strongly to a recurrent inflammatory affection of the superficial lymphatic system, probably leading to coagulation of lymph, and to the ultimate occlusion of many of the superficial lymphatics. The case would thus be regarded as one of lymphatic engorgement of the leg or pseudo-elephantiasis.

TREATMENT.

The rationale of treatment is based on well-recognized physiological laws:

1. The lymphatics in the leg are divided into a superficial and deep set; and whereas the lymphatics of the same set anastomose freely with each other, the deep only communicate with the superficial in the glands. This anatomical separation of the lymphatics has much to do both with the etiology and also with the treatment of lymphatic disease.
2. The activity of tissue absorption, as a rule, is in an inverse proportion to that of circulation. When the force of the circulation is weakened the process of absorption is energetic; the serum of the blood passes through the walls of the capillaries in a more or less rapid stream in accordance with the blood pressure—irrigating the connective tissue and collecting in its interstices, and is drawn off by the efferent lymph vessels, in which the pressure is practically nil.

I must acknowledge with all due gratitude my sense of indebtedness to Mr. J. Howson Ray, an old house-surgeon of mine at the Manchester Royal Infirmary, and now Assistant Surgeon to the Salford Royal Hospital and Surgeon to the Manchester Children's Hospital, for the careful way in which he has collated my notes and embodied my remarks on these cases.

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Remarks

ON SOME POINTS IN THE

TREATMENT AND MORBID ANATOMY OF ENLARGED PROSTATE.

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CONSIDERABLE interest has been excited lately as to how far total extirpation of the prostate is surgically possible. Although for many years it has been known that certain tumours of the prostate admit of removal, the knowledge was never made use of as a regular proceeding in the treatment of enlargements of the organ, the growths having been removed only during the operation of lithotomy and without a definite design. It was mainly owing to the work of McGill and the Leeds surgeons that this operation has been definitely adopted in the treatment of prostatic disease.

Of late some operators have claimed that they have removed the whole prostate and left the urethra intact or little damaged. The expression used in speaking of this operation is that the prostate was removed "in its capsule." Some support has been lent to this statement by the large size of the masses removed, their comparatively smooth surface, and by the fact that apparently little or no tissue has been left behind in the region formerly occupied by the organ.

The establishment of normal micturition and the absence of stricture have been taken as showing that the urethra has escaped very serious damage. The following case of enlarged prostate seems to throw considerable light on the subject:

CASE I.—H. H., male, aged 60, was admitted to St. Thomas's Hospital for retention of urine produced by the impaction of a calculus at the junction of the prostatic and membranous urethra. One stone had already been passed, and the stone causing the obstruction could be felt from the rectum and pushed by the finger back towards the bladder and out of reach. Suprapubic cystotomy was performed, and a stone weighing 5.7 grams was removed from the bladder, and with the aid of a catheter another was extracted from the prostatic urethra. The projection of the prostate into the bladder was of what may be called the os uteri type, that is to say, the orifice of the urethra lay in the middle of a lowly-raised ring, the "posterior lip" of which was more prominent than the anterior; and immediately behind, the urethral opening had undergone a greater

development and formed a small rounded projection, but even then its summit did not stand more than half an inch above the surface of the bladder. The patient died suddenly on the fourth day after admission. The necropsy showed chronic interstitial nephritis and engorgement of both lungs.

After death the prostate was removed from the body, hardened in alcohol, and examined by means of sections cut at right angles to the urethra. The whole organ viewed from the outside forms a globular swelling without any indications of division into lobes. The greatest transverse diameter measures 6 cm.; the urethra along its length also measures 6 cm. The cut surfaces show a distinct "capsule" and within this a glandular mass. The average thickness of the "capsule" is 0.3 cm. It is an exceedingly definite structure, and is distinctly laminated to such a marked degree that it admits of artificial cleavage for considerable distances along its lamellae. That the capsule is a proper part of the gland appears from the fact that flattened foci of gland tissue are found within it, after the separation to be described below has been made, and also from the fact that in certain positions behind the urethra it (the "capsule") presents the normal spongy structure of the prostate.

Fig. 1.—A transverse section through the prostate in Case 1 showing the "capsule," the vertical slit representing the urethra, and the fibrous septum between the upper or anterior parts of the glandular substance of the prostate. (Natural size.)

In the section taken through the centre of the enlargement the urethra is a vertical slit measuring 1.5 cm., and lies 2 cm. from the posterior and 1.5 cm. from the anterior border of the organ. The glandular substance is arranged in somewhat ill-defined lobules, absent on the anterior or upper aspect of the urethra. In the last-named situation there is a septum of fibrous or fibro-muscular tissue surrounding the urethra, and continuous above or in front with the "capsule" of the gland. Towards the inferior or distal end of the organ this fibrous septum is less distinct, being broken up by processes of gland tissue.

In the middle section the entire glandular mass admits of being cleanly enucleated from its "capsule," and from the median septum above and anterior to the urethra. Towards the opposite, lower part of the urethra the separation is not possible without injury to the canal, the union between the fibrous tissue and the surrounding gland substance being more intimate.

The median projection behind the urethral orifice is shown on a transverse section, carried through this part, to be inseparably continuous with the lateral portions.

The following specimen (Fig. 2) is described because it is practically identical with that just related.

Specimen 1 (No. 1319, Royal College of Surgeons Museum).—There is a globular enlargement of the organ. The projection into the bladder resembles that of the uterus into the vagina, but the posterior lip is more prominent than the anterior. A section of the organ made at right angles to the mid-point of the prostatic urethra shows the following points: The gland is surrounded with a very distinct laminated fibrous "capsule," which has an average thickness of about 3 cm. From this "capsule"

fibrous septa run in between the lobules, to be presently described. With a blunt dissector the "capsule" can be easily raised and separated, and leaves the surface of the central mass as smooth as that of most adenomata in general. The cut surface of the mass within the capsule is made up of many lobules (average size 5 cm.), which are yellowish in colour, round or ovoid in section, and the smallest of which are no larger than a pin's head. Between these, and differentiated by their whitish colour, are strands of fibrous tissue which surround and hold together the lobules. The portion of the organ immediately in front of the urethra measures 2.5 cm., and immediately anterior to the urethral canal is a median fibrous septum passing forwards for a space of 1.3 cm., at which point it breaks up into numerous small bands that pass between the glandular lobules. In front of this, again, the glandular lobules pass continuously across the urethra, showing no division into two lateral halves. The arrangement of the gland tissue behind the urethra cannot be examined, as this has been cut away with the posterior part of the canal. In the section examined the rest of the urethral wall admits of separation from the substance of the prostate. The actual thickness after its separation is about 1 mm. Although readily separable, the urethral wall is so thin that the removal of the glandular substance without rupture of the canal would have been impracticable.

Fig. 2.—The same section after the enucleation of the central mass from the "capsule." In the upper part of the latter on the right hand side is shown a small lenticular focus of glandular tissue, proving that the "capsule" is in reality the altered peripheral portion of the organ. (Natural size).

When these specimens are compared with the normal prostate three main points of difference appear:

1. The organ is quite altered in appearance, and instead of being generally spongy to the eye, has lost its open structure and become converted into irregular lobulated areas which on section are smooth and firm.
2. The arrangement of the fibro-muscular tissue has also undergone a great change, and instead of forming bands radiating from the posterior aspect of the urethra, now forms irregular septa running between the lobules. The anterior fibrous septum is less disturbed, and may exist intact as in Fig. 1, or be more or less broken up as described in the College Specimen 1.
3. The thin fibrous covering has given place to a thick definite "capsule," which further differs from the normal structure in that it is readily separable from the contained glandular substance. Fig. 2 shows a section through the middle of the prostate described in Case 1. The central part, containing the urethra, has been shelled out from the "capsule." This can be repeated in every section of the organ, so that ultimately the organ is divided into two parts, namely, the "capsule" and a contained glandular portion, in which lies the urethra, the only line of continuity

between the two being the thick anterior fibrous septum which is continued in from the "capsule" to join the peri-urethral tissue. If it were not for the intimate connexion of the main glandular portion to the urethra, it would be possible to have a hollow sphere formed by the "capsule" crossed axially by the urethra, suspended by the anterior septum, and between the two the loosely-lying glandular part of the prostate. If during life the urethra had been sacrificed and the whole central part removed, the operator would have been justified in believing that he had removed the entire organ; certainly nothing recognizable as prostate would have been left behind.

In the following instance the urethra was sacrificed and removed, surrounded by prostatic tissue.

CASE II.—The specimen, of which drawings are given in Fig. 3 and Fig. 4 was removed from a man aged 68, who was admitted for retention, the consequence of prostatic enlargement. When the bladder was opened, the prostate was but little enlarged on its vesical aspect, but there was a well-marked prostatic pouch. The organ was pushed down by a finger in the bladder and removed through a perineal incision. The actual separation was done with the finger and presented no great difficulty. The mucous membrane at the junction of the bladder and urethra was torn and the mass was then pushed out of the perineal wound. It was then seen that the specimen was completely separated except at its anterior point, where the urethra passed out. It did not seem possible to separate this from the mass, so it was divided. The membranous urethra was then approximated to the bladder with one stitch on its upper or anterior surface. The suprapubic wound closed in a short time, but that in the perineum remained open, and all the urine was discharged through it for some time. At first there was practically no control, but this gradually returned and at the same time more urine was passed through the penis. At the present time there is only a small sinus in the perineum; urine is voided by the penis and control has returned. The urethra admits of the passage of a steel sound. The patient has still to empty his bladder once in the night.

Fig. 3, Case II.—View of the enlarged prostate removed by the author. A bristle has been passed through the urethra. The mass is bilobed. Anteriorly it is circularly ridged, the rest of the surface, with the exception of one area, being slightly rough. The area referred to is that shown towards the upper part of the drawing on the right lateral lobe. This represents the exterior of the most posterior part of the glandular mass shown in the right-hand side of the section in Fig. 4. The anterior end of the urethra lies on the right-hand side of the drawing. (Natural size).

Fig. 4.—A transverse section of the same specimen. The urethra is triradiate, the long arm being the anterior. The cut surface presents several areas of glandular tissue. These show a tendency to form compound circumscribed masses, but little indication of a "capsule." The areas described nowhere approach the urethra, and had they grown into adenomata would have admitted of removal without injury to the canal. (Natural size).

In connexion with these developments in the surgical treatment the points to be determined are the nature of the pathological alteration in the organ, the nature and origin of the "capsule," and the relation this bears to the normal sheath. To do this numerous specimens of the prostate in all stages of enlargement have been examined, and in all the same changes though in different degree have been found.

Fig. 5.—Specimen 1 (No. 4312, Royal College of Surgeons). (Natural size.)

Formation of the Adenomata.

Specimen 1 (No. 4312, Royal College of Surgeons).—An enlarged prostate, showing a small reniform enlargement of the middle lobe. A section was carried through the right half of the prostate so as to include the middle and the lateral lobes. The section was coronal. The cut surface shows no line of fissure between the middle and lateral lobes. The ejaculatory ducts lie in the lower part of the gland. There is very little glandular enlargement below or behind the urethra. The reniform tumour above mentioned consists of glandular tissue, but this extends in the section beyond the actual enlargement, and is continuous with the tissue of the lateral lobe, there being no more distinction between it and the lateral lobe than between the parts of the lateral lobe itself. In the right lateral lobe there is a spheroidal mass in which the arrangement of the glandular substance suggests an early adenomatous formation; the prostatic tissue on the outer side—that is, the lateral aspect—presents the normal structure without any division into lobes. The adenomatous formation does not at present admit of being enucleated.

Fig. 6.—Specimen 3 (No. 4337, Royal College of Surgeons).—(Natural size.)

Specimen 3 (No. 4337, Royal College of Surgeons). An enlarged prostate through which a vertical section has been made which passes a little to the right of the mid-line. The urethra presents an abnormal curvature, being convex forwards; this is possibly connected with the displacement of the parts due to a large diverticulum from the anterior wall of the bladder. The greater part of the section shows the lobules and fibrous septa ordinarily seen in cases of enlargement. The lobules are small and not so differentiated as they are in some of the other specimens. In a somewhat triangular area on the upper or anterior aspect adjoining the membranous urethra—that is, the anterior and lower part of a normal prostate—the lobules are wanting, and the structure is homogeneous to the naked eye, and tough, the section presenting a certain number of deep brown concretions showing the presence of glandular elements. In preparing the specimen most of the fibrous tissue has been cut away, so that no definite statement can be made about the capsule in general, but over the above-mentioned triangular area a somewhat thin membraniform sheet can be separated. The surface of the prostate thus exposed presents very obvious striae, due to the presence of bundles of muscle fibre which course circularly over it.

Figures 1, 3, and 4 show that very different conditions are to be met with in the enlarged prostate, and that there may be very obvious differences between two contiguous areas of the same prostate. There can often on the same section be seen normal spongy prostatic tissue, areas showing whitish points, ill-defined lobulated masses, and distinctly encapsulated adenomata. It would seem that the first indication of a pathological condition is the appearance of small whitish areas.

The different appearances presented by the same section point to an unequal growth of the glandular elements. The more rapidly-growing areas increase at the expense of the more slowly-growing ones, which are compressed and stretched over the surface of their quickly-growing neighbour. By this process a capsule is formed, ill-defined at first, but later becoming very distinct. The elements forming this "capsule" show in process of time a lamellar disposition. The adenomatous mass can now be easily enucleated, and not only presents a smooth surface, but also leaves behind a smooth-lined cavity.

The adenomata may be either single or compound, that is to say, they may be composed of several adenomata bound together by their "capsules," or one adenoma may contain two or more smaller ones. The size of such a growth is very various, so that it may only occupy the central portion of a lobe, or may be so large as to apparently represent the whole lateral mass, or again, in some cases occupy both lateral lobes and also the "middle" lobe as seen in Fig. 1.

If situated near a free surface the adenomata grow in the direction of least resistance, and form the nodular masses so often met with on the vesical surface of the prostate or in the interior of the prostatic urethra. This point is illustrated by the following specimens:

Specimen 4 (No. 4331, Royal College of Surgeons).—"The prostate is generally enlarged, and the parts that project into the bladder and urethra are irregularly knobbed. Part of the right lobe projects as a short, thick nipple-like process into the neck of the bladder in front of the enlarged middle lobe. Part of the left lobe projects as a broad, but rather flattened, process into the urethra directly over the caput gallinaginis, so as to be in contact with the opposite wall. The middle lobe forms a deep and broad transverse and trilobed ridge across the neck of the bladder." The patient was aged 70 years. A vertical, almost transverse, section along the course of the urethra shows the following points: On the urethral aspect it presents three rounded eminences which correspond with the same number of imperfectly circumscribed adenomata. External to these there lies a thin layer of more or less normal spongy prostatic tissue, and beyond this, without any line of separation, lies the prostatic plexus. The section of the right lateral lobe shows the nipple-like process to be separated from the main mass by a fibrous septum. The rest of the mass presents two adenomatous foci, but elsewhere it is spongy, but for the most part less so than the normal gland. The outer surface of the lateral lobe can be separated from the muscular and fibrous tissue enveloping it; the surface of the envelope thus raised is transversely striated from the presence of muscular fibre.

Specimen 4340 A, Royal College of Surgeons, shows a similar condition in which the adenomatous enlargement occupies a median position behind the urethral orifice. Microscopic sections taken from these adenomatous areas show, besides a fibro-muscular stroma, a large proportion of gland tissue.

To recapitulate, it may be said that the increase in the organ is due in the first instance to an increase in the glandular elements.¹ This growth usually affects the greater part of the organ but often leaves small portions almost unaltered. Within the changed area the alteration of the glandular element may be of very varying degree, consisting in some cases of small discrete points, while in others well-marked adenomatous lobules occur. These adenomata are often, indeed, usually compound, and, as in Case 1 and Fig. 2, may occupy the whole space within the "capsule." The hypertrophy of the prostate in these cases is therefore best described as an adenomatous hypertrophy, and is comparable to the adenomatous form of goitre.

Formation of the "Capsule."

The next point of interest is the consideration of the nature and origin of the "capsule."

Some difficulty arises as to what is really meant by the word "capsule" in speaking of the prostate, and in works on anatomy the words "capsule" and sheath are used as interchangeable. In *Quain's Anatomy* both layers of the "capsule" are described as derived from the pelvic fascia, and therefore presumably are not considered an integral part of the organ. There is certainly no "capsule" comparable to that of the kidney. In the normal state the fibrous covering is intimately combined with the organ, and except for a small area

on the rectal surface any attempt at separating it simply leads to tearing the prostatic tissue.

Whatever may be the opinion as to the nature of the covering of the normal gland, there can be no doubt that the "capsule" shown in Fig. 1, and described in the other specimens, is a structure which does not normally exist. It must, therefore, have been formed during the enlargement of the organ. That the "capsule" is really an integral part of the gland is proved by the presence in the "capsule" of normal prostatic tissue, as shown in Case 1 and Specimen 6, and in addition it is often possible to see with a hand lens minute foci of gland tissue lying in the fibrous tissue; indeed, in some instances these foci are plainly visible to the naked eye, as shown in Fig. 1.

If microscopic sections are made from a part of the "capsule" that appears entirely fibrous to the naked eye, it will be found that such a section contains glandular elements either in the form of slightly altered alveoli or of long slit-like cavities containing epithelium. Fig. 7 shows such a section taken from the "capsule" in Case 1.

Fig. 7.—A microscopic section through the outer portion of the "capsule" artificially separated from the preparation shown in Fig. 1. Most externally it consists of connective tissue, fat, and vessels, and on the inner side of lamellae of fibro-muscular tissue, in which there lie well-marked collections of gland cells; these collections are flattened as a result of the displacement of the tissue by the adenomatous mass which has grown more centrally.

These points are well illustrated also by the two following specimens:

In addition to Figs. 1 and 2, Fig. 8 shows the ready separability of the "capsule," and in this particular instance the continuity of the "median" enlargement with the lateral mass, and also of the "capsule" covering the median lobe with that covering the lateral lobe.

Specimen 6 (No. 4332, Royal College of Surgeons) shows the changes already described, and particularly a definite separable "capsule." It is to be noticed that in this instance there is a fibrous septum both in front and behind the urethra.

Specimen 6 (4332, Royal College of Surgeons).—The prostate forms a globular swelling slightly compressed from before backwards. Viewed from the

bladder, the median portion is seen to be enlarged, and to form a slightly crescentic prominent tumour of rounded outline, surrounding the opening of the urethra on the posterior half of its circumference. A section was made of the gland at right angles to the urethra, the plane of the section being rather nearer the membranous urethra than the bladder. The transverse diameter measured 5.5 cm. and the antero-posterior 4.5 cm. The urethra is triradiate in section; the long arm is the anterior. The space behind the urethra, measuring from the summit of the veru montanum and including the capsule, is 1.5 cm. and in front is 1.3 cm. There is no glandular tissue immediately in front or behind the urethra, the space being occupied with connective tissue, which passes out to join the capsule. This latter forms a definite covering to the prostate, and measures 0.4 cm. where thickest. It is composed of fibrous lamellae, which pass mainly in a circular direction. From the inner surface, in addition to the ones already mentioned, there pass in numerous fibrous septa, which run between the lobules of which the cut surface is made up. The outline of these is not so definite as in some specimens, and one lobule shows a tendency to run into another. The largest of the lobules measures 0.8 cm. Surrounding the urethra is a zone of connective tissue, continuous in front and behind with the capsule, from which the glandular substance admits of being separated without great difficulty. The thickness of this zone varies very much as the glandular portion approaches or retires from the urethra. The urethra would not admit of complete isolation because the connective tissue which surrounds it passes out both in front and behind, through the glandular substance to join the capsule.

The formation of the "capsule" can be actually traced if a number of specimens are examined. The adenomatous change increases more quickly at one part of the organ than in another, with the consequence that the surrounding tissue, whether it is normal prostate or that which has undergone glandular hyperplasia, is stretched over the more rapidly growing part and at the same time compressed. The effect of this is that the glandular elements become less obvious, and the other elements become disposed in a laminated manner. This is well shown in Fig. 5.

Since the "capsule" to the adenomatous masses is formed of the stretched and laminated prostatic tissue, the amount of "capsule" left on the adenoma will simply depend on the situation at which the separation was made. Should this pass near the adenomatous mass little or no capsule will be demonstrable on the tumour after removal, whereas should the separation pass through the middle of the "capsule," a very distinct laminated "capsule" may be found on the tumour after removal. In other words, the amount of "capsule" found on the adenoma after removal will depend on whether the separation has been carried through or within the "capsule." It may therefore be said that the so-called "capsule" is really altered prostatic tissue.

The Continuity of the "Median" and Lateral Lobes.

Specimen 5 (No. 4334, Royal College of Surgeons).—Enlargement of the median and lateral lobes of the prostate. A longitudinal section shows that the median enlargement occupies the anatomical situation of the so-called middle lobe. The ejaculatory ducts lie immediately behind and below. The muscular wall of the bladder is traceable over the posterior part of the intravesical eminence nearly to its summit, and posteriorly a second process of muscular tissue is continued for a distance of 0.5 cm. over the position of the extravascular surface of the enlargement, beyond which it thins out and is lost. Anteriorly and inferiorly the glandular tissue of the enlargement stops a short way behind the most prominent part of the veru montanum. The gland tissue of the median tumour admits of being cleanly detached with the finger on the extravascular aspect, and when the separation is continued the finger can be easily passed round the back and sides of the lateral lobe for its whole extent, thus showing the continuity of the lateral with the median enlargements. The capsule left behind after the shelling out of the glandular substance includes the posterior extension of the muscle fibre above referred to. The cut surface of the median enlargement presents to the naked eye the ordinary texture of spongy prostatic tissue imperfectly divided into lobe-like masses by septa continuous with the capsule.

Whatever may be the actual origin of the median enlargement, it has, in all the specimens examined, appeared to occupy the situation of the anatomical median lobe; that is to say, it lay between the ejaculatory ducts and the trigone. Fig. 8 is interesting in this connexion, for it shows the continuity between the median enlargement and the lateral mass. In addition, the capsule covering both is shown to be the same, and the instrument shown in the figure passes down behind the lateral lobe and is inserted into the space into which the finger passed after having enucleated the median enlargement and in the process of enucleating the lateral mass. Both the lateral mass and the median enlargement would have been removed together, and in fact show no more separation between themselves than is met with between different parts of the lateral lobe itself. It is also to be noticed that the upper part of the capsule of the median lobe is formed of muscle fibre continuous with the muscle in the wall of the bladder. This has apparently been stretched over it, as would have been expected if the median enlarge-

Fig. 8.—Specimen 5 (No. 4334, Royal College of Surgeons). (Natural size). The enlargement had commenced beyond the bladder wall. The continuity of the median and lateral lobes is equally well shown in the following specimen (Fig. 9).

Fig. 9 (No. 4336, Royal College of Surgeons).

No. 4336, Royal College of Surgeons.—The prostate gland is considerably enlarged, but the part corresponding to the middle lobe is increased in a much greater proportion than either of the lateral lobes, so that it forms a smooth pyriform tumour which measures 2½ in. by 2 in. in its chief diameter. The prostatic part of the urethra is very deep and narrow, and at the enlarged middle lobe turns suddenly upwards at a right angle to its former course. A transverse section of the urethra at a short distance from the bladder through the lower part of the third lobe shows on the right side that the median and lateral lobes are identical in character. The cut surface presents glandular areas of various sizes, but no enucleable masses. The median and lateral lobes as already mentioned are quite continuous, without any trace of a septum. The mucous membrane and subjacent tissue are no thicker over the lateral than over the median lobe, being in either situation about 1 mm. There is a marked capsule common to both parts of the enlargement, and having an average thickness of 2.3 cm. It presents obvious marks of lamination. On the right side the glandular substance as seen by the

naked eye is not continuous between the median and lateral enlargements, the lateral enlargement being bounded by a septum of laminated tissue directly continuous with the capsule. The forward rounded projection of the median lobe gives the urethra a crescentic shape, with the horns backward, and the distance between the bottom of the left lateral horn and the exterior of the capsule is 1.2 cm. The median and lateral portions are enucleable in continuity the line of separation being carried through the common "capsule." The enucleation of the entire mass would be quite impracticable without removal of the urethra. The cut surface resembles that shown in Fig. 1, except that the coarsely lobulated character is not so sharply defined. Were such a case dealt with during life the entire mass would admit of being removed together with the corresponding part of the urethra, with the result that the canal would be represented by the outermost portion "capsule." When a normal adult prostate is divided transversely to the urethra the same continuity between the lateral and middle lobes, as described in the foregoing specimen, is observed.

Enucleation.

Judging from the examination of specimens and from attempts in the *post-mortem* room, it does not appear possible to enucleate the prostate in its normal state, leaving the presence of the urethra out of the question. The upper part of the rectal surface can be cleared of its enveloping fibrous tissue over a small area, and the prostate, covered by a thin fibrous layer, exposed. Laterally these two fibrous layers join together to enclose the lateral plexus of veins. Immediately within this sheath is a fibro-muscular layer, and by working within this with a blunt instrument the main mass of the organ can be separated from the fibrous covering with more or less difficulty. The surfaces left by this procedure are rough and ragged, nor has the procedure any resemblance to "enucleation." The normal organ has no separable "capsule." The connexion between the prostate and the urethra is even more intimate than between the prostate and its fibrous covering.

When the organ is the seat of an adenomatous hypertrophy it has long been known that certain tumours are enucleable. These are of very various size and shape; they may be round, oval, lobulated, and are often compound. The surface after removal may be as smooth as that of most adenomata in other organs, or may exhibit in some places areas of torn tissue. The ease with which they are removed depends on two factors—namely, their situation and their isolation from the surrounding tissue. If they have so grown as to protrude into the bladder, the line of separation, after the incision of the mucous membrane, is soon reached and the enucleation is quickly carried out. On the other hand, should they lie more deeply in the lateral lobes, a considerable layer of prostatic tissue must be traversed before the line of separation is reached. Again, the mass may not have become isolated from the surrounding prostatic tissue or only partially so, in which case the removal will be more or less difficult and only accomplished with some tearing. This was the case when the specimen shown in Fig. 3 was removed. The adenomata shown in Fig. 4 were not yet truly encapsuled, and the separation was carried through prostatic tissue which had undergone less change than had the adenomatous areas. The surface of the specimen was therefore rough and ragged. The ease with which the removal was effected seems to show that the tissue outside the adenomatous masses had undergone some change which made it more brittle and friable than normal prostatic tissue.

A glance at Fig. 2 will show that the whole adenomatous mass could have been removed by enucleation from within the "capsule," but that the urethra would have been sacrificed on account of the close connexion between the posterior part of this canal and the adenomatous masses. If the quickly-growing adenomatous masses were situated toward the centre of the lateral lobes, as shown in Fig. 4, it is quite conceivable that in their growth they would have still left a considerable zone of tissue between themselves and the urethral wall, so that in their removal the urethra would have been left intact, and when placed together after removal they would have enclosed a sulcus in which lay the urethra in the body. If joined together on only one side of the urethra such masses would still be capable of removal without injury to the urethra, and outside the body they would form a horseshoe-like mass. In those cases in which the adenomata of the two sides are continuous with one another, both in front and behind the urethra, it would be necessary to tear through the bond either in front or behind, or to circularly detach the prostatic urethra from the bladder and draw the ring adenoma over the centrally lying urethra.

It therefore seems that there are no appearances presented by tumours removed from the prostate, and supposed to represent the whole organ, that cannot be accounted for equally well on the supposition that they are adenomata. On this theory the encapsulation, the ease of removal, the absence of bleeding, and the safety of the ejaculatory ducts, can easily be explained. These facts, taken together with the appearance shown in the various drawings, seem to leave no reasonable doubt that the so-called total prostatectomy is nothing more than the removal of adenomatous masses.

There are unfortunately some cases of enlarged prostate which do not present any easily separable tumours, and any attempt at removal simply leads to tearing portions of the organ away piecemeal. There does not at the present time seem any sure method of differential diagnosis between the two conditions before the actual attempt at removal is begun, though the projection into the bladder of a large asymmetrical tumour is, on the whole, the more favourable, since a large tumour is more likely to be caused by an enucleable mass than is a small or slightly projecting prostate.

In conclusion, I may say that Mr. Shattock has kindly given me his assistance in the examination and study of the specimens described from the Museum of the Royal College of Surgeons, and I am indebted to him for many suggestions made during the progress of the investigation.

The admirable and extensive collection of preparations in the College Museum has been of the highest value on arriving at the conclusions formulated in the paper.

I am indebted, also, to Mr. C. G. Seligmann for his help in the microscopy of certain of the specimens.

NOTE.

¹ This accords with the statement made by Virchow (Lecture 23), namely, that the process of enlargement in the prostate commences in general from the glandular parts, and that an increase of the stroma follows only little by little. Besides the glandular tissue such tumours necessarily contain fibro-muscular, and, to judge from the descriptions of writers on this subject, the latter tissue appears at times to be the chief, or even the sole, constituent.

TOTAL EXTIRPATION OF THE PROSTATE FOR RADICAL CURE OF ENLARGEMENT OF THAT ORGAN.

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I READ with much interest Mr. Freyer's clinical lecture on this subject in the BRITISH MEDICAL JOURNAL of July 20th, 1901, with the correspondence that followed; and I determined if opportunity arose to perform the operation as advocated by Mr. Freyer on the cadaver, and after removing the parts by dissection to study the results.

A suitable case was met with, and I opened the bladder suprapubically, a catheter having previously been passed and left in. Both lateral lobes were much enlarged, the enlargement having been sufficient to cause complete retention of urine during life. The mucous membrane covering the left lobe, which was the larger, was snipped through with scissors, the opening in the mucous membrane was enlarged with the finger, and the mucous membrane was peeled off the prostate. Then with two fingers in the bladder and a finger of the left hand in the rectum, the whole of the enlarged prostate was enucleated and removed. The finger in the rectum steadied the prostate, and the fingers in the bladder peeled off the sheath from the prostate, and by manipulations between the fingers it was easy to be sure that one was working completely outside the gland, and that only the prostatic sheath remained behind.

The abdomen was then opened and the parts removed *en masse*. The tumour consisted of the two enlarged lateral lobes of the gland joined by a fibrous band. The left lobe was the size of a tangerine orange. Its surface was smooth and lobulated, and was covered by a complete fibrous capsule. On section, it was seen to be made up of adenomatous masses, each with a fibrous capsule of its own. The right lobe was similar in structure though rather smaller. The fibrous band joining the two lobes was partially covered with mucous membrane, and this, together with a few shreds on the left

lobe was the only mucous membrane removed with the tumour.

The incision into the bladder was prolonged into the anterior wall of the urethra and the parts laid open.

Fig. 1.—A, mucous membrane of bladder; B, prostatic fossa; C, cut edge of mucous membrane; D, urethra; E, cut surface of bulb; F, small lobule of prostate left behind.

Fig. 2.—The prostate. The two lobes removed by operation.

The urethra was unaffected to the level of the openings of the ejaculatory ducts. From this level to the internal orifice where it was torn across the wall of the urethra was separated from the prostatic sheath, and lay quite free in the fossa left after removal of the gland. The ejaculatory ducts could be traced into this fossa where they had been torn. The cavity from which the prostate was removed was quite smooth except at one very small area where an adenomatous nodule had been left behind. It was completely lined by a fibrous layer outside which lay the prostatic venous plexus which separated it from the thin fibrous sheath derived from the pelvic fascia. The space containing the prostatic venous plexus was nowhere opened up and no extravasation of urine could have taken place. The preparation, I think, demonstrates that the whole of the enlarged prostate can be extirpated leaving the urethra intact and without danger of extravasation of urine.

I attempted to remove the normal prostate in the same way, but found it quite impossible to do so.

I am greatly indebted to Dr. Stock, the resident medical officer, for his drawings.

THE total number of students on the books of the University of Warsaw is 1,312, of whom 312 belong to the medical faculty.