are all in agreement about this, but there is the temptation now­
adays to resort to the more attractive and mechanical methods
of investigation which in most instances should follow rather than
precede exhaustive bedside examination. To give way to such
temptation is to court mistakes which the use of observation and
our own senses would avoid. One often hears that in the present
day delicacy of touch and hearing and the training of the senses
is inferior to what was possessed by the physicians of two genera­
tions ago; this may or may not be true, but there is no reason why
it should be, and it will be a deplorable thing if it should occur.
In making a plea in favour of clinical work I hope I may not be
considered to undervalue in any way the work of scientific investiga­
tion leading to the prevention of disease, in which so many of the
officers of our medical services are engaged; work that is now
being carried forward with such marked success in this College,
within whose walls we are privileged to hold our meetings.
Gentlemen, in making these few remarks my desire has been to
confine myself to matters connected with the Society whose welfare
we all have at heart, a wish I cannot express better than in saying,
"Let it advance and prosper!"

TOTAL ENucleATION OF THE ENLARGED PROSTATE
PRACTICAL OBSERVATIONS ON THE OPERATION.

By Lieutenant-Colonel P. J. Freyer, I.M.S. (Retired Pay).
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I HAVE in the first place to acknowledge the compliment you
have paid me in inviting me to contribute a paper to the pro­
cedings of the Society at this the opening meeting of the Session;
and I hope I may be permitted to express the pleasure it gives me
to be enabled to comply with this invitation under the Presidency
of a friend and valued officer of my old Service.

No apology is, I trust, needed for choosing for my theme the
operation of enucleation of the enlarged prostate. It is true that
the condition requiring this operation is not one frequently
encountered in naval and military surgery, for the simple reason

1 Paper read at the United Services Medical Society, October 13th, 1909.
that the malady is mainly confined to the declining years of life. Still I possess among my trophies the prostates removed from many old sailors and soldiers drawn from institutions under the control of the medical officers in the Services, as well as of many officers on the active and retired lists. Amongst these latter the senior officers of the Services from which the members of this Society are drawn, figure largely—a fact which will appeal to you personally no doubt, as opening up a not unpleasant contemplation of the future, I hope!

But to whatever extent you may be brought into contact with this malady, as officers in the Services you will be desirous of being au courant with the most recent advances in surgery, and I believe I may say there is no surgical innovation that in recent years has aroused greater interest in the profession all the world over than that with which we are dealing this evening.

I am afraid that in what I am going to say to you to-night there is little new—little that I have not already published; but I hope that with the aid of a few rough drawings on the blackboard I may be enabled to make clear to you a subject that in written description is not quite easy to comprehend. A brief description of the anatomical and pathological considerations, on which my operation is based, is necessary for a clear comprehension of the details of the procedure.

Examination of the specimens removed in these operations has thrown an entirely new light on the anatomy of the prostate, and its relations to the surrounding structures, and proves that the descriptions contained in the anatomical text-books generally were incomplete, and erroneous in treating that organ as a single body with a canal tunnelled through it in the form of the prostatic urethra.

The prostate is in reality composed of twin organs, which in some of the lower animals remain distinct and separate throughout life, as they exist in the human male during the first four months of foetal existence. About that period in the human foetus they approach each other, and their inner aspects become agglutinated together, except along the course of the urethra, which they encircle in their embrace. These two glandular organs, which constitute the lateral lobes of the prostate, though welded together, as it were, to form one mass, remain, so far as their secreting functions are concerned, distinct, their respective gland-ducts opening into the urethra on either side of the verumontanum. Each of these two glandular bodies, or prostates, is enveloped
by a strong fibro-muscular capsule; and it is these capsules—less those portions of them that dip inwards, covering the opposing aspects of the glandular bodies or lobes, and thus disappearing from view, being embedded in the substance of the prostatic mass—that constitute the true capsule of the prostate regarded as a whole. This capsule extends over the entire organ except along the anterior and posterior commissures, or bridges of tissue that unite the lateral lobes in front of and behind the urethra, thus filling in the gaps between them. This capsule is intimately connected with—in fact forms part of—the prostatic mass, and is incapable of being removed from it even by dissection.

The urethra, accompanied by its surrounding structures—viz., its longitudinal and circular coats of muscles continued downwards from the bladder, its vessels and nerves, passes downwards and forwards between, and is embraced by the inner aspects of the two glands or lobes.

The ejaculatory ducts enter the prostatic mass close together in an interlobular depression at the upper part of its posterior aspect, each duct coursing along the inner aspect of the corresponding lobe. They do not penetrate the capsules of the lobes, but pass forwards in the interlobular tissue to open into the urethra.

The prostate thus constituted and enveloped by its true capsule is further encased in a second capsule, or sheath, formed mainly by the recto-vesical fascia. Embedded in this sheath lies the prostatic plexus of veins, most marked in front and on the sides of the prostate.

There is nothing that illustrates more simply and forcibly the composition of the prostate and its coverings than an orange. If we imagine the edible portion of an orange composed of two segments only, instead of several, with the septum between them placed vertically, we have a rough and homely illustration of the formation of the prostate. The strong fibrous tissue which covers the segments of an orange, and which is intimately connected with the pulp, represents the true capsule of the prostate, the two segments or halves of the orange representing its two lobes. Further, the rind represents the sheath formed by the recto-vesical fascia.

And here let me remark that in the operation about to be described, it is this inner or true capsule that is removed, the outer capsule, or sheath, containing the prostatic plexus of veins, being left behind, thus preventing infiltration of urine into the cellular tissues of the pelvis. The old text-books drew no
distinction between the two separate coverings of the prostate, treating them both combined, or the outer one only, as "the capsule." To persons brought up in this school of thought and teaching my operation must necessarily at first sight have appeared impossible.

In most, if not all, cases of enlargement of the prostate of declining life (cancer being excluded) the overgrowth is adenomatous; numerous encapsulated adenomatous tumors being found embedded in the substance of the lobes, and frequently protruding on their surfaces. They sometimes assume the form of polypoid outgrowths, which, however, are invariably enclosed within the true capsule, which is pushed before them. As the lobes enlarge they bulge out and have a tendency to become more defined and isolated, thus recalling their separate existence in early fetal life. They become more loosely attached along their commissures (particularly the anterior one), and in the course of this change the urethra, with its accompanying structures, is loosened from its close attachment to the inner surfaces of the lobes, particularly below the verumontanum, thus facilitating its being detached and in large part left behind in the removal of the prostate, as will presently appear.

In the earlier stages of the adenomatous overgrowth the enlargement is probably mainly extra-vesical. Its expansion in this direction is, however, limited, particularly by the triangular ligament below. As the enlargement progresses it advances in the direction of least resistance—namely, upwards into the bladder. The sheath at the upper aspect of the prostate is incomplete, and the prostate insinuates itself through this opening into the bladder, and, the inner layer of the bladder muscle becoming thinner and thinner from pressure of the outgrowth, the prostate in this direction is eventually covered only by mucous membrane.

In most of the specimens of enlarged prostate removed by me a well-defined circular groove is noticeable at the junction of the intra- and extra-vesical portions. This groove is caused by the constriction of the growth by the sharply defined edges of the sheath and by the sphincter muscle.

The shape of the outgrowth in the bladder appears to be mainly influenced by the conformation of the sheath superiorily, and by the two strong muscular bands found in the inner layer of the bladder muscle which are continued downwards from the ureters and, converging, pass into the floor of the urethra. Sometimes this outgrowth assumes the form commonly known as a middle
lobe, which, as can be seen from the specimens, is not a middle lobe at all—there being no such structure in the normal prostate, as pointed out by Sir Henry Thompson nearly fifty years ago—but an outgrowth from one or both of the lateral lobes. More frequently there is a protrusion of each lateral lobe into the bladder, and this may advance to such an extent that one-half, or even more, of the bulk of the enlarged prostate may lie in this viscus. These, then, are the anatomical and pathological considerations on which my operation is based.

The Operation.—The pubes having been previously shaved and the parts purified, an anaesthetic is administered and suprapubic cystotomy performed. The bladder is thoroughly washed out with an antiseptic lotion in the first instance, the catheter used for this purpose being made of stiff gum-elastic and of the largest size that the urethra will readily admit. The bladder is then distended with lotion and the catheter left 

in situ. An incision varying in length from 2½ to 3½ inches, according to the stoutness of the patient and the previously estimated size of the prostate, is made in the median line of the abdomen, its lower end reaching to the level of the pubic arch. This incision is rapidly carried down through or between the recti muscles till the prevesical space is opened. Any bleeding vessels being clamped by catch forceps, the forefinger is introduced into the lower angle of the wound and the prevesical fat scraped upwards off the bladder by the fingernail for the whole length of the wound. The peritoneum, which should not be seen, is thus pushed upwards out of harm’s way, and the bladder appears deeply in the wound, quite tense, glistening, and of a pale white colour, with large and tortuous veins coursing in its substance. Selecting an area devoid of veins, the point of the scalpel is plunged boldly into the bladder and an incision about an inch is made in the vertical direction towards the symphisis. The wound in the bladder can be enlarged subsequently if necessary; and this is best effected—as being attended by least bleeding—by separating two fingers placed in the wound and tearing the bladder wall to the required extent. On withdrawal of the scalpel the forefinger is introduced into the bladder as the lotion rushes out through the wound, and a general survey of the viscus is made. Should calculi be present they are forthwith removed by forceps or scoop.

The forefinger of the other hand is now introduced into the rectum, to render the prostate prominent in the bladder and to keep it fixed during the manipulation by the finger in the bladder. The mucous membrane over the most prominent portion of one
Total Enucleation of the Enlarged Prostate

lateral lobe (or over the so-called "middle" lobe if there be but one prominence) is scored through by the finger-nail and gradually detached by it from the lobe. The other lobe is similarly attacked and laid bare of mucus membrane.

As I have already explained, the portion of the enlarged prostate prominent in the bladder is covered merely by mucus membrane, so that when this latter is scraped through and detached the true capsule of the prostate is at once reached. Keeping the point of the finger in close contact with the capsule, the enucleation of the prostate out of the enveloping sheath outside the bladder is proceeded with, by insinuating the finger-tip in succession behind, outside, and in front of one lateral lobe, thus gradually separating the capsule from the sheath. The finger is successively swept in semicircular fashion from behind to the front of the lobe till the triangular ligament is reached. The other lobe is similarly detached from the sheath, the finger completely sweeping round the vesical end of the prostate. During the course of these manipulations it will be found that, as a rule, the anterior commissure of the prostate will have opened out; indeed, in a large proportion of cases it will have already opened out in the course of the prostatic enlargement, the prostatic urethra assuming the form of a deep furrow rather than a tube. The finger is then passed down deeply behind the gland, and first one lobe and then the other detached with ease from the triangular ligament. The prostate now lies loosely in the sheath, hanging on merely by the urethra and the ejaculatory ducts. During the course of the enucleation the urethra anterior to the verumontanum becomes detached from the lobe so that the finger-point can be inserted between the urethra and the lobes on either side. If the tip of the finger now be placed behind the prostate in the middle line above the ejaculatory ducts and the prostate be propelled upwards into the bladder by the finger in the rectum, the urethra will be found to snap across at the verumontanum, leaving the ejaculatory ducts, as a rule, adherent to the anterior portion of the prostatic urethra that is left behind.

The prostate which now lies free in the bladder is withdrawn by strong forceps through the suprapubic wound. And here I may remark that it is astonishing through what a comparatively small wound a very large prostate can be delivered owing to the elasticity and compressibility between the blades of the forceps of the adenomatous growth. In the vast majority of cases the prostate has opened out like an oyster along its anterior commissure in the course of the enucleation. The forceps should be applied to one
of the lobes which is withdrawn through the wound, the other lobe following. In this manner the prostate is delivered through a wound in the bladder one-half the size that would otherwise be necessary.

When I first conceived the possibility of removing the whole prostate, my ideal operation consisted in enucleating the enlarged gland entire in its capsule out of the enveloping sheath, leaving the urethra behind; and this was the procedure attempted in my earlier cases. An accident which occurred during the operation on my eighth case had, however, the effect of modifying my views in this respect. In that case though the urethra was undesignedly torn across no untoward result ensued, the patient making a thorough recovery and living for six years untroubled by any urinary symptom. Further experience taught me that the prostatic urethra may be removed in part, or even entire, with the gland with impunity. The excellent results obtained by the operation above described have long since convinced me that no advantage is to be gained by leaving the vesical end of the urethra behind. In a large proportion of cases of enlarged prostate this vesical end of the urethra is widely dilated, being trumpet-shaped, gutter-shaped, or distorted out of any shape resembling a more or less circular tube, as in the normal prostatic urethra. Even when left behind I always had my doubts as to its ultimate fate in most instances. The probability is that, through want of support and adequate blood supply, it sloughed in large part and came away in the washings during the after-treatment.

Examination of the prostates which, in removal, have opened along the anterior commissure—to which category the great majority belong—shows that the dilated portion of the prostatic urethra, viz., that portion lying between the verumontanum and the vesical outlet, has come away with the prostate, the urethra in front of this, which is loosely attached to the lateral lobes, being left behind.

No cutting instrument is necessary or desirable for incising the mucous membrane over the prostate, the finger-nail alone being most convenient and expeditious. Besides, if scissors or scalpel be employed there is danger of cutting through the capsule, and, the guiding line being lost, the finger flounders about inside, enucleating isolated adenomatous tumours instead of the organ entire in its capsule.

With the delivery of the prostate from the bladder the essential part of the operation is completed. The forefinger of one hand is
reintroduced into the bladder forthwith and that of the other hand into the rectum. The opposing surfaces of the cavity from which the prostate has been enucleated are then pressed together all round the vesical orifice between the tips of the fingers. By thoroughly kneading the opposed surfaces together in this manner the contraction of the cavity is facilitated and hemorrhage is thus arrested, as when a dentist presses the gum after the extraction of a tooth, or the accoucheur does the flaccid womb, after parturition, with a similar object in view.

The bladder is then irrigated with hot boracic lotion (temperature about 110° F.) through the catheter still in situ for the purpose of removing clots, and, further to check bleeding. This process should not, however, be continued for more than a minute or two, as I find from experience that these irrigations not infrequently promote bleeding instead of diminishing it, if continued too long.

The bladder having been cleared of clots a stout india-rubber drainage tube is introduced through the suprapubic wound. The dimensions and management of this tube are of the utmost importance in the after-treatment. I now employ a tube \( \frac{3}{8} \)th inch in diameter with a lumen of \( \frac{3}{8} \)th inch. Two large perforations or eyes are made near the vesical end of this tube on opposite sides of it. Only about an inch of the tube should project in the bladder, just sufficient for the side openings to lie completely within its cavity. When the bladder is allowed to contract the tube is gripped by it so that the whole of the urine escapes through the tube. On no account should the tube be inserted into the prostatic cavity, our object being by every means to facilitate the contraction of this cavity.

The edges of the parietal wound are now brought together above the tube by silkworm gut sutures, one or two of which should pass deeply through the recti muscles. Buried sutures should not be employed as they are certain to be infected by the urine. The tube is retained in position by suturing it to the skin on either side. These latter sutures may be removed in forty-eight hours, the tube being then retained by the grip of the bladder.

A couple of inches of iodoform gauze tape are inserted in the angles of the wound above and below the tube for the purpose of preventing the accumulation of fluids in the pre-vesical space. The wound is covered with cyanide of zinc gauze and the patient deeply swathed in absorbent dressings applied to the front, sides, and back, and kept in position by a many-tailed bandage. Cotton-wool, wood-
wool tissue, or cellulose may be employed. The last is the most absorbent and keeps the patient driest, but a thin layer of cotton-wool should be placed between it and the skin, as the cellulose when wet forms a pulp and adheres to the skin, inducing a cold, clammy feeling.

Space will not admit of my going into details of the after-treatment which would form the subject for a paper in itself. The dressings are changed every four to six hours when saturated with urine. The bladder is irrigated twice daily through the tube first and, when this is removed, through the wound. The large tube is removed after four days, but before doing so a small tube is introduced through its lumen and left in till the tenth or twelfth day. After this period a full-sized rubber or gum-elastic catheter is passed through the urethra daily till the suprapubic wound completely closes, and the bladder is irrigated in this way. But on no account should a catheter be tied in after the operation. The suprapubic wound as a rule completely closes in from a fortnight to three weeks, when the patient passes his urine naturally, without the use of a catheter, as well as he ever did.

Results from the Operation.—I have now completed 664 cases of the operation of total enucleation of the prostate for enlargement of that organ, the patients varying in age from 49 to 89 years with an average age of 69 years. There were forty-nine octogenarians between the ages of 80 and 89 and ten patients aged 79 years. The prostates ranged from $\frac{1}{4}$ to 17 ounces, with an average weight of about 2½ ounces. The great majority of the patients had been entirely dependent on the catheter for periods varying up to twenty-four years. Nearly all were in broken health, and many apparently dying before operation. Existence was simply unendurable to most of them. Few were free from one or more grave complications, such as cystitis, stones in the bladder, pyelitis, kidney disease, diabetes, heart disease, chronic bronchitis, paralysis, hernia, and in a few instances there was malignant disease of some other organ than the prostate. Such were the unfavourable circumstances under which the operation was undertaken.

In connection with these 664 operations there were forty deaths in periods ranging from four hours to thirty-seven days after the operation, or a mortality of 6 per cent. The mortality has been steadily decreasing from 10 per cent. in the first 100 cases to 4·24 per cent. in the last 200.

The causes of death were: Uræmic symptoms due to chronic kidney disease, 16; heart failure, 6; septicaemia, 2; shock, 5;
Total Enucleation of the Enlarged Prostate

exhaustion (kidneys much, diseased) 1; mania (hereditary in 1), 2; malignant disease of liver, 2; heatstroke, 1; pneumonia, 1; acute bronchitis, 2; pulmonary embolism, 1; and cerebral haemorrhage with paralysis, 1.

Though all these deaths are accepted in connection with the operation, in not more than half the number can the fatal result be attributed thereto, the remaining deaths being due to diseases incident to old age and unconnected with the operation.

In 110 cases vesical calculi were removed at the same time; but all the deaths in these cases are accepted in connection with the prostatectomy, none being put down to the suprapubic lithotomy involved.

When I speak of success attending this operation I mean an absolute and complete success, the patients regaining the power of retaining and passing his urine naturally, without the aid of a catheter, as well as he ever did. There is no relapse of the symptoms, no contractions at the seat of operation leading to stricture, and no fistula remaining. Further, there is no diminution in the sexual power after the operation.

DISCUSSION.

Major Spencer said the best thanks of the meeting were due to Colonel Freyer for his exceedingly clear and instructive address; the operation Colonel Freyer had devised was an excellent one, which he had had the privilege of seeing him perform; the results were most encouraging, and in Colonel Freyer's hands the operation appeared fairly easy, though that would probably not be the case in the hands of an operator with less experience of the particular procedure.