membrane of the urethra." With reference to the urethral membrane, I was not aware, either during the operation or from the subsequent progress of the case, that it had been injured.

CASE III.

C. D., a gentleman aged about 58, was sent to me in January, 1904, by Dr. M. O'Malley Knott of Castlebar, and Dr. Allman of Westport. He had suffered for four or five years from gradually increasing prostatic irritation, which assumed the form of urethral obstruction about two years ago, and has since been increasing in degree. The urine was faintly acid, and contained a little pus and albumen, but no tubercle. The amount of residual urine was never less than 24 oz. The prostate examined by the rectum did not seem to be much increased in size, but was distinctly larger on the left than on the right side. A No. 12 (E) catheter passed without any resistance. The catheter had not been previously used except on one occasion about a year ago for the purpose of examination. The patient could not pass any urine except when lying down on either side; it then dribbled slowly away. From these conditions I expressed the opinion that a pedunculated growth was present without much hypertrophy, and this was found to be the case.

I operated on January 16th, 1904, feeling some anxiety owing to the low condition of the patient and the shabby state of a somewhat exhausted heart, and found a prostate slightly enlarged on the left side, not at all hypertrophied on the right, and with a small flabby growth $\frac{3}{4}$ in. long, with a broad pedicle, growing from the prostate gland at the right side of the neck of the bladder, and movable in such a way that it effected the maximum of obstruction when the patient was erect, and the minimum when lying down; in the former position its action was valvular. I incised, enucleated, and removed this growth, finding, owing to its small size and flabby consistence, more difficulty in doing so than if the whole of an ordinary enlarged prostate were in question. No necessity existed for attempting to remove the gland itself. It was not the seat of any essential enlargement, and was not nodular. Indeed, I doubt if it would be possible, without inflicting grave injury, to enucleate a prostate in a normal or nearly normal condition as regards size and attachment, and which had not by growth freed itself to some extent from its connexions.

The patient is now (on the eighth day), doing well, and has given no cause for anxiety, except for the twenty-four hours following operation, when the weak state of his heart caused some alarm.

Dr. Earl reports that "the part removed weighs 105 gr., and is an adenoma mainly composed of glands lined by columnar epithelium lying close together, and similar to those forming the prostate."

As the nature of prostatic enlargements seems still to be a moot point, I may be allowed to express my views, founded on an extended observation of cases and specimens. There seem to be three conditions of senile enlargement:

1. A true hypertrophy of the gland without any interstitial growths.
2. The existence upon and within the substance of the prostate of one or more encapsuled tumours, distinct from the substance of the gland proper, and either myomatous or adenomatous in structure. Both forms of neoplasm or one only of them may be present.
3. A mixed condition of true hypertrophy and interstitial growths of the second class. This condition is much the most common. The tumours may eventually reduce the prostate to a state of pressure atrophy, or cause it to become a mere capsule for adventitious growths. It is the latter condition which in all probability has given rise to so much dispute and uncertainty as to the true pathology of enlarged prostate. The third of the figures represents a section of one of the lobes seen in Fig. 2, and shows the appearance of the prostate studded with these growths, which are nearly always of a spherical form, and only depart to more irregular outlines when they become of large size or approach the surface of the prostate.

ADULTERATION OF HONEY.—The Laboratory of the Inland Revenue Department of Canada has issued two brief reports by Mr. Thomas Macfarlane, Chief Analyst, on the results of analysis of honey and of flavouring extracts. Ninety-nine samples of honey were examined: eighty-one were genuine, five were doubtful, and thirteen were adulterated (six with glucose sugar and five with cane sugar). Honey may contain cane sugar either owing to artificial addition or because the bees are fed exclusively on it. Invert sugar may also be added and is less easy of detection. This sort of adulteration is known in Europe, where the product is sold as "Turkey honey" or "table honey." Its manufacture has increased greatly during the last decade. Water may also be added to honey above the amount (20 per cent.) normally present. Only eight samples were found to contain water in excess of 25 per cent. No injurious ingredients were met with in this series of analyses. The same may be said for the flavouring agents, many of which however are artificially coloured.

PROSTATIC ENLARGEMENT AND ITS TREATMENT

BY FREYER'S METHOD.*

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ENLARGEMENT of the prostate is a subject of perennial interest from the frequency with which it occurs, the difficulties it offers to the practitioner, the dangers to life which it brings in its train, and last, but by no means least, from the misery and degradation with which it surrounds the later period of life.

The various operative measures for the relief of this condition hitherto at our disposal have on the whole been either disappointing or surrounded with too great risks, hence the readiness with which new proposals are welcomed. The latest of these, namely, the possibility of complete removal of the prostate by the perineal or the suprapubic route with reasonable safety, and with complete relief to the patients' symptoms, is now earnestly receiving the attention of the surgical world. Numerous observations in man and animals show conclusively that the prostate fails to develop if the testicles are removed in early life, further, that the healthy prostate shrinks if the testicles are removed when adult life is attained. We are familiar with the ingenious arguments of White, of Philadelphia, based on these facts, which led him to advocate castration to relieve the symptoms attendant on the enlargement of the prostate associated with advancing age. The proposal was welcomed with enthusiasm, and often indiscreetly practised, but we are now in a position to estimate fairly the true value of the proceeding. As far as my own experience goes, and I believe I am in accord with most other surgeons, the final results have been disappointing, and castration is now rarely done for prostatic enlargement. It was not without risk to life and to the patients' mental condition, but these drawbacks might have been faced if the relief had been thorough and persistent. Unfortunately this has not been realized, and *a priori* argument falls to the ground in the face of clinical experience which is opposed to it. The adenomatous, fibroid, or myomatous overgrowth does not yield to removal of the testicles as does normal prostatic tissue. The lesser operation of vasectomy has given even more disappointing results, and has equally fallen into disrepute.

Ligature of the internal iliac arteries with the purpose of cutting off the prostatic blood supply and inducing atrophy has been resorted to in a few cases, but the results have been disappointing and not commensurate to the severity of the operative proceedings.

Partial removal of the prostate, in this country so honourably associated with the name of McGill of Leeds, has, on the whole, given the best results attained, but its mortality has not been small; whilst in some cases the relief has not been adequate to the risk run, and in others continued growth of the prostate has eventually nullified the advantage at first obtained.

These are the reasons which induce—nay, which require—surgeons to give a fair trial to methods which promise better results, for unless some more satisfactory method is forthcoming than those briefly alluded to the catheter, with all its drawbacks, will still remain, in the large majority of cases, the main remedy by which relief is given.

Complete removal of the prostate, either via the perineum or by the suprapubic route, is now on its trial; each method has its ardent advocates, and if one listened uncritically to either side it would seem as though the question were sure and settled, the risk to life very small, the recovery after operation uneventful, the final results irreproachable; the conclusion is like that of a child's story book, in which the characters "all lived happily ever after."

In bringing the subject before you to-day I do not intend to contrast the two operations—the high and the low—but to place before you the main facts with reference to cases in which I have removed the prostate by the suprapubic route.

It is necessary to make a few preliminary observations on the parts concerned. Without going minutely into the anatomy of the prostate, there are some essential points to which I wish to call attention as bearing directly upon the question before us. We have to deal with an organ which in healthy adult life weighs about 6 drachms, embraces and is intimately connected with that portion of the urethra next to

* Read at a meeting of the Birmingham Branch of the British Medical Association.

the bladder, and is composed partly of glandular and partly of involuntary muscle and fibrous tissue. It has its own proper capsule, just as the kidney or testicle has; it is surrounded by a plexus of veins, and these veins, together with the prostate, are enclosed in a sheath derived from the deep perineal fascia. When the prostate becomes so altered as to interfere with the function of micturition we have always, so far as my own observation goes, an increase in its weight, but this may vary in an extreme degree from little more than 1 oz. to as much as 10 oz., the increase in bulk being due to an overgrowth of any or of all the elements of which it is composed, sometimes the stroma only showing an increase, so that we have a body produced which may be compared to the familiar fibromyoma of the uterus, but more commonly the gland element is chiefly in excess, and the term "adenomatous prostate" is fairly descriptive of the result. The varying conditions produced are well seen in the microscopic sections I shall presently show on the screen, taken from cases upon which I have operated.

The enlarged prostate varies greatly in consistence, so that we find in some cases a tough, hard body difficult to enucleate or to remove piecemeal, and clinging closely to the prostatic urethra, from which it cannot possibly be separated, the urethra coming away with the prostatic tissues; or we have an elastic—almost succulent—body, generally of considerable size, enucleated with comparative ease, perhaps separable from the urethra and leaving it behind, but this I believe to be an uncommon event. Between these two extremes we have various gradations, but the variations in size and in consistence do not correspond to particular types in microscopic structure. The prostate in health is of pyramidal shape, with the apex forward, but as it enlarges the shape alters until we have a body produced still pyramidal in shape, but with the base forward, tightly pressed against the triangular ligament, and the apical portion facing backwards, and encroaching on the bladder. The changes in the prostatic urethra are in the direction of elongating and of flattening it, thus increasing its length and vertical measurement; at the same time its walls become atrophied until practically nothing may remain but the epithelial layers. The changes in the bladder, the ureters, and kidneys, are too well known to justify me in occupying your time by describing them here, but I would like just to emphasize the importance of the latter. The dilatation of the kidney pelvis, the atrophy of part of the renal substance, the interstitial nephritis which damages what part of the kidney remains; these are the conditions to be dreaded, and they are mainly responsible for the mortality which follows removal of the prostate by producing uraemia, and constitute a strong argument for early operative intervention. An argument sometimes advanced against operative interference in enlarged prostate is the presence of a general arterio-sclerosis, of which the enlarged prostate is only a part. I found this in one of my cases, and though the patient died after operation, the death was not due to this change, but to an entirely different disease, which I shall allude to when describing the case, but as I shall point out later there is some evidence that this arterio-sclerosis is not merely coincident with, but may actually be induced by the prostatic overgrowth. Another objection urged against removal of the prostate is the probable inability of the bladder muscle to contract and expel the urine when the patient has been for some time dependent on the catheter, it being inferred that the muscle has become feeble and atonic, but here again experience of the final results attained shows the objection to be groundless in, at all events, the very large majority of cases.

Before describing the operation of suprapubic prostatectomy, it is only just to acknowledge the obligation, which I at all events feel under to Mr. Freyer for introducing, and, as far as I know, originally working out the method associated with his name, an acknowledgement which has I think in some quarters been rather churlishly withheld. The diagnosis having been made by rectal examination, the patient's symptoms, and often by the use of the cystoscope, the usual preparations are made for suprapubic section of the bladder, the organ is distended with fluid, and the patient is placed in the Trendelenburg position, this last being, I believe, a useful assistance in the diminution of haemorrhage, which is mainly venous.

When the bladder is open I generally introduce a Fergusson's speculum and inspect the prostatic region; in this way a clear idea is obtained of the amount and shape of the outgrowth into the bladder. This may be massive or

quite small, sessile or almost polypoid, regular or irregular in outline, but it is interesting to note that in two of my cases in which the overgrowth was quite moderate in size, a small lobe not bigger than a bean situated at the very margin of the internal meatus appeared to play a large part in the obstruction to the outflow of the urine. By examination with the speculum we often find also enormous venous dilatation in the mucous membrane over and around the prostate, a condition which is very suggestive when we recall how large a part chill, or other causes of venous engorgement, plays in the production of retention of urine. Having made this inspection, which may be omitted if there is reason for haste in the operation, I pass a metal bougie of good size, introduce my left finger into the bladder, and, with a pair of blunt pointed scissors in the right hand, divide the mucous membrane over the most prominent part of the prostate close to the floor of the bladder. This division is only large enough to admit the end of the finger, and it must be made only through the mucous membrane. The scissors are then entirely discarded and the right index finger, entering the small wound in the mucous membrane, proceeds to strip underneath the prostate, but clinging close to it all the time. The stripping may be quite easily accomplished, especially when the enlargement is considerable and elastic, but in the firmer and tougher prostate it may be necessary to use all the force of which the fingers are capable. The left index passed into the rectum protects that cavity and at the same time pushes up and steadies the prostate. When the organ has been freed underneath the finger strips it on each side and then above so that at last the digit can sweep round it. Beginning then at the front of the prostate, close to the triangular ligament, an attempt is now made to peel it off the urethra stripping backwards towards the bladder, and here the metal bougie is of assistance, steadying the part and acting as a guide to the enucleating finger.

Occasionally the prostatic urethra may be left behind, but in the large majority of cases it comes away with the organ, and in a few cases part, or even all, the membranous urethra may be torn away also. As the process of enucleation proceeds it will in some cases be found that the prostate separates in two halves, or it may be into three or more portions, but often it comes away in one connected mass. These points, as to the condition of the urethra, the subdivision or otherwise of the prostate, and that it is possible to remove the whole of it I shall hope to demonstrate presently with specimens and with the aid of the lantern screen. When I say the whole of the prostate I do so with this reserve, that there may be some outlying acini left behind in the outer layers of the split sheath, but these are microscopic objects and, I believe, quite unimportant. During the enucleation there will be a continuous, but as a rule very moderate, loss of blood, which I think one may estimate as a rule at not more than 4 oz. to 6 oz. This loss should be entirely disregarded and no attempt at this time made to stop it. The fingers should go quickly and persistently on with the stripping process, and when the prostate is once completely freed most of the oozing stops spontaneously, the rest is easily controlled by sponge pressure or by hot douching. The enucleation is generally completed in a few minutes, and indeed, from the commencement of the operation until the dressing is applied, not more than from twenty to thirty minutes is occupied. The after-treatment is simple, the bladder is washed out through the wound daily as long as the latter is patent enough; the drain is removed on the fourth day, and the patient may be allowed out of bed as a rule in the third week, and in some cases earlier, with advantage. If the passage of the urine by the urethra has been delayed I have thought it useful to pass once or twice a No. 12 metal bougie to see that no granulation tissue or similar obstacle is obstructing the outflow. I have in two or three cases washed out the bladder with a soft catheter passed down the urethra, thinking that it would be more effective than the washing from above. On the whole, however, I doubt if this method has any advantage and in one case (No. 7) I came to the conclusion that it was a positive disadvantage and danger and I no longer resort to it.

Before describing the cases and showing the preparations, macroscopic and microscopic, which illustrate them, I will briefly give you the results attained and the conclusions I have arrived at.

Of the ten patients operated on, three died, one of malignant disease in the colon during the process of recovery and when he was practically convalescent; his death cannot therefore be in any way ascribed to the prostatectomy. The other two

deaths are in a different category, one patient died of uraemia in the third week after operation the ureters and kidney pelvis being dilated and the renal tissue atrophied and cirrhotic; the other patient died of angina pectoris in the sixth week. Both of these patients were bad subjects for any operation, and their lives, if no operation had been performed, would probably have been comparatively brief, but I certainly do not wish to suggest that the prostatectomy must therefore be acquitted of bringing about the deaths probably earlier than they would otherwise have occurred. As to the safety then of the operation I will only say that at all events it is as great as can reasonably be expected under the circumstances and for the conditions for which it is performed.

The final result in those who have recovered has generally been most admirable, far beyond what has been attained by the operations previously in vogue—a complete restoration of the function of micturition, freedom from pain, from broken rest, from haemorrhage, and so on. Whether the prostatic urethra has been removed or not, so far no ill-result such as stricture from cicatrization has followed, and pretty certainly now will not, seeing what time has elapsed since operation.

In the past I have made little selection of my cases. Once I refused to operate on a hospital patient as his kidneys were evidently insufficient, and he justified my refusal by dying of uraemia three weeks afterwards; and here is his bladder, prostate, and kidneys. In another case, a private patient, the prostate is very large and elastic, the catheter is required three or four times daily, and there is much inconvenience from incontinence when only a very moderate amount of urine has accumulated in the bladder; but there are granular and fatty casts in the urine, an insufficient excretion of urea, and a feeble failing heart. Prostatectomy would, I feel satisfied, be a highly dangerous operation in this case, and I have refused to undertake it. (This patient has just died.)

I hesitate yet to commit myself to any dogmatic statement as to which cases should be selected for operation and which rejected, but my inclination is to reserve it for cases in which the prostate conforms to the large elastic and succulent type. It goes almost without saying that patients should not be allowed to fall into a worn-out and poisoned condition from pain and cystitis without prostatectomy being considered. It is one thing to remove the prostate of a fairly hale old man at the commencement of catheter life, but quite another to do so when disturbed rest, pain, and sepsis have broken him physically and mentally. One limited class of sufferers from this distressing condition will obtain immense benefit from Freyer's operation; I allude to the young prostatic subjects, one of which is included in my cases. Whilst about 55 is the usual age at which prostatic overgrowth occurs, there are a few patients in whom symptoms exist in the early 40's, and catheter life is reached by 45 or even earlier. To such the boon offered by prostatectomy is enormous, and I feel justified in urging them to seek relief in this way.

In yet another group of cases very great benefit is to be expected—namely, in patients where vesical stone is complicated with enlarged prostate. Unlike the last, this group is a considerable one in point of numbers. Such patients, if submitted to litholapaxy, are apt to get recurrence of stone, in some cases, no doubt, because a fragment is left behind to form a nucleus for a phosphatic deposit in the presence of a cystitis, in others because the enlarged prostate prevents the expulsion of small stones formed in the kidney and passed into the bladder. If instead of crushing the stone suprapubic section is resorted to, the wound is a long time in healing in the presence of an enlarged prostate, and the function of micturition does not resume its normal course but remains too frequent and often painful as well, whilst residual urine may call for the assistance of the catheter. In the future, when vesical calculus and enlarged prostate coexist it will, I believe, become the routine practice to remove both by high section of the bladder.

CASE I.

W. M., aged 55, was admitted to the General Hospital on May 28th, 1902, with pain and frequent micturition and cystitis.

The history dated back two years, when he noticed that he had occasional difficulty in passing water, and that the stream was suddenly arrested, and at times he had to defaecate before he could micturate; following this came frequent micturition, especially at night, when he often had to rise four or five times. Later he suffered also from pain in the hypogastric region. Three weeks before admission pain in the hypogastrium became severe and he was in bed three days, and his doctor advised the use of a catheter.

When admitted the patient was sounded for stone, but none was found. The prostate was much enlarged as felt per rectum, was firm,

but not densely hard; residual urine amounted to nearly a pint, containing a good deal of pus. Cystoscopy revealed a good deal of enlargement of the prostate and a collection of what appeared to be pus and mucus in a pouch behind the prostate.

Operation.—June 2nd, 1902. The prostate was enucleated in two portions of nearly equal size. Bleeding was very moderate and the enucleation easy. The bladder itself and the tissues in front of it showed evidences of severe recent inflammation, and there was much oedema; the cavity of the bladder was hourglass in shape, the upper portion well up in the abdominal cavity being separated from the lower cavity by a marked constriction.

A good recovery followed the operation, and the patient was discharged quite healed on July 9th, but still with some cystitis and with residual urine generally amounting to 3 oz. or 4 oz., but with his symptoms very much relieved. The tissue removed consisted of two encapsulated and nearly equal portions, weighing together 45 grams (about 1½ oz.), but this was after hardening in spirit and not in the fresh state. The prostatic urethra and a little of the membranous were removed with the prostate. The enlargement was mainly an adenomatous one.

Present Condition.—Dr. Berkeley Murray, the patient's medical attendant at Tenbury, wrote me on November 28th, 1903: "I think his case may be considered a decided success. The condition compared with what it was before operation must be one of absolute bliss, and he is now able to do his ordinary work." I saw the patient at hospital December 3rd, 1903, and found that he completely empties his bladder, and that there is no stricture of the urethra. The only point in the case which is not entirely satisfactory, eighteen months after the operation, is that there is occasionally a little incontinence of urine at night, about a teaspoonful escaping at times. On examining his rectum a something is felt in the prostatic region, suggesting just an outline of the organ without its central filling up. Taking this into consideration with the parts removed, it is probable that a thin layer of prostatic tissue was left when the bulk of the organ and almost the whole of it was stripped out.

CASE II.

E. F., aged 59, was admitted to hospital on March 10th, 1903, for difficult, painful, and frequent micturition. Two years ago he first noticed difficulty in passing water, later pain also troubled him. These symptoms increased in intensity, and six months ago the patient found he had to get up ten or a dozen times at night to pass his water, and he felt much broken in consequence.

On admission it was found he only passed a very little urine, and his bladder was constantly overfull. Per rectum the prostate was found to be considerably enlarged and of dense consistence; the urine contained pus, blood, and phosphates; its quantity varied from 20 to 48 oz., specific gravity from 1008 to 1018, and the urea was under 200 gr. As the patient was unable to manage a catheter himself, and the condition of his bladder and his general condition were growing worse, prostatectomy was determined upon.

Operation.—March 16th. A speculum introduced into the bladder through the incision showed a small projecting lobe on the posterior lip, which appeared to play a large part in the obstruction to the outflow of the urine. Enucleation was performed, but with great difficulty, owing to the extreme toughness of parts, and the line of cleavage was nothing like as definite as it generally is. Operation was well borne, but at the end of a few days the patient became dull and apathetic, the escape of urine into the dressings became less and less, and he died of uraemia on the twentieth day. The necropsy showed that the right kidney weighed 7 oz., the left 5 oz. The cortex was diminished, the capsule stripped badly, the pelvis were dilated, encroaching on the kidney substance, and causing some atrophy of the pyramids; the ureters were dilated, their diameter averaging about one-third inch. The prostate was removed entire, and with a fairly complete capsular envelopment, but the surface of this indicated that the line of cleavage was irregular; the specimen weighs 33 grams (a little over 1 oz.) after immersion in preservatives. The whole of the prostatic and part of the membranous urethra came away with the prostate.

CASE III.

In June, 1902, I was asked by Dr. Short to see, in consultation with him, a gentleman, aged 46, who was suffering from a distended bladder. He had consulted Dr. Short three years previously as to his general health, at which time there was no complaint of bladder symptoms and the urine was of specific gravity 1016 and free from albumen and sugar. The apex-beat was in the normal position, but the arteries were somewhat thickened and tension was increased.

At the time of our consultation the patient looked very ill. The symptoms complained of were extreme lassitude, inability to concentrate thoughts, broken rest from frequent micturition, dizziness, and dry skin; duration some weeks. The heart was hypertrophied, the apex-beat ½ in. outside the nipple line, the arteries were hard and the tension high. The bladder reached nearly to the umbilicus and the prostate from the rectum was found to be much enlarged; micturition was frequent, the urine of specific gravity 1020, but free from albumen, was excessive in quantity. There was considerable loss of weight.

We arranged that the bladder should be emptied three times in twenty-four hours with a rubber catheter. Speedy improvement in the symptoms followed; but at the end of five days the quantity of urine passed, though greatly lessened, still amounted to 120 oz. in 24 hours.

August 1st. Dr. Short's note is, apex-beat just internal to the nipple line, pulse much less hard. Urine, specific gravity 1020; amount, 72 oz. in twenty-four hours.

In March, 1903, I was asked to see this patient again, because he was suffering from haematuria set up by the passage of a metal instrumen-

To Illustrate Different Types of Prostate and their Microscopic Structure.

Fig. 1.—Case VI. Weight, 182 grams; posterior aspect; vesical end above; removed in one mass with the prostatic urethra.

Fig. 2.—Case VI. Showing enormously dilated acini, rounded in shape, lined by low columnar epithelium, and containing mucus and catarrhal cells in varying proportions. The acini are supported by delicate bands of fibromuscular tissue.

Fig. 3.—Case IX. Weight 33 grams. Anterior aspect; vesical end above; removed in one mass with prostatic and membranous urethra.

Fig. 4.—Case IX. Showing a few dilated and more or less flattened acini lined by low columnar epithelium, and supported by a dense fibromuscular stroma.

Fig. 5.—Case III. Weight, 51 grams; postero-superior aspect; vesical part below; three separate masses; vesical calculus; bristle in bleeding vein. Prostatic urethra not removed.

Fig. 6.—Case III. Showing a pure connective-tissue stroma, consisting of fibrous and non-striated muscular tissue intimately intermixed and running in all directions.

To Illustrate the Relation of the Prostatic Tissue to its Capsule, to its Sheath, and to the Levator Ani, showing also that, however Complete Enucleation Appears to be, some of the Outlying Acini may be Left Behind through Junctions.

FIG. 7.—The relations of the prostatic acini to the prostatic capsule are well seen in this specimen. The levator ani is seen on the extreme right; passing towards the left we see a loose layer of areolar tissue, then fibromuscular bundles running longitudinally. Within this layer are the large blood vessels, and on the extreme left prostatic acini are just showing themselves.

FIG. 10.—Case VIII. Showing a section of a smooth adenoma which shelled out readily. Outside the dilated acini of the tumour is a capsule of fibromuscular tissue in whose meshes are flattened acini, which are seen even at the extreme margin.

FIG. 9.—Capsule of Case VII. A general enlargement showing dilated acini below, flattened acini in the circular capsule, going quite to the surface.

FIG. 8.—Shows prostatic acini to the left, then a very thick fibromuscular tissue which extends to the levator ani; the elliptical spaces are flattened prostatic acini, and can be seen quite close to the levator ani.

FIG. 11.—Case VII. A section through a piece of loose capsule which was all but detached from the surface of the tumour, showing a large acinus with one or two bundles of striped muscle.

as stone in the bladder was suspected. Before this accident the patient had for some time been entirely dependent on the catheter, no urine being voided without it; but, by the aid of elaborate precautions as to cleanliness, cystitis had so far been avoided. His general condition had greatly improved with the complete emptying of the bladder, the apex-beat had come back considerably; the condition of the arteries was also much more satisfactory, and the urine, about 40 oz. in the twenty-four hours, was of specific gravity 1020.

Despite treatment the haematuria persisted for eleven days, and was so severe as to cause faintness at times. The patient was therefore advised to submit to operation for control of the bleeding and for enucleation of the prostate, if that was feasible. This was done on April 1st, and when the bladder was opened a Fergusson's speculum clearly demonstrated the source of the bleeding, which was a small vein partly divided lying on a lobe of the enlarged prostate; there was a calculus the size of a hazel nut. Enucleation was speedily performed, the prostate coming away in three portions with moderate difficulty, and apparently leaving the urethra behind.

A very good recovery followed the operation. The urine was slow in coming by the urethra, but by the end of the fifth week the patient was able to undertake a little professional work, and was quite healed in about six weeks. Since that time he has been and is well. He passes his urine four times in twenty-four hours, never rises at night for that purpose, and has a full and forcible stream such as he had in early adult life. He is free from headaches, his arterial condition is fairly good, the urine, specific gravity about 1020, averages about 40 oz. in twenty-four hours, and has no abnormal constituent.

The case I have just related, apart from the successful operative result, is a singularly interesting one, from the evidence it gives of the strain thrown on the kidneys and, owing to their imperfect excretion, on the heart and arterial system by unrelieved distension of the bladder due to prostatic enlargement. When I first saw the patient with Dr. Short we both took a most anxious view of his condition. It would hardly be an exaggeration to say that he was on the verge of uraemia. The regular emptying of the bladder with the catheter speedily improved matters and relieved us of our fears, bringing about a rapid improvement, which has continued. In view of this case it is not unreasonable to say that, at all events in some cases where a marked arterial sclerosis and hypertrophied heart coexist with prostatic enlargement, the last-mentioned is the cause of the before-mentioned changes and not merely coincident with them.

The prostate was removed in three masses, well defined but only in part showing a capsule; the weight was 51 grams (nearly 1½ oz.) after immersion in preservatives. No trace of urethra can be found in the specimen. The enlargement is due almost entirely to an overgrowth of the connective tissue of the gland, and the specimen may fairly be described as a fibromyoma.

To Illustrate the Relation of the Urethra to the Prostatic Tissue, and the Difficulty of Separating the Two and Leaving the Urethra when Removing the Whole Prostate.

Fig. 12.—Section through normal prostatic urethra showing how closely adherent is the epithelium of the mucous membrane to the fibromuscular tissue of the prostate. Urethral glands and prostatic acini seen in section also.

Fig. 13.—Case vi. Section through the prostatic urethra, showing the epithelium represented by a single layer of cells, and occasionally several layers, below which is a loose areolar tissue, infiltrated here and there by small round cells; subjacent to this is the fibromuscular tissue of the prostatic enlargement, containing oedematous lymph spaces and flattened blood vessels.

Fig. 14.—Epithelium of urethra of Case VII; areolar layer; stroma with vessels.

CASE IV.

H. T., aged 70, was admitted to the General Hospital on April 15th, 1903, with retention of urine, which was relieved by a silver catheter, but a soft catheter could not be introduced into the bladder. The prostate was felt to be moderately enlarged by the rectum and extremely dense and hard. At the end of sixteen days the patient was still unable to pass his urine and it was considered undesirable to provide him with a metal catheter for his own use. Operation was determined upon, especially in view of the fact that his urine was normal in quantity and specific gravity and contained 300 gr. to 400 gr. of urea in the twenty-four hours.

Operation.—April 23rd. When the bladder was opened a speculum showed a small button-like nodule from the upper margin of the urethral orifice, which probably played a large part in producing retention. Enucleation was impossible, the tissues were dense to a degree, but with considerable force practically all the prostatic tissue was dug out with the fingers. The bleeding was moderate and the operation well borne.

On the fifteenth day some urine was passed by the urethra, and the patient was discharged on May 23rd with his wound perfectly healed, and passing the whole of his urine without the aid of a catheter, at intervals of five to six hours, there being no residuum.

The tissue removed consists of two masses rather irregular on the surface and devoid of any defining capsule, weight 17 grams, a little over ½ oz. No part of the urethra is contained in this specimen. The overgrowth is partly very dense fibrous tissue and partly glandular.

CASE V.

H. G., aged 71, was admitted to the General Hospital, April 29th, 1903, for persistent haematuria, frequent and painful micturition. When in hospital there was constantly a good deal of blood in the urine.

Micturition took place every hour and a-half with pain and there were several ounces of residual urine. The use of the catheter by his doctor at home and treatment by medical measures failed to give relief. Cystoscopy was difficult owing to the presence of blood, but in addition to enlargement of the prostate it was discovered that a dark mass lay behind the prostate which it was feared might be growth. This proved at the time of operation to be partly decolorized blood clot which had escaped from a vein over the enlarged prostate.

Operation.—On May 4th the prostate was enucleated entire, and the bleeding was very moderate indeed. Steady convalescence followed but it was five weeks before much of the urine passed by the urethra. At the end of the sixth week when the patient left the hospital all the urine came by the natural channel.

Present Condition.—The patient still has a little blood in the urine at times, but the bladder is emptied and the frequency of micturition is much less, the urine being retained about three hours, except when blood is present, at which times there is more frequent call but probably this is due to nervousness, as the patient very much dreads the occurrence of bleeding.

The prostate was removed entire and was enclosed in a well-defined capsule, the weight was 42 grams (about 1½ oz.) after immersion in preservatives. The whole of the prostatic and some, if not all, of the membranous urethra came away with the prostate.

CASE VI.

Mr. Y., aged 62, was referred to me by Dr. Saundby (May 5th, 1903) for bladder symptoms. These appeared to have originated about four years before, at which time the patient states that he had an attack of cystitis. This recurred about two years later, when he was laid up in bed for three months, and subsequent to this time practically all his urine was drawn off with the catheter.

When I saw the patient his condition was most deplorable, his rest was constantly broken, the catheter was constantly required, was passed with increasing difficulty and did not give complete relief, the pulse was quick, the temperature considerably raised, and the mental condition was very unstable. Per rectum the prostate was found to be a good deal enlarged, but the finger could reach its posterior boundary, to touch it was elastic, and appeared possible of enucleation.

May 7th. The prostate, which proved to be 6½ oz. in weight, the largest I have removed, was enucleated entire, and the operation in so feeble a man was well borne.

The few following days the patient was fairly well, though the pulse continued to be rapid. A little later he became restless and excited, did not know where he was, and became altogether like a patient with senile dementia. Still, he took nourishment well and healing went slowly on. In the third week the patient left my private hospital to go home in the hope that more familiar surroundings would assist in restoring his mental condition. He then came under the care of Dr. Hadow, who looked after him assiduously. The wound healed at the end of several weeks, the mental condition slowly improved, and the bladder resumed its functions. In October, when I last saw him, he held his water three to four hours, had good nights, was quite free from pain, and had no residual urine. Mentally he was clear and alert, had lost a habit of very stuttering speech, and was, as regards his mind, much better than before his operation, in fact the general contrast of before and after operation was eminently satisfactory.

The prostate was removed in one piece with a well defined thick capsule; the weight immediately after removal was 6½ oz. The prostatic urethra came away with the organ. The enlargement was mainly due to glandular overgrowth and dilatation, though there is also in parts excess of the connective tissues.

CASE VII.

C. L., aged 72, was admitted to the General Hospital on June 6th, 1903, with retention of urine. It was found impossible to introduce a catheter of any description or size into the bladder, so aspiration above the pubes was resorted to. The day after admittance it was found possible to pass a silver catheter, and later in the day a rubber one could be introduced.

History.—The illness dated back fourteen years, with symptoms of frequency of micturition, especially at night, and difficulty in the act, it being generally some time before the stream would flow. Six months ago he had his first attack of retention, which was relieved by catheterization. Since then he has had three or four such attacks, which have had to be relieved by instruments.

Operation.—On June 8th the prostate was enucleated in one piece without much difficulty. During the whole operation the patient did not lose more than 3 to 4 oz. of blood, and it was well borne.

June 15th. The patient developed acute orchitis on the right side, probably due to the use of the catheter daily for washing out the bladder. This was followed on June 21st by an acute attack of gout in the metacarpo-phalangeal joints of both great toes, which cleared up under the influence of colchicum. On June 25th orchitis occurred on the left side, in addition to that already existing on the right side. On July 17th he had another attack of gout, this time in the left ankle-joint, and in addition during the evening had an attack of severe pain in the left side of his chest. During the following day, July 18th, these attacks of pain in the left chest continued at intervals, death occurring suddenly during an exceptionally severe attack late in the evening. The patient passed urine per urethram for the first time after the operation on July 7th, at the beginning of the fifth week. Necropsy was refused.

The prostate was removed in one mass, surrounded by a capsule, complete everywhere, except over a portion of the anterior surface. It

weighed when fresh 3½ oz., but only 90 grams after being in preservatives. The whole of the prostatic urethra appears to have been removed with the specimen. The overgrowth is mainly glandular, and there is some prostatitis.

CASE VIII.

Mr. K., aged 63, was sent me by Dr. Craig of Bridgnorth in June, 1903, complaining of very frequent micturition, especially at night, of pain in the act and afterwards, and of haematuria. The symptoms dated back five or six years, and had steadily increased in intensity until the patient, who was a very nervous man, was driven by broken nights to seek relief. Sounding for stone was most unsatisfactory owing to the patient's extreme sensitiveness, and no stone was detected, but I thought it extremely probable that calculus existed in the bladder. Examination per rectum revealed a much enlarged prostate, quite elastic to the touch, and there were some ounces of residual urine. I advised sounding under an anaesthetic, and, if stone were detected, its removal by suprapubic section and the enucleation of the prostate at the same time. This was effected on June 12th. Five calculi of some size were removed from a large prostatic pouch, and the prostate was enucleated in two portions. Recovery was uneventful; most of the urine was passed by the urethra at the end of three weeks, and the whole of it in the sixth week. On November 4th Dr. Craig kindly wrote to me saying that the patient was well and completely free from all bladder symptoms, being able to hold his urine a normal period and going through the night without wanting to micturate. The prostate was removed in three masses, which were well defined, and in the main encapsuled; the weight was 70 grams (about 2½ oz.) after immersion in preservatives. The prostatic urethra was also removed. The enlargement was mainly a glandular overgrowth and distension.

CASE IX.

R. T., aged 60, was admitted to the General Hospital on July 28th, 1903, with overflow of urine following retention dating back five to six weeks, during which time he had been catheterized by his doctor at home, but he was still unable to pass his urine, and there was a severe cystitis. This was preceded by frequency of micturition and some difficulty to starting the stream. Per rectum moderate enlargement of the prostate could be felt, and it was densely hard.

Operation.—July 27th cystoscopy was first performed, but the enlarged gland could only very indefinitely be made out owing to the turbid condition of the fluid in the bladder. The bladder was opened by the suprapubic incision, and the prostate enucleated by the fingers with very great difficulty, owing to it being so very firmly adherent to adjacent parts. It was noticed that the walls of the bladder were much hypertrophied and in a very friable condition. Only about 3 to 4 oz. of blood were lost during the whole procedure. Shock was considerable, but after the first two days steady progress was made, and on the tenth day after the operation some urine was passed per urethram for the first time. About this time the patient complained of slight escape from the rectum at times which he could not control. Per rectum nothing abnormal could be made out except some thickening in the region of the prostate and great laxity of the sphincters. The suprapubic wound closed by August 18th, all urine being passed by the natural channel, but it broke down and opened again by September 2nd, and about this time the patient lapsed into a very weak and cachectic, drowsy condition, with very loose green involuntary stools, and it was now discovered that he had a hard lump to be felt on palpation of the abdomen on the right side just internal to the anterior superior iliac spine. Patient gradually became more cachectic and weak and died on September 16th. Necropsy showed a large malignant growth involving the caecum with secondary growths in the liver and enlarged retroperitoneal glands. The cavity left by removal of the prostate was almost obliterated, but its walls were covered with sloughy particles. The coats of the bladder were greatly thickened and very friable. The kidneys were fairly healthy. The prostate was removed complete and in a well-defined capsule, the surface of which was ragged, showing that the line of cleavage was irregular and rather erratic. The weight was 30 grams (about 1 oz.) after immersion in preservative fluid. The whole of the prostatic and some of the membranous urethra came away with the prostate.

CASE X.

Mr. I., a stout man, aged 56, was brought to me on September 16th, 1903, by Dr. Huxley, with the following history: Five or six years ago he had difficulty in passing water, having to strain when doing so; this difficulty was followed by increased frequency of micturition. Both these symptoms became more marked as time went on, until at last micturition, which now at times was painful, was performed as a rule every half-hour, and was most trying at night owing to broken rest. When Dr. Huxley's advice was first sought he found the bladder much distended, and as catheter life was intensely distasteful to the patient he brought him to me.

I found the bladder within 2 in. of the umbilicus: the prostate was much enlarged when palpated from the rectum, and was elastic to the touch. The urine was almost the colour of water and its specific gravity 1005, but it was free from albumen and sugar; the amount passed was not known, but was evidently very excessive. The patient complained, in addition to his urinary troubles, of great lassitude, persistent thirst, and a dry tongue. An important point in this condition was the presence of an old mitral stenosis from acute rheumatism, but the heart appeared to be doing its work well and there were no symptoms indicating any inefficiency of that organ.

Prostatectomy was decided upon by the patient without hesitation as an alternative to the persistent use of a catheter. On one occasion I did pass a rubber catheter, but it produced such intense pain and

spasm that an injection of morphine had to be given, and the experience was one the patient declined to repeat.

Operation (September 20th) was devoid of unusual features, but inspection of the intravesical portion of the prostate showed an enormous venous dilatation, and the oozing of blood during enucleation was freer than usual. On the ninth day there was a good deal of blood oozing from the wound; this continued free for a week, and the temperature, generally averaging about 99.5° at night, rose on the fourteenth day after a rigor to 104° , and again after a rigor on the seventeenth day to 103.5° . In view of the patient's chronic heart trouble I felt anxious about him, but the oozing and the fever both came to an end when on the twentieth day I washed a large slough out of the bladder, probably some of the detached mucous membrane stripped off the prostate. At the end of the third week some urine was passed per urethram, and when the patient went home at the end of the fifth week practically the whole of his urine was passed naturally. By this time the thirst and dryness of the mouth, which had proved so troublesome, had quite disappeared.

At the present time the patient holds his urine for three to four hours in the day time, and is not disturbed at all in the night; the specific gravity of the urine has risen to 1020.

The prostate came away in one mass, and was surrounded by a complete capsule; the weight was 90 grams (nearly 3 oz.) after immersion in preservatives. The whole of the prostatic urethra came away with the organ. The enlargement was almost entirely due to overgrowth and distension of the acini, and there was a considerable amount of prostatitis.

CONCLUSIONS.

Briefly, my conclusions are that:

1. It is possible to enucleate the prostate.
2. The prostatic urethra is then almost invariably, if not always, removed with the organ.
3. If the prostatic urethra were left it would necrose from want of blood supply.
4. Stricture does not follow the damage to the urethra.
5. The operation gives excellent results, often restoring the functions of the bladder to an absolutely normal condition.

I should like to express my great indebtedness to my friend, Dr. Hewetson, for the assistance he has given me in preparing the material I exhibit.

AN ANATOMICAL CRITICISM OF THE PROCEDURE KNOWN AS TOTAL PROSTATECTOMY.*

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THE NORMAL PROSTATE.

A short description of the normal prostate is necessary in order to make one or two points of comparison with the organ in its diseased state.

Fig. 1.

Fig. 1 shows the appearances of a section of an adult prostate taken at right angles to the urethra. There is no indication of any division into lobes. The fibro-muscular tissue is most marked in the following situations: (1) At the circumferential portion of the gland where there is an absence of gland tissue; (2) behind the urethra from which place it radiates in all directions to join the outer non-glandular area; (3) in front of the urethra, where it forms the so-called anterior commissure.

The gland tissue is fairly evenly distributed in the posterior part of the gland, both at the sides of and behind the urethra. The amount of gland tissue behind the urethra varies very much in different specimens, as has been pointed out by Griffiths. This variation has an influence on the type of enlargement, as will be pointed out later in this paper.

Outside the non-glandular area is the fibrous covering of the organ, which is derived from the recto-vesical fascia. This covering is not a dense definite structure, as is the fascia lata of the thigh or the arm, but consists of a series of areolar

planes in which on the lateral and anterior aspects is embedded the prostatic plexus of veins. It is a structure in which extravasation of fluid could take place, and would form the wall of the cavity left if a prostate were completely ablated.

In speaking of prostatectomy and of the presence or absence of a "capsule" it is very necessary to define the terms used.

The term "sheath" as used by Sir H. Thompson is the fibrous covering derived from the recto-vesical fascia, and contains the venous plexus. The term "capsule" as used by the same observer is the thin outer non-glandular portion of the organ, and is really only the outer portion of the stroma of the organ; it contains both muscular and fibrous tissue.

In *Quain's Anatomy* the term "fibrous capsule" is used to express the fibrous sheath derived from the recto-vesical fascia. There is no "capsule" in the sense of a separable membrane such as invests the kidney, nor can the prostate be shelled out from its surroundings like a lymphatic gland or the thyroid body.

Mr. Shattock has suggested that the outer non-glandular portion of the organ be termed the cortex, which title seems to represent the facts adequately.

I propose, then, that the investment from the recto-vesical fascia be called the "sheath," and that the outer part of the gland proper be called the "cortex."

Let us now study the organ in its pathological state:

Fig. 2.

Fig. 2 represents a specimen that I removed by the so-called operation of total prostatectomy. It was taken from a man, J. M., aged 77, who had suffered from complete retention for six years. The intravesical projection was circular, and of a character that I ventured to compare with the projection of the uterus into the vagina, and to which I shall refer hereafter as the "os uteri" type of projection. The

Fig. 3.

weight of the specimen was 152 grams ($4\frac{1}{4}$ oz.). The so-called "capsule" is seen to be composed of transversely-coursing bundles. The upper or vesical part of the specimen is smooth

* A previous paper on the same subject, to which references are made in the present communication, appeared in the BRITISH MEDICAL JOURNAL of March 29th, 1902, p. 764.