

OBSTRUCTION AT THE BLADDER NECK IN THE ADULT MALE

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Obstruction at the bladder neck in the adult male occurs as the result of a variety of causes and each particular patient is a separate problem demanding individual management. Certain features, however, are common to all types of lesion and the problem can thus be discussed as a whole, differences where they exist being pointed out. Improvements in the management of these patients have resulted in a significant lowering of the mortality. Better control of infection, advances in our knowledge of renal physiology and internal environment, improved operative techniques, the greater use of one-stage operations, the preservation of an intact bladder or its immediate closure, replacement of blood loss, and improved anaesthesia, are all well-recognized advances which have contributed towards this. The recognition and treatment of biochemical imbalances occurring in these patients is one facet of the problem of which there is not as yet a general awareness. Attention to this aspect will result in an even further lowering of mortality and an increased operability rate. This has been adequately demonstrated in departments active in this field in recent years and it has been said with a certain element of truth that the urologist must be a biochemist too¹. The word management is used here to indicate the manner of treating the patient, including the preliminary assessment, the decision whether to operate, the pre-operative preparation, the method of treatment, the post-operative details, and the complications.

Obstruction at the bladder neck may be prostatic or non-prostatic in origin.

1. Prostatic Obstruction

Benign Senile Enlargement. The enlargement represents a hyperplasia rather than an adenoma, both glandular tissue and fibro-muscular stroma being involved. Generally speaking, all except the posterior lobe is involved, but occasionally the middle lobe alone is affected. Surrounding the hypertrophied part of the gland is a false capsule consisting of compressed normal prostatic tissue.

Prostatic Fibrosis. In this condition there is overgrowth of the connective-tissue stroma with atrophy of the glandular element. The gland is of normal size or smaller. The fibrosis leads to a gradual narrowing of the prostatic urethra.

Carcinoma of the Prostate. The gland is not as a rule greatly enlarged but is usually densely hard and nodular. The malignant process develops as a single or multiple nodule and slowly infiltrates the gland; the ultimate effect is likely to be obstruction to emptying of the bladder.

2. Non-Prostatic Obstruction

Obstruction at the bladder neck also occurs from causes other than changes in the prostate. The lesions that may be responsible would seem to be congenital in origin, but frequently the obstruction develops slowly and symptoms may not be sufficiently marked for the patient to seek advice until he reaches adult life. In the main these patients present themselves at an earlier age than the group with prostatic disease and there is a history of a poor urinary stream for as long as can be remembered.

Marion's Disease includes (a) stenosis of the bladder neck which occurs as a result of either subepithelial fibrosis

or muscular hypertrophy, and (b) median-bar obstruction, which may be due to either a localized muscular hypertrophy or an adenoma of outlying glandular foci. When adenomatous the glands involved are either those of Albarra, some of which are subtrigonal, or the glands of Jores, which lie between the most median of the prostatic tubules and the urethral mucosa below the sphincter. In both varieties it occurs as a protuberance projecting forwards from the internal meatus and causing obstruction.

Hypertrophic Interureteric Ridge is frequently associated with one or other of the lesions of Marion's disease. It may also occur as a result of secondary hypertrophy of the fibres of the trigonal musculature following upon existing obstruction at the bladder neck. The hypertrophied ridge overhangs the internal meatus and so causes obstruction.

CLINICAL

An enlarged prostate results in compression from side to side and elongation of the prostatic urethra, or its constriction as a result of fibrosis or malignant infiltration of the prostate. An enlarged middle lobe projecting upwards and overhanging the internal meatus occludes it in the manner of a ball valve. Marion's disease and hypertrophied interureteric ridge occlude the internal meatus in the manner described above. Whatever the underlying pathology the ultimate effect is likely to be obstruction to the emptying of the bladder. Patients with bladder-neck obstruction may present in a number of ways and clinically they fall into several well recognized groups, viz. (1) patients with urinary symptoms, (2) those with acute retention of urine and (3) those with chronic retention of urine.

1. PATIENTS WITH URINARY SYMPTOMS

Patients with obstruction due to prostatic lesions are generally over the age of 60 years, but the appearance of symptoms at an earlier age is not unknown. The group with non-prostatic lesions generally present themselves at an earlier age and there is a history of a poor urinary stream for as long as can be remembered. Whatever the underlying cause, the symptoms of obstruction at the bladder neck are essentially the same. Any or all of the following may be present: Frequency of micturition occurs, both diurnal and nocturnal, the latter being complained of earlier as a rule. It results from interference with the action of the internal sphincter or from congestion and irritation or the accumulation of residual urine. Urgency and some loss of control of micturition may be apparent. The stream loses its force, micturition is slow and often interrupted and dribbling continues after the end of voluntary micturition. Dysuria occurs in the presence of infection—cystitis or prostatitis—or a vesical calculus, which may, however, be painless. Haematuria may occur from an enlarged prostate and is painless and bright red in colour.

The main objective sign is the finding of an enlarged prostate, but its absence does not exclude other lesions. Rectal examination may be misleading even when enlargement of the gland has taken place, for this may occur mainly into the bladder and be inaccessible to the examining finger. The fibrous prostate is not enlarged and is often smaller

than normal. It is usually uniformly harder than the healthy gland. A malignant prostate is likely to be hard and nodular and there may be loss of the median sulcus or fixation of the overlying rectal mucosa. In many of these latter cases the diagnosis is extremely difficult. Residual urine may be present. It can be demonstrated by the passage of a catheter after the bladder has been emptied by normal micturition; but this procedure is generally inadvisable since there is a very definite risk of introducing infection. The necessary information can readily be obtained by means of an intravenous pyelogram, which is desirable in these cases in either event. Films of the bladder are taken immediately before and after micturition and if carefully done will provide as much information as is required, since a knowledge of the exact amount of residual urine is of little practical value. The films are also of value in demonstrating the degree and type of any intravesical prostatic projection.

If the diagnosis is in doubt it may be necessary to carry out an endoscopic examination. If there has been haematuria cystoscopy is essential to exclude other causes of bleeding. When the prostate is much enlarged cystoscopy is apt to cause bleeding or precipitate acute retention. In these cases it is preferably carried out in the theatre immediately before operation. Examination of the urine is invariably carried out.

Patients with minor symptoms such as slight frequency do not necessarily require operation. They can be treated expectantly but must be seen regularly for review. They should be advised to empty the bladder regularly and avoid enforced retention. Any urinary infection is treated. Malignant cases are started on hormone therapy. When frequency interferes seriously with sleep, business activities or social life operation should be considered. Extreme difficulty in micturition, a high residual urine, persistent or recurrent infection, and a history of a recent hernia or piles associated with straining,² are indications for operation. Operation is necessary where definite signs of obstruction have developed, since progressive deterioration of renal function is likely to occur. The casual finding of an enlarged prostate without urinary symptoms is not in itself an indication for operation.

2. PATIENTS WITH ACUTE RETENTION

There is generally a history of preceding urinary symptoms but occasionally acute retention is the first indication of bladder-neck pathology. The commonest precipitating cause of retention is enforced holding of the urine when there is a call to micturate, resulting in overstretching of the detrusor musculature. Alcohol in excess, causing rapid diuresis and impaired faculties with neglect to empty the bladder, is another common cause. A sudden chill may precipitate retention.

One attack of retention is as a rule an indication for operation. Catheterization will occasionally restore micturition but further episodes usually occur and repeated catheterization will ultimately result in the introduction of infection with its sequelae. In some centres the use of a catheter in cases of retention due to benign prostatic obstruction is forbidden and these patients are treated by immediate prostatectomy,³ the pain being temporarily relieved by morphia. This method permits of only the minimum of pre-operative investigation and preparation, and in addition requires a urological service with 24-hour radiological and

laboratory backing. It has limited application. The treatment of choice for these patients is preliminary drainage by an indwelling catheter followed within 7-14 days by operation. During this period the patients general condition is assessed, the urine is examined, the blood urea estimated and an intravenous pyelogram done. Where preceding chronic retention is suspected the electrolyte pattern of the plasma is fully investigated. Minor degrees of cardiac embarrassment or impaired renal function can be attended to, any infection present treated, biochemical imbalances corrected, and hormone therapy commenced in malignant cases. This period at the same time allows congestion of the prostate and bladder to subside and enables the patient to recover from any emotional upset occasioned by the retention and hospitalization.

Indwelling Catheter

There is endless discussion concerning the advisability of an indwelling catheter. Liability to infection is the chief argument advanced by those opposed to the procedure. This discussion is spurious, however, if one passes a catheter and connects it to a tube draining into an open unsterile container whose broad fluid surface from then on will serve as a perfect collecting medium for ward dust laden with bacteria. Such an exposed container standing under the bed and filled with obviously infected urine getting cloudier by the day is still a common sight in many wards and is a complete negation of all the accepted principles of modern urology. If properly managed, an indwelling catheter has not been found to carry any serious risk of infection and has in no way prejudiced the results of operation. It has the distinct advantages mentioned above and the use of this method over a period of years has resulted in an increased operability rate with a marked reduction in the number of suprapubic cystostomies done, and has materially contributed to a lowering of the operative mortality and morbidity.

Technique. Of paramount importance is the maintenance of absolute asepsis. Catheterization as a casual procedure is to be condemned. The operator should scrub as for any surgical procedure. Ideally a gown and mask are worn. A sterile trolley is set and careful swabbing of the external genitalia is carried out. A collecting flask, glass connections and tubing are sterilized beforehand, preferably by autoclaving. It is quite satisfactory to use empty vacolites for this purpose, removing the glass air-outlet tube and retaining the use of the rubber stopper. A glass connection is inserted into one of the inlets in the stopper and to this is connected a length of rubber tubing sufficiently hard not to kink easily. A second glass connection attaches the tubing to the catheter. The remaining inlet in the stopper acts as an air vent and is protected from dust contamination by a filter packed with cotton wool and formalin tablets. A closed sterile system of urinary drainage is thus established and is maintained throughout the period of indwelling catheterization. When it is necessary to empty a full container it is immediately replaced by a sterile one. Should there be any need to break the circuit, the catheter is temporarily sealed with a sterile spigot and the whole drainage system below this replaced by a sterile set. A small catheter (16 or 18 F) is used and is changed at least once a week. Chemotherapy can be instituted concomitantly if desired. The provision of a wire basket for the container enables the patient to be mobile.

Catheterization may present difficulty. The ideal is to insert a self-retaining catheter of the Foley type. This may not be possible at the first attempt. Other types should be tried, viz. a red rubber, a small stiff rubber Tieman's, or a coude or bicoude which can now be obtained in boilable material (woven nylon or plastic). It is often possible to insert a Foley immediately after decompression with one of these. In other instances this can only be accomplished after one of these varieties has been left in the bladder for 12 hours or more. In rare instances it is found impossible to get into the bladder any form of catheter otherwise than by guiding it through the urethra on a curved metal introducer. A general anaesthetic is necessary, and when this is undesirable a useful addition to one's armamentarium is to decompress the bladder by inserting a lumbar-puncture needle into it suprapubically. The needle should be inserted well above the pubes and passed in a downward and backward direction. Excessive mobility is prevented by inserting it through a flat cork which is strapped to the abdominal wall. It is usually possible to pass a catheter after decompression in this manner. In acute retention slow decompression of the bladder is not required.

Suprapubic cystostomy is only carried out when, because of associated medical conditions, operation is likely to be delayed for an appreciable or unpredictable length of time or is completely contra-indicated. The usual contra-indications are recent coronary thrombosis (within 6 weeks), uncompensated cardiac failure, recent symptoms of cerebral arteriosclerosis, and severe renal damage. Many of these patients can be made fit for operation during a period of suprapubic drainage. Hypertension, valvular disease without incompetence, arrhythmias, and respiratory disease such as bronchitis or emphysema, are not contra-indications to operation. In cases of active pulmonary tuberculosis, carcinoma of the bronchus, or pulmonary failure, suprapubic cystostomy is desirable. Patients confined to bed for some other illness may develop acute retention supervening on a mild degree of chronic retention.

In most cases the course to follow is clearly indicated, whereas others may tax the surgeon's clinical judgment to the utmost. Where there is doubt it is advisable to institute a period of urethral drainage as a first measure. This can always be followed by suprapubic cystostomy when necessary, as circumstances dictate. This method of management has an added advantage. After a period of urethral drainage micturition is sometimes restored to normal, thus avoiding suprapubic cystostomy completely. In cases with severe renal damage due to chronic retention, however, restoration of voluntary micturition is insufficient grounds *per se* for discontinuing drainage.

3. PATIENTS WITH CHRONIC RETENTION

In this condition there is no pain and the patient is usually unaware of his distended bladder. He may on close questioning admit to an awareness of not emptying his bladder satisfactorily. The retention has been present for a long time as a rule and there is a history of a poor stream, frequency, urgency or dribbling. Symptoms of uraemia may be apparent, such as dyspepsia, loss of appetite, dryness of the mouth, loss of weight, nausea or vomiting, and constipation. Mental changes in the nature of dullness or confusion may be present. On examination the bladder is distended and there may be overflow incontinence. The

patient should immediately be admitted to hospital and the further management depends on the findings.

If the blood urea is not raised above 70 mg.%, the electrolyte pattern of the plasma is normal, the urine is uninfected, an intravenous pyelogram can be obtained, and the cardiovascular and general condition are satisfactory, there is no need to institute bladder drainage. Operative treatment of the causal condition can be undertaken as soon as the usual investigations and preparations have been completed. If any of these conditions are not fulfilled it is necessary to institute bladder drainage. The indications for doing a supra-pubic cystostomy are the same as those discussed under acute retention; otherwise a catheter is passed and drainage established by means of the closed system described in a preceding paragraph. Combined with the vigorous treatment of any infection present (sensitivity tests being an essential routine), a period of drainage will generally result in a lowering of the blood urea. The blood-urea level alone, however, is not an accurate assessment of renal function and should not be allowed to create a false sense of security, for marked alterations in the internal environment may be present with little or no urea retention.⁴ Existing biochemical imbalances must simultaneously be attended to.

Biochemical Imbalance

Broadly speaking, there can occur disturbances of water metabolism, either retention or dehydration, depletion of base (either sodium or potassium or both), or an acid-base disturbance (usually acidosis). As a rule they are so intimately connected that any attempt at division is unsatisfactory. It cannot be emphasized too strongly that there is no one formula or group of formulae that can be used in determining the type or amount of therapy to be given. Constant clinical and chemical evaluation of the patient, coupled with an intimate knowledge of renal physiology and water and electrolyte disturbances, are required. Each patient is a separate problem demanding individual management.

Relief of obstruction may result in further biochemical abnormalities. After decompression the capacity of the kidneys to conserve or concentrate certain substances may be seriously impaired. There may be a marked diuresis resulting in depletion of Na, Cl, and possibly K, requiring energetic replacement of these ions. In other cases ionic loss is not so severe since no diuresis occurs. The responsible tubular dysfunction is not permanent and partial recovery takes place within a few days, when the kidney is once more able to maintain the internal environment at a constant level. Until this occurs it is important to maintain a high index of suspicion, with constant biochemical supervision of the blood plasma. Any substance found to be deficient is supplemented. Unobserved ionic loss after relief of obstruction in chronic retention, either by operation or drainage, may be the reason for unexplained clinical deterioration often observed.⁵

Drainage is maintained until maximum correction of all abnormalities is achieved. It is permissible to proceed to operation once the cardio-vascular and general condition are satisfactory, the normal electrolyte pattern of the plasma has been restored, and the blood urea is stabilized even if it is still above the accepted normal. Severe anaemia if present is corrected by the transfusion of blood or packed red cells.

Patients admitted in acute renal failure must be treated by suppression of endogenous protein metabolism until renal function has improved. The use of 50% glucose in water as advocated by Merrill⁶ is adopted. The solution is administered as a continuous slow drip over the 24-hour period. To minimize the occurrence of venous thrombosis a polythene catheter is inserted into the brachial, cephalic or saphenous vein and passed well up into the larger veins, where the rapid blood flow dilutes the hypertonic solution. Taking into account both insensible loss and endogenous production of water, replacement in the anuric phase should be limited to 400 c.c. of the solution per day for the average man of 70 kg. In addition any overt losses of fluid (vomiting or diarrhoea) must be replaced. The use of androgens for their anabolic effect has recently been suggested. They should be used with caution, as there is evidence that there is a reversal of this action after a period of about 10 days. The development of hyperkalaemia constitutes a grave danger during this phase and must be carefully watched for. A significant rise in the serum-potassium level or the demonstration of typical changes in the electrocardiogram are indications for instituting immediate measures to deal with the situation. In most instances the use of 50% glucose will have been sufficient. The administration of insulin in addition is often of value. The use of ion-exchange resins is of considerable value when administered rectally in the form of a retention enema. A rapid and significant lowering of the potassium level can be achieved in this way. Failure of response to these measures may demand the use of some form of haemodialysis as an emergency procedure. The most satisfactory method is by the use of the artificial kidney, of which there are several types available. Haemodialysis can be life-saving in these cases and under ideal conditions an artificial kidney would always be available.

Antibiotics are given to deal with any infection that may be present. Indwelling catheterization carries a high risk of infection in these patients and is inadvisable.

This regime is continued for as long as the anuria persists. With the return of renal function oliguria is followed by a diuretic phase. Water balance must be carefully regulated from the outset and maintained throughout these phases. The diuretic phase may be accompanied by profound losses of water and electrolytes, which must be replaced. Unobserved losses may lead to sudden and disastrous deterioration in the patient's condition. Caution, however, must be exercised in replacing water eliminated in the urine in the diuretic phase; it may merely represent oedema fluid and then replacement of the total volume will only serve to maintain the oedematous state. The state of hydration at the onset of the diuresis rather than the urinary losses alone should indicate the amount of replacement required. Food is given *ad lib.* as soon as adequate nourishment can be taken voluntarily. Further management will depend on assessment of the patient once renal function has been restored.

SURGICAL TREATMENT

Since obstruction at the bladder neck is due to a variety of causes no single operation covers all the different types. The choice is dependant on the lesion and to a certain extent on the personal preference of the surgeon. If not done previously cystoscopy is carried out in the theatre, and careful inspection of the lesion will confirm the preliminary

impression regarding the best method of dealing with the particular patient. The bladder is carefully inspected for tumours, diverticuli or stones, for the presence of any of these will affect the final decision. For the large benign prostate my preference is for the retropubic operation of Millin.⁷ It gives the best exposure of the prostatic cavity and thus facilitates diathermy of all bleeding points under direct vision. The hypertrophied gland is carefully and gently enucleated from within its false capsule of compressed prostatic tissue after it has been exposed by a transverse incision through overlying true and false capsule. Vesical calculi, if present, can in most instances be removed quite easily by this route. If they are too large to traverse the bladder neck there is no objection to a central vertical incision in the anterior bladder wall extending upwards from the transverse capsular incision. Diverticuli can be similarly dealt with if necessary. Following this additional incision the catheter is left in for a longer period, 7-10 days usually being sufficient. Bilateral vasotomy is performed.

Prostatic fibrosis, moderate degrees of benign hypertrophy, carcinoma of the prostate, Marion's disease, and hypertrophied inter-ureteric ridge, are dealt with by means of perurethral resection. Perurethral resection followed by hormone therapy is the correct treatment for carcinoma of the prostate. The obstruction is removed and the diagnosis can be confirmed microscopically. In the hands of a skilled operator perurethral resection can also be used for moderately large prostates. It may also be advocated for patients whose general condition precludes other methods of prostatectomy. The resection is carried out under direct vision, either by means of a wire loop activated by a cutting current—the resectoscope, of which there are many varieties and modifications—or the cold punch of Gershom Thompson. The choice is largely a matter of individual preference and experience and there are enthusiastic advocates of both methods. My preference is for the resectoscope, which is an instrument of greater scope and accuracy, enabling the operator to carry out a more complete clearance of the offending tissue. Most instruments are based on the original design of McCarthy, which has been subject to numerous modifications and improvements. The sheath of the instrument is straight and is introduced into the bladder with an articulated obturator. The telescope supports a diathermy electrode consisting of a loop of tungsten wire which is mounted on a rack in one of several ways so that it can be moved within the sheath and alongside the telescope. Resection is carried out by allowing the loop to retract repeatedly, each time cutting off a segment of tissue. Continuous irrigation with fluid is installed to clear the field of vision. Bleeding vessels are coagulated as they are encountered, thus reducing the blood loss to a minimum. In each of the conditions mentioned above as much tissue as is necessary to relieve the obstruction is removed. In cases of benign prostatic hypertrophy an adequate prostatectomy must be carried out, removing all tissue down to the false capsule as completely as in the enucleation practised in the retropubic operation. In the hands of a skilled operator large amounts of tissue can be resected in a comparatively short space of time.

In patients with vesical diverticuli requiring treatment or calculi too large for perurethral removal it is usual to expose the bladder suprapubically and deal with these first. The necessary resection at the bladder neck can in some

instances be carried out simultaneously from the vesical aspect by means of an ordinary diathermy knife.

After any type of operation the bladder is drained *per urethram* by means of an indwelling Foley catheter. An added advantage of this type of catheter is that it can if necessary be used as a haemostat by applying gentle traction. The catheter is connected to a closed drainage system and the usual aseptic precautions observed throughout.

Post-operative Care

As a routine measure these patients are given antibiotic therapy—500,000 units of penicillin and $\frac{1}{2}$ g. of streptomycin twice daily for 5 days, unless sensitivity tests indicate the use of some other substance. Intravenous 5% dextrose in water is continued post-operatively for approximately 24 hours, sufficient being given to maintain the patient's fluid balance. It should be borne in mind that there may be a low urinary output for a varying period (24-48 hours) as a result of antidiuretic hormone release after the surgical procedure and care must be taken not to overhydrate the patient.

Routine irrigation of the bladder is forbidden. In the presence of a good urinary output a free flow through the catheter can readily be maintained by gentle milking of the tubing at intervals. This will aid the passage of any obstructing clots or force them off the catheter eye. A vigilant nursing staff is essential in this connection. Should drainage cease in spite of this routine a useful manoeuvre is to deflate the catheter balloon, thus allowing any clot which has connected around it and obstructed the catheter eye to float off. In most instances this is followed by free drainage. Very occasionally, despite these precautions, the presence of large clots causes drainage to cease. When all other measures have failed very gentle irrigation of the bladder is permissible. A large glass syringe is attached to the catheter outlet and several washings of lukewarm sterile water are given. No force must be used and the soft clots can readily be aspirated into the syringe. Stringent aseptic precautions are observed.

A strictly sterile closed circuit is maintained throughout the period of drainage. The catheter is removed after 72 hours unless the urine is heavily blood-stained or the bladder has been opened. The patient is allowed up after 48 hours. The average stay in hospital is about 2 weeks. In cases requiring minimal resection, e.g. Marion's disease and hypertrophic inter-ureteric ridge, the period of hospitalization may be much shorter.

Complications

A certain degree of post-operative frequency of micturition may persist for a time while the field of operation is healing.

A mild degree of infection of the urine may also persist for a time, necessitating the continued use of urinary antiseptics. Sensitivity tests will indicate the correct antibiotic to use and will in most instances considerably reduce the period of treatment required. Most infections clear up without any difficulty when aided by a high fluid intake and a good urinary output. Persistence of infection after several months is an indication for reassessment of the patient. Occasionally a minor degree of obstruction is still found to be present at the bladder neck due either to incomplete initial treatment of the lesion or the development of a mild degree of narrowing as a result of the healing process. In the latter instance the passage of bougies is curative whereas in the former perurethral resection of any remaining obstructing tissue may be required. With careful attention to operative technique this complication is fortunately rare.

Epididymitis is largely prevented by bilateral vasotomy. It still, however, occurs in a few patients, but is usually mild and responds satisfactorily to chemotherapy. Osteitis pubis is rare. It is infective in origin. Atony of the bladder persists in a percentage of cases. It is due to prolonged over-distension of the bladder. Catheterization, either continuous or daily, is instituted for a period and is supplemented with oral carbachol twice or three times a day. In very rare instances a large atonic bladder is refractory to this conservative regime and may have to be dealt with by partial cystectomy.

SUMMARY

The various causes of obstruction at the bladder neck in the adult male are discussed.

The clinical groups into which patients with bladder neck obstruction fall are presented. The management of each group is discussed.

Observations on the advantages of indwelling catheterization are made. The management of the method is presented.

The occurrence of biochemical imbalances in these patients is stressed. The nature, recognition and treatment of these is considered.

The surgical treatment of the various causal lesions is discussed, along with some post-operative details and complications.

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