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TRANSURETHRAL RESECTION OF THE PROSTATE A REVIEW OF FOURTEEN YEARS' WORK*

BY

KENNETH M. WALKER, F.R.C.S.

Surgeon to the Royal Northern Hospital and to St. Paul's Hospital

Twelve years have elapsed since I first published in this *Journal* an article on perurethral operations on the prostate. At that time it was necessary to plead that consideration should be given to a method of treatment against which there existed a considerable amount of prejudice. Special pleading is no longer required, for the value of perurethral methods of dealing with prostatic obstruction is now fully recognized. It will be more useful, therefore, to consider perurethral resection in a spirit of criticism and to dwell on its shortcomings, dangers, and limitations rather than its virtues. But if I approach the matter from this standpoint it is not because I am anything but an optimist on the subject of perurethral methods, but because I feel that it is helpful at times to stand aside from our work and to look at it with a critical eye, recalling where we have failed rather than where we have succeeded, what have been our mistakes, and how we may avoid such errors in the future.

Undoubtedly the two complications of perurethral resection most to be feared are haemorrhage and sepsis. Of these, to my way of thinking the latter is by far the more serious. Looking back on fourteen years of perurethral operations on the prostate I can recall only some half-dozen cases in which haemorrhage became sufficiently alarming to necessitate opening of the bladder. Yet in the same period of time sepsis has often proved a serious complication, and sometimes one that in the end proved fatal. What is the explanation of my immunity from haemorrhage and my susceptibility to sepsis? Writing as I do in a vein of criticism and relentless examination of methods, I think that if I have made an error it has lain in the direction of excessive tissue coagulation. J. R. Caulk, to whose pioneer work on perurethral methods urology owes so much, is convinced that high-frequency currents cause damage to tissues at a far greater distance from the cutting loop than most resectionists believe. I am inclined to agree with him, and it is this leaving behind of coagulated tissue as a nidus for infecting organisms that is the chief drawback of the McCarthy operation. Unfortunately it is a drawback inherent in any method of resection in which a cutting current is employed.

Operative Trauma

But in addition to the unavoidable trauma of electrocoagulation there is a trauma over which we have more control—the trauma of instrumentation. When I pause and look back at my failures I see that there is one type of case in which perurethral resection is attended by special dangers. I refer to the patient with small external genitalia and with a urethra so narrow that it offers a considerable resistance to the passage of the resectotome. Naturally these cases crop up most frequently among those elderly patients in whom involution of the genital tract has taken place, the type of senile patient for whom a perurethral operation is otherwise most suitable. At all costs we wish to avoid carrying out on them a

prostatectomy, and yet the smallness of the urethra makes difficult the passage of our instruments. The temptation to use a little extra persuasion is a real one, but I have learned my lesson and am now very cautious about the amount of force I am prepared to exert in attempting to pass the

resectotome. Where I have not shown this caution the results have sometimes been disastrous—in one case extravasation of urine, and in two others severe urethral and vesical sepsis. It must be remembered that the tissues of these elderly patients are exceedingly vulnerable, and even in health offer but a feeble resistance to microbial invasion. After they have been bruised by the passage of an instrument the resistance is reduced to a minimum.

Finally we must consider the trauma due to errors in our technique after the instrument has been passed. Errors of this kind are by no means uncommon, for in no operation is the experience of the operator a factor of greater importance than in perurethral resection of the prostate. Initially welcomed as a minor procedure, the McCarthy operation in the hands of the inexpert soon proved itself to be fraught with dangers, and even when carried out by experts the earlier resections were not always satisfactory. The better results achieved later have indeed been due less to an improvement in our instruments than to more control during the operation. With the cutting loop it is quite easy to do great damage, and it is experience that teaches the operator where he may cut in safety and where he must proceed with caution. The figure above represents a vertical section

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through the mid-line of the bladder and prostate, and shows approximately the thickness of tissues that separate the bladder and posterior urethra from such structures as the peritoneum and rectum. Starting at a point in the bladder above the inter-ureteric bar it will be seen that a single cut at this level would perforate the bladder wall and open up the peritoneum. Fortunately few operators would be capable of making such a mistake. The error of mistaking a hypertrophied inter-ureteric bar for the posterior lip of the vesical outlet is, however, less unlikely. Should this happen, but the misguided operator cut not more than half an inch above the inter-ureteric bar, he will miss the peritoneum and open up the space of Denonvillier. At this level the vesicles and ampullae of the vasa are interposed between the bladder and rectum, so that the latter is well protected from possible injury. But to open up the space of Denonvillier is sufficiently disastrous, for it will result in prolonged and severe infection. The same risk is attached to any cut made in the trigone from the inter-ureteric bar down to the region of the intravesical projection of the prostate. At this lower level the thickness of the prostate is interposed between the loop and the rectum, and even without any enlargement gives the operator the safety of an inch. As we pass down into the posterior urethra this margin of safety diminishes rapidly, so that at the upper limit of the verumontanum less than half an inch of tissue separates the urethra from the rectum. Lower still, in the membranous urethra, even this distance is diminished.

Danger Points

From a consideration of these anatomical details it will be seen, therefore, that there are two chief danger points in carrying out a prostatic resection: (1) the region of the trigone; (2) the posterior urethra. An injudicious cut in the first region will open up the space of Denonvillier, and in the second perforate the rectum. Of these two disasters I fear the former more. Two of my patients have passed urine per rectum a few days after resection without being any the worse for their temporary fistula. Some twenty have suffered from severe sepsis following a resection, and, although I have no definite proof of this, I believe that in some of these cases of protracted sepsis the space of Denonvillier has been infected. In order to prevent this, when removing tissue at the level of the sphincter the instrument should be kept horizontal and not dipped down into the bladder.

It may be thought that I am over-emphasizing the factor of sepsis in the McCarthy operation. If this be so it is because it has proved to be the chief trouble that I have encountered in my own practice. Some of this sepsis, as we have seen, is avoidable, but some is inherent in the operation. So long as the actual removal of prostatic tissue is accomplished by a diathermy cutting current, so long must we leave behind tissue that will form a nidus for infection. That I am not alone in fearing this defect in what is otherwise an excellent operation is shown by a reference to current urological literature. Everywhere we see an increasing realization of the risks of extensive tissue damage and a forsaking of electrical methods of resection in favour of the cold punch of Young. For what is the Bumpus resectotome except a Young punch to which has been added a diathermy electrode, an irrigation system, and an internal source of illumination? Unfortunately I have not yet had an opportunity of visiting the Mayo Clinic and of seeing Mr. Thomson at work with his latest pattern of punch. I have, however, had the pleasure of watching Mr. R. H. O. B. Robinson using the same technique at St.

Thomas's Hospital, and have been very favourably impressed by the ease and rapidity with which he removed a large amount of prostatic tissue. More particularly have I been struck by the moderate amount of haemorrhage that has been provoked by the cold punch, and by the ease with which it was subsequently controlled by the use of a coagulating electrode. Certainly in the hands of an expert, accustomed to the use of a direct-vision cystoscope, the Thomson punch is an excellent instrument. The ease of its introduction and the avoidance of coagulation, except for the control of isolated bleeding points, contribute to render it a less traumatic weapon than is the McCarthy resectotome. Its chief disadvantage, to my way of thinking, is that it makes use of an optical system to which few of us are accustomed. This is, however, a deficiency to be overcome in us rather than in our instrument, and while learning a new technique we may take comfort in this thought. The punch is a much less dangerous weapon than the loop: with a punch it would be difficult to perforate the bladder; with a loop it is quite easy to do so.

That the realization of the disadvantages of using the cutting current in prostatic surgery is widespread is also shown by the fact that J. F. McCarthy, the inventor of the resectotome most widely employed in this country, has recently designed a new instrument on the lines of the Young punch. He has referred to it as supplementary to his other instrument, but that the chief exponent of a cutting current method of resection has moved in the direction of the cold knife is highly significant.

Treatment

So far I have spoken only of the factors that determine the onset of sepsis. It will now be necessary to discuss methods of treatment once it has occurred. In this connexion bladder drainage and lavage are of primary importance. This is easily carried out by the indwelling catheter. Where, however, a severe infection has existed prior to operation, where the urethra tolerates badly an indwelling catheter, or where the patient is likely to resent catheterization, I am more and more inclined to combine resection with a temporary suprapubic drainage. Not only does this allow of the adoption of far more efficient methods of treatment of sepsis, but it relieves us of all fear of clot retention following the operation. Moreover, these gains are purchased at a very small cost, for once the obstruction has been removed the suprapubic fistula will close up in the course of a few days.

Another addition to the technique of the McCarthy operation which I invariably make is vasoligature. An acute epididymitis is a distressing complication, but one that is not usually considered serious. Yet I can recall one patient on whom I omitted to carry out vasoligature on the grounds that he was so poor an operative risk that the less that was done to him the better. In spite of severe attacks of angina pectoris he survived my resection, but died four weeks later from a suppurative epididymitis.

Indications for Perurethral Resection

A critical survey of perurethral resection of the prostate may well conclude with a discussion of its indications. For what type of case and in what circumstances should resection be substituted for prostatectomy? These are questions to which many answers have been given. How widely these answers vary is shown by a comparison of statistics obtained from six different American urological centres. I quote American statistics because the figures available for perurethral resection are much larger

than those obtainable in this country. Dr. L. M. Orr, in the *Journal of Urology*, states that in six different American clinics the number of resections performed to one prostatectomy was as follows: 80, 19, 9, 1.7, 1.5, 0.9 respectively. To his question, On what type of case do you employ resection? circularized American surgeons returned answers that ranged from a frank denial that it was of any value to an assertion that it should be employed in every type of case. In England, perhaps owing to our happy genius for discovering middle courses, these extremes of opinion are seldom encountered. The majority of urologists have accepted perurethral resection as a valuable addition to our methods of treating the obstructing prostate, and use it in moderation. Each of us may differ in our interpretation of the word moderation, but our divergence is not great. Personally I mean by that word that I employ resection in about 20 per cent. of all my prostatic cases, reserving it in particular for minor enlargements or for patients in whom, for one reason or another, it would be dangerous to perform a prostatectomy. Because resection can be carried out in cases in which enucleation would be dangerous it appears to me to be the most valuable of recent additions to our methods of treatment. When combined with a temporary suprapubic cystotomy, done under local anaesthesia, it is by far the safest of all the surgical attacks on the obstructing prostate, and can be carried out on patients who formerly would have been condemned to catheter life or to a permanent suprapubic drainage. It provides, therefore, a welcome way out of many a difficult clinical problem.

In conclusion I should like to make a digression. For a long time I have felt that our methods of dealing with prostatic obstruction were in some danger of becoming over-standardized. There is a tendency for us to become champions of one or another particular brand of operation instead of exponents of them all. Personally I am trying to avoid being pro-McCarthy, pro-Thomson, pro-Harris, pro-Freyer, or pro-Thomson-Walker, and employ each method where I believe it to be indicated. Each of these techniques has its place in our surgery; each its advantages and its shortcomings. In the preceding retrospect I have pointed out what in my opinion are the chief disadvantages of the McCarthy operation and have discussed some of the steps that urologists are now taking to remove them.

C. Weysser (*Dtsch. med. Wschr.*, February 19, 1937, p. 307) remarks that some sixty different causes of abortion have been identified, but that it is very difficult to associate any one of them with a given case. The treatment of threatened abortion has till recently lacked specific direction, but now, with the recognition of the part played by vitamins and hormones in this matter, it is possible to be more rational and less empirical. The author gives an account of his experience with ninety-six cases of threatened abortion treated with the vitamin D preparation vigantol. His rationale was based on the investigations of Poullson, who in 1924 drew attention to the favourable effect of cod-liver oil on intra-uterine development. The vigantol was administered three times a day, only one drop at a time. This treatment was continued for several weeks, and when possible to term. Other and older remedies for threatened abortion, such as opium and rest in bed for at least a week after the cessation of haemorrhage, were not neglected. This treatment was successful in about half the cases. The author chooses as controls the records of other gynaecologists whose patients were not treated with vitamin D and whose results varied considerably but were always much inferior to those claimed for vitamin D medication.

BLOOD TRANSFUSION IN OBSTETRICS

BY

**MALCOLM D. BLACK, M.B., Ch.B.,
F.R.F.P.S., M.C.O.G.**

Lately Registrar to the Glasgow Royal Maternity and Women's Hospital

This article has been written to describe the formation of a blood transfusion service and to give an outline of the indications, method, and dangers of blood transfusion. Among the branches of medicine in which there is a place for blood transfusion obstetrics is pre-eminent; yet this fact has been neglected for many years on the ground that the pregnant or parturient woman stands blood loss better than any other type of patient.

As pointed out by Professor Dugald Baird in a lecture to the Glasgow Obstetrical Society and later published in the *Lancet* (1936), one of the outstanding needs of an efficient maternity hospital is a blood transfusion service. The great difficulty found by most institutions requiring large numbers of transfusions has been to secure a suitable donor promptly. In previous years patients have died after a stay of eight hours in this hospital, during which time twelve donors had been tested and found unsuitable. It is thus desirable to have a list of grouped donors within easy call.

Procedure in the Glasgow Royal Maternity and Women's Hospital

In June, 1936, a service was started in this hospital. Placards had been posted at the entrance to it and in public places in the neighbourhood stating that male donors were urgently required, and that a fee of £1 1s. would be paid to anyone giving blood. The prospective donors were asked to leave their names at the inquiry office. At a later date they were requested by postcard to come to the hospital for examination of the heart and lungs, Wassermann reaction, and blood group. If the heart and lungs were normal and the Wassermann reaction was negative the donor was placed on the roll and informed to that effect by another postcard. By this means a roll of 180 donors has gradually been built up. All groups are put on the roll.

Before a donor is sent for the recipient's blood is first grouped to determine the appropriate donor. The policy of the hospital, notwithstanding, is still to use a relative where possible. By this means a saving of universal donors is effected. However, in cases of great urgency a Group IV donor is summoned at the time of the patient's admission. When the occasion arises the motor hirers to the hospital are telephoned, given the names and addresses of three donors living in the same locality, and instructed to secure one donor as quickly as possible. In this way a donor can practically always be secured within thirty minutes.

When a donor arrives a rapid direct compatibility test is performed before the transfusion is started. The blood having been withdrawn the donor is kept lying flat for about one hour, given a hot meal, and then sent home by taxi. He also receives a form stating that he has given blood, and on production of this form at the house-superintendent's office he is paid the fee of £1 1s. Should a donor be called and not used he is paid 5s. This service has been made available for the private practice of the members of the visiting staff of the hospital. Since the commencement of the service fifty donors have given blood and nineteen have been called and not used. By means of this service we hope to prevent as far as possible deaths from haemorrhage in the hospital.