fistula closes three or four days after the suprapubic tube has been removed, and by this time the risk of secondary haemorrhage has passed.

One rarely finds that the closure of the fistula is delayed beyond the third week. The most common causes for delayed healing are (1) sepsis, (2) adhesions between the bladder and the pubes, (3) recurrent obstruction at the vesical orifice, and (4) hernia of the bladder wall through the fistula. The last condition is more usual since patients have been placed in the Fowler position than when they were kept flat until the wound was healed. If the sinus is not healed at the end of four or five weeks I usually dissect it out, free the bladder from adhesions, and examine the state of the internal meatus. In many cases it shows signs of commencing recontraction. The

opening is enlarged with the finger, a catheter is tied in, and the bladder sutured completely. The abdominal wound is closed round a small tube placed in the space of Retzius. This method undoubtedly saves time, as the delay in healing is evidence that there is something which prevents the bladder from emptying, and which, if unrelieved, may result in a permanent fistula.

OTHER METHODS

The method I have described was introduced by Sir John Thomson-Walker in 1919, and in my opinion gives the best results. The success of suprapubic prostatectomy depends largely on free communication between the bladder and the prostatic cavity; in fact, the latter should be considered as a portion of the former. The patient depends entirely on the compressor urethrae for his sphincteric control, and this muscle is quite sufficient for the purpose.

When a perineal prostatectomy is performed the compressor may be damaged during the operation or its muscular fibres may be entangled in the scar. For this reason surgeons who practise perineal prostatectomy endeavour to restore the function of the internal sphincter in order to prevent incontinence. In this they are rarely successful, because if the prostate is at all large the internal sphincter is so stretched that it cannot recover, and if the prostate is small and fibrous the sphincter itself is transformed into a fibrous ring.

Some operators—for example, Harris—endeavour to narrow the opening between the bladder and the prostatic cavity, and also to cover a portion of the raw area in the latter by bringing down a flap of mucous membrane from the bladder. I agree with Sir John Thomson-Walker that it is advisable to leave the opening between these two cavities as wide as possible, as by this means the best functional results are obtained. About ten years ago I tried to reduce the size of the raw area in the prostatic cavity by bringing down flaps of mucous membrane derived from the covering of the intravesical projection of the prostate, but I gave up doing so. The flap either sloughed or tended to occlude the internal meatus, and the results were not good. The prostatic cavity always becomes infected, and is unsuited for plastic operations. It rapidly contracts after operation, and generally becomes covered with epithelium derived either from the base of the bladder or from the urethra.

THE SEQUELAE OF PROSTATECTOMY*

BY

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In this short time at my disposal, I think it will be best to concentrate on one or two of the various sequelae that may bother the surgeon in the latter stages of a prostatic's convalescence.

NON-CLOSURE OF WOUND

Failure of the suprapubic wound to close may be partial or complete; that is to say, the sinus may remain persistently open, or else, having closed for a period, may again become patent, so that the patient who has tasted the joys of micturating normally suffers the disappointment of seeing himself back again in a state which appears to him little different from that which existed a week or so after his operation. A persistent suprapubic sinus, although it cannot be regarded as a common sequel of prostatectomy, is such an annoying one to doctor and patient alike that it is worthy of our attention.

* Read in opening a discussion in the Section of Surgery at the Centenary Meeting of the British Medical Association, London, 1932.

The factors that may determine its occurrence are (1) persistent sepsis, (2) the presence of an obstruction to the passage of urine, and (3) adherence of the vesical wall to the abdominal wound with (in extreme cases) hernia of the bladder through it. One alone of these factors is sufficient to prevent closure of the suprapubic sinus, but not infrequently two are combined—more especially persistent sepsis associated with a certain degree of post-prostatectomy obstruction. It will be more convenient, however, to consider each factor separately.

PERSISTENT SEPSIS

At one time surgeons accepted as inevitable the fact that prostatectomy was a septic operation, but to-day we are all striving to remove this stigma from prostatic surgery. The infection which we have to combat may have antedated the operation or it may have followed it. Where the patient already has an infected bladder when first seen, he will require preliminary drainage either through an in-dwelling catheter or a preliminary cystotomy wound. Surgeons differ in their partiality for one or other of these two pre-operative methods, and I myself, when confronted by a severe cystitis previous to operation, am becoming more and more inclined to deal with it by preliminary cystotomy rather than by catheter drainage.

Post-operative infection is encouraged by the tags, shreds of mucous membrane and partly detached nodules of the prostatic gland, that are left behind after enucleation. Although by the open operation the amount of this damaged tissue is materially reduced, it cannot be entirely eliminated. Our efforts to deal with the infection that almost inevitably follows by irrigating through the suprapubic tube can only be partially successful, since the prostatic cavity is so low in position that irrigating fluids do not penetrate to this region of maximum sepsis. The fact that during the first forty-eight hours after operation the urine is usually soaked up into voluminous dressings and layers of wool encourages infection. So also does the introduction of foreign bodies like haemostatic bags and packing. Whilst all these factors make for sepsis in the earlier stages of a convalescence, during the later stages this is more likely to be kept up by such complications as an infected vesicle. The fact that secondary epididymitis is so common a sequel to prostatectomy is an indication of the almost inevitable existence of a primary vesiculitis. Finally, the sepsis may be maintained by the existence of dead spaces either within or without the bladder; in other words, of vesical saccules and of pockets behind the pubis. It is the presence of these persistent foci that is responsible for the periodic flare-up of inflammation in the suprapubic scar and the reopening of the sinus.

Preventive treatment consists in preliminary drainage in septic cases, in eliminating, at the time of operation so far as is possible (and when possible), damaged tissue in the region of the prostatic capsule, and in careful aseptic handling of the wound after operation. When, in spite of these measures, severe infection has occurred, it must be combated by satisfactory drainage and by efficient irrigation of the infected area. If the chief focus of infection is an infected vesicle, vesicular massage should be carried on. For the cure of a few cases a vesiculectomy may even become necessary.

It would take too long to discuss the question of the drainage of the prostatic cavity by means of an in-dwelling catheter, the indications for the performance of the open operation, and the treatment of such complications as bladder diverticula and suppurative vesiculitis. All that it is necessary to emphasize is that persistent sepsis is the most common cause of persistent suprapubic sinus, and that if this disappointing failure in healing is to be avoided we must do all that is in our power to combat it.

POST-OPERATIVE OBSTRUCTION

This may be complete or incomplete: in other words, the patient may be able to void a small amount of urine, or the urethra may offer obstruction not only to the passage of urine but also to the introduction of a bougie. Sir John Thomson-Walker, in his Lettsomian lectures of 1927, stated that in sixty-six out of sixty-nine cases of post-prostatectomy obstruction coming under his notice the obstruction was situated at the outlet of the bladder, where the mucous membrane had been torn across. In my own experience, although I agree that this is the commonest situation of a post-prostatectomy obstruction, I have found a somewhat larger proportion in which it was lower down in the region of the torn membranous urethra. If the obstruction is discovered early in convalescence it can often be dealt with satisfactorily by dilatation, but, on the other hand, if it is only discovered late, granulations will have been replaced by dense fibrous deposits that are unlikely to yield to such methods of treatment. For this reason it is a wise precaution always to make sure that the passage is clear by passing a metal instrument a fortnight after prostatectomy. A special look-out must be kept for the occurrence of post-prostatectomy obstruction in all cases in which the prostate is small and does not project into the bladder. The fact that an open operation may have been performed in the removal of such a prostate will provide no guarantee that obstruction will not occur in the process of healing. When an obstruction has been discovered and treated, bougies must be passed at extending intervals until it is certain that no recurrence is taking place. If the healing of an obstruction by means of a dilatation proves unavailing, two alternatives are left—namely, to reopen the bladder and dissect away all scar tissue in the neighbourhood of the bladder outlet, or else to use some form of prostatic puncture. In order that the latter may be possible, the obstruction must, of course, not be so great as to preclude the passage of an instrument. If this cannot be achieved, an open dissection of all scar tissue from the vesical outlet must be carried out. The bladder can then be completely closed, and drainage provided for by means of an in-dwelling catheter.

Although the majority of cases of post-prostatectomy obstruction are explained by fibrosis, another possibility must always be borne in mind. Statistics have shown that some 15 per cent. of seemingly innocent prostates contain foci of malignancy. This figure, in my opinion, gives an exaggerated idea of the incidence of malignant elements, since the pathological reports on which it is based include such doubtful conditions as pre-cancerous states. But in spite of this we would be wise to remember that, although the prostate has been successfully removed, malignant disease may recur in the site of operation and cause an obstruction. We are indeed realizing more and more that we do not rid the patient of all prostatic tissue when we shell out his enlargement. In fact, some of us are inclined to deny that we have removed the prostate at all, but have merely dealt with submucous glands lying between the prostate and the mucosa. It may be by no means easy, in the absence of clear proof of the nature of the original operation, to decide whether the obstruction that subsequently occurs is fibrous or malignant, but the possibility of its being the latter must always be borne in mind.

ADHESIONS BETWEEN BLADDER WALL AND WOUND

It is the practice of most surgeons when sewing up the abdominal wound to make sure that the bladder has not been drawn up by the drainage tube but has been pushed down into the depths of the wound, well away from the skin. Yet in spite of this precaution, fistulae,

due to the mucous membrane having become adherent to the scar, still occur in our practice. If this is not quickly remedied, hernia of the superior wall of the bladder through the wound subsequently takes place, especially in stout patients suffering from distension and constipation. This trouble is also more likely to be encountered when the surgeon has opened up the cave of Retzius during the operation. The dislodgement of the fat lying within this space encourages the formation of adhesions between the bladder wall and the posterior surface of the os pubis, to be followed in time by adhesions between the skin and the vesical mucosa. Once this has happened, time is only lost by postponing surgical intervention. However much the patient may resent another anaesthetic, it cannot be avoided. Personally, I tell my patients that I can save them many weeks of convalescence by inserting a few stitches into their wound, and for the sake of this advantage they cheerfully consent. Once under the anaesthetic the bladder is dissected away not only from the suprapubic scar but also from the os pubis. After carefully inspecting the interior of the bladder to make sure that there is no obstruction at the outlet, it is completely closed and a catheter tied into the urethra.

OTHER POST-OPERATIVE COMPLAINTS

So far we have considered the factors of sepsis and obstruction only in their relation to persistent suprapubic fistula. It must, however, be remembered that they are responsible for other unfortunate sequelae of prostatectomy, such as painful micturition, frequency, and calculus formation. A patient who has submitted to so grave a proceeding as prostatectomy has the right to expect that he shall be relieved of the discomforts that brought him to the operating table. If he still continues to rise three or four times at night, and if he finds that the passage of urine causes discomfort, he has grounds for complaint. The residual urine of a patient who has undergone prostatectomy should therefore be tested, and if it is more than two ounces, and some months have elapsed since the operation, he should be cystoscoped. Sometimes the poorness of the operation results will be explained by the existence of some slight obstruction to the passage of the instrument, sometimes by small diverticula that previously had been missed, and sometimes by the fact that the bladder walls have been so damaged by prolonged distension and sepsis prior to operation that they have never recovered.

Treatment of these unsatisfactory cases, if it is to be effective, must be thorough—something more than the oral administration of a urinary antiseptic of doubtful value. Lavage of the bladder is usually indicated, and, since this must be done frequently, it is best whenever possible to teach the patient how to carry this out for himself. If there is much residual urine, the washing is best done through a catheter, but otherwise by the Janet method. I can recall several cases of persistent post-prostatectomy sepsis, some complicated by a tendency to form calculi, that owe their present comfort and freedom from stones to the fact that they have learned to wash out their bladders daily with as little difficulty as most of us experience in cleaning our teeth.

If there is a criticism that may sometimes with justice be made of our work as prostatic surgeons, it is to the effect that, having steered our patients through the "narrows" of the operation, we are over-ready to leave them before they have reached smooth waters. It is not enough that the patient who has previously micturated with difficulty should now do so with ease; we must regard our work as unfinished until he is free from all smarting and frequency, and until the urine contains only a minimum of pus.

MILK-BORNE DISEASES *

BY

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It is needless to point out the importance of milk-borne diseases; their existence is not only recognized by medical and veterinary practitioners, but also by the general public. They may be divided into two classes: (1) those in which the milk becomes contaminated after withdrawal from the cow—for instance, typhoid and the paratyphoid group of fevers, some epidemics of streptococcal and staphylococcal sore throats, and perhaps scarlet fever; (2) those the causative organism of which actually infects the cow and is excreted with the milk; these include bovine tuberculosis, undulant fever, and perhaps certain epidemics of sore throat, scarlet fever, and diphtheria.

The diseases in the first category are usually associated with cases in man or carriers of the specific microbe in individuals, such as milkers or others who are concerned with handling milk. Occasionally the contamination is less direct, and outbreaks have been described in which water fouled by excreta of infected people has been used to clean vessels employed in the distribution of milk. Whatever the source of the contamination the milk acts simply as a suitable medium for the multiplication and conveyance of the specific micro-organism to the consumer; the cow is unaffected and perfectly healthy. Investigation of such epidemics shows that all cases of the disease can be connected with a particular source of milk supply, and further research usually results in the discovery of individuals who are infected or are carriers of the causative micro-organism. Such a history can be obtained in many epidemics caused by the typhoid bacillus or members of the *Salmonella* group of bacteria. In the case of outbreaks of sore throat and scarlet fever, however, although the usual method of milk contamination is from infected human beings after withdrawal from the cow, there is some evidence that the cow's udder can be infected occasionally by milkers or others. They will be discussed in a later section.

In the second category the most completely studied disease is bovine tuberculosis, and even to outline the mass of facts known of this disease and its transmission to man is impossible in the time at my disposal, and my remarks will therefore be limited to a few selected points.

TUBERCULOSIS OF THE COW AND TUBERCLE BACILLI IN MILK

Forty per cent. of the milch cows of England and Wales are stated to be tuberculous as estimated by the tuberculin test and post-mortem examination; probably this is an under-estimate, the true figure being considerably higher. The incidence of infection increases with the age of the cow; the disease is frequently fatal and causes serious economic losses. About 0.2 per cent. of cows have clinically recognizable tuberculosis of the udder; there are also a considerable number in which tuberculosis of the udder may escape clinical recognition. Such animals almost certainly secrete tubercle bacilli, either continuously or intermittently in their milk.

Cows with progressive tuberculosis, although apparently in good condition and yielding large quantities of milk, may from time to time secrete tubercle bacilli in the milk, although there is no local lesion in the udder. Frequently such animals excrete large numbers of tubercle bacilli in the faeces, which may constitute another source of milk contamination. Examinations of mixed samples of milk

* Read in opening a discussion in the Section of Bacteriology at the Centenary Meeting of the British Medical Association, London, 1932.