

Prostate Oncology

THE EARLY DIAGNOSIS AND RADICAL CURE OF CARCINOMA OF THE PROSTATE.

BEING A STUDY OF 40 CASES AND PRESENTATION OF A RADICAL OPERATION WHICH WAS CARRIED OUT IN FOUR CASES.

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The recent publication of Courvoisier, Wolff, Socin and Burckhardt, and Albarran and Hallé, have furnished a considerable stimulus to the study of cancer of the prostate, but although the disease has been shown to be much more frequent than was formerly supposed, and the pathological aspects have been well elucidated, practically nothing has been suggested in recent years as a routine operation for its radical cure.

Albarran's startling announcement that in 100 specimens of supposed benign hypertrophy he found more or less pronounced invasion of carcinoma in 14, seems not to have suggested the necessity of a radical excision, and even at this late date we find Pousson and Hawley advocating a mere enucleating prostatectomy, leaving behind the prostatic capsule, urethra, anterior commissure, the adjacent vesical mucosa and the seminal vesicles—structures which are manifestly in intimate contact with cancerous lobes.

The need of early diagnosis and radical methods of removal has been brought forcibly to the writer's attention in the past two years by the sad results arising from his failure to recognize, and to operate radically in six cases of early carcinoma of the prostate—several of which ought certainly to have been cured by the operation which he has since carried out in four cases. The object of this paper is to give in detail:

I. The six cases of early carcinoma in which the malignant nature of the disease was not recognized and a partial operation performed.

II. A radical operation, proposed as a routine for cases of cancer of the prostate, with histories of four operated cases.

III. A clinical and pathological study of 40 cases of carcinoma of the prostate.

IV. A comparison with cases in the literature in which operations for carcinoma of the prostate were performed.

V. Conclusions as to the practicability of early diagnosis and the radical cure of the disease.

I. CASES OF UNRECOGNIZED EARLY CARCINOMA WITH PARTIAL OPERATION

CASE I. Male, aged 67. Admitted May 9, 1901. Duration of symptoms 2 years and 4 months. Uses a catheter, has had no hematuria and very little pain. Prostate much enlarged in left lateral lobe which is soft. Right lateral lobe not enlarged but indurated. Cystoscope shows enlargement of left lateral lobe and a small median bar. Diagnosis: benign prostatic hypertrophy. Bottini operation. Excellent result; maintained for 2½ years. Returned three years after operation complaining of pain in bladder and urethra, frequent urination. Pros-

tate much enlarged and indurated in both lateral lobes; seminal vesicles also involved. Cystoscope showed large irregular villous outgrowth in region of left lateral lobe which involved also the bladder. Death three months later. Autopsy showed the bladder invaded almost everywhere by malignant neoplasm, involving also the prostate. Microscope shows carcinoma.

CASE II. E. G. W., aged 67. Admitted November, 1901. Difficulty of urination 2½ years duration. Catheterism for one year. Severe pain in bladder of late. Prostate considerably enlarged, smooth but very hard. Seminal vesicles not indurated. Residual urine 70 cc. Cystoscope shows large irregular calculus. Slight enlargement of lateral and median portions of prostate. Operation. Suprapubic lithotomy and complete prostatectomy. Recovery. Cure, maintained for 3 years and 10 months. Six months ago began to have pain in region of left kidney. Can now hold his urine for 5 hours, voids easily, no residual urine, bladder large, no pain in that region. Examination shows a large irregular mass beneath the left kidney. Liver enlarged and nodular. In region of prostate a very hard irregular mass. Cystoscope shows no intravesical obstruction or enlargement. Examination of specimen removed at first operation shows carcinoma of the prostate.

CASE III. W. H., aged 56 years. Admitted May, 1902. Duration of symptoms two years. Now voids urine 30 times a day. No hematuria, no pain on urination, but severe pain is present in the region of the sacrum. Prostate enlarged and indurated in both lateral lobes. Left seminal vesicle also indurated. Cystoscope shows very little intravesical enlargement of prostate. Bottini operation. Five months later patient reported he had no difficulty in urination, but had pain in his spine and down his legs; this gradually grew worse and patient died six months later, evidently from carcinoma of prostate.

CASE IV.—J. S., aged 68 years. Admitted August, 1902. Frequency and difficulty of urination for two years. Very little pain—no hematuria. Prostate much enlarged, large indurated nodule at upper end of each lobe. Residual urine 450 cc. Bottini operation, with good results for 20 months. Then return of difficulty; had to use a catheter. December, 1904; cannot void naturally, uses a catheter, has no pain. General glandular enlargement present. Prostate and seminal vesicles involved in a large irregular indurated mass. Cystoscope shows intravesical tumor.

CASE V.—A. F., aged 60 years. Admitted September, 1902. Frequency of urination for three years. No pain, no hematuria. Prostate enlarged and indurated in both lobes. Left sem-

inal vesicle also indurated. Cystoscope shows a slight hypertrophy of median and lateral lobes. Bottini operation. Excellent result maintained until January, 1904. After that difficulty and frequency of urination, pain and hematuria. Examination April, 1904. Prostate very large hard, nodular. Seminal vesicles involved on both sides. Cystoscope shows considerable outgrowth into the bladder. Patient died 8 months later.

CASE VI.—J. J. S., aged 75. Admitted September 18, 1903. Frequency and difficulty of urination for three years. Pain in bladder, perineum and urethra—no hematuria. Uses catheter 6 times a day. Prostate considerably enlarged, very hard, slightly irregular, not tender. Seminal vesicles not palpable. Cystoscopic examination shows slight intravesical enlargement of prostate. Perineal prostatectomy, enucleation difficult owing to induration and adhesions. Immediate result good, and maintained for 9 months. Examination 10 months after operation. Difficulty of urination has returned. Residual urine 500 cc. Large irregular indurated mass involving prostate and seminal vesicle. Cystoscope showed marked increase in intravesical enlargement. Bottini operation. Improved. Death two months later. Tissue removed at prostatectomy showed adenocarcinoma.

REMARKS.—In none of the foregoing six cases were the classical symptoms of prostatic carcinoma, as usually given, present. Pain was present only in the case with calculus and none had hematuria. The clinical picture of nearly all of the cases was that of the so-called sclerotic prostatic hypertrophy. Induration was a common finding in all the cases and the cystoscope showed very little intravesical hypertrophy. The failure to recognize the malignant nature of the enlargement in these cases caused the writer to be more careful, and to be suspicious of marked induration associated with little intravesical hypertrophy.

II. FOUR CASES OF CARCINOMA OF THE PROSTATE RECOGNIZED EARLY AND OPERATED UPON RADICALLY

In March, 1904, patient aged 70, who had suffered from frequency and difficulty of urination for one year, which had been unimproved by a Bottini operation three months before, presented himself. The prostate was hard, slightly nodular, induration extending into the region of the left seminal vesicle. The cystoscope showed only a slight intravesical prostatic enlargement. Pain had been slight and hematuria absent, but diagnosis of carcinoma was made because of the induration, and absence of intravesical enlargement. The patient gave his consent to a radical operation and the entire prostate, with the urethra and capsule, a cuff of an adjacent portion of the bladder including most of the trigone and the seminal vesicles, was removed in one piece. The operation was performed as follows with the kind assistance of Dr. Halsted:

An inverted V cutaneous incision was made in the perineum as in the operation employed by me for simple hypertrophy of the prostate—each branch of the incision being about two inches long. By blunt dissection the end of the bulb and central tendon were exposed, and the latter divided, exposing in turn the recto-urethralis muscle, the division of which gave free access to the membranous urethra behind the triangular ligament. Urethrotomy upon a grooved staff, was followed by introduction of the prostatic tractor, which was opened out after it reached the bladder. While traction was made upon this instrument the rectum was carefully separated from the prostatic capsule by blunt dissection until the entire posterior surface of the prostate was brought into view. Up to this point the operator proceeded exactly as in the usual prostatectomy operation with the exception that the tissues around the prostate were more hemorrhagic and the wall of the rectum more closely adherent to the capsule of the prostate than usual. Examination of the prostate then showed much greater induration than I have ever encoun-

tered in the benign prostate. The rectum and periprostatic tissues were free from invasion. Complete excision was therefore decided upon, and carried out as follows: The handle of the tractor was depressed, thus exposing the membranous urethra anterior to it at a point where it was easily divided transversely with a scalpel, leaving a small stump of the membranous urethra protruding from the surface of the triangular ligament. By further depressing the handle of the tractor the pubo-prostatic ligament was exposed, and being very tautly drawn, easily divided by scissors, thus completely severing the prostate from all important attachments (except posteriorly) as shown in Fig. 1. The lateral attachments, which are slight, were easily separated by the finger. During these manipulations a moderate amount of hemorrhage was encountered (coming from the prostatic veins, particularly those just behind the triangular ligament in front of the prostate) but it was easily controlled by clamping several bleeding points, and applying pressure with gauze by means of an anterior deep retractor (see Fig. 3).

The posterior surface of the seminal vesicles were then freed by blunt dissection, the now mobile prostate being well out of the wound, as shown in Fig. 2. In this exposure of the posterior surface of the vesicles I was careful not to break through the fascia of Denonvilliers which covers not only the posterior surface of the prostate but also of the seminal vesicles, and forms I believe an important barrier to the backward growth of the disease.

The next step was to expose the anterior surface of the bladder, which was easily done by depressing the tractor and making strong traction. By this procedure, the bladder was drawn down so close to the skin wound that it was easily incised at a point in the middle line about 1 cm. behind the prostatovesical juncture, as shown in Fig. 3.

By means of scissors the division was continued on each side until the trigone was exposed, Fig. 4. After swabbing away the blood and urine the ureters were easily found and the line of incision carried across the trigone with a scalpel so as to pass about 1 cm. in front of the ureteral orifices.

While still making traction upon the prostate, the base of the bladder was pushed upward with the handle of the scalpel, thus exposing the anterior surface of the seminal vesicles and the adjacent vasa deferentia, Fig. 5, all of which were carefully freed by blunt dissection with the finger as high up as possible, so as to remove with the vesicles much circumjacent fat and areolar tissues on account of the lymphatics which they contained. The vasa deferentia after being drawn well down were picked up on a small blunt hook and divided with scissors as high up as possible, care being taken to see that the ureters were not in danger. After division of the vasa, the seminal vesicles were found to come down more readily, the deep adhesions were finally divided and the mass shown in the photograph, Fig. 6, was removed. As seen here in the side view, a portion of the membranous urethra, the entire prostate with its capsule intact, the seminal vesicles, 4 cm. of the vasa deferentia, and a cuff of the bladder 1 cm. wide along the anterior and lateral surfaces and 2 cm. wide in the region of the trigone has been removed in one piece. Fig. 7 shows the posterior view of the tissues removed.

There now remained a large defect to be repaired. The vesicle opening was about 8 cm. in diameter and had sunk far back into the depths. The stump of the membranous urethra had been obliterated by the compression of the anterior retractor so that it was necessary to insert a soft rubber catheter through the urethra from the meatus to discover it. The anterior wall of the vesicle opening was then caught with forceps, and with no great traction I was surprised to find how easily it could be drawn down to the membranous urethra, where an anastomosis was readily made as shown in Fig. 8. The first suture was placed by inserting the needle into the triangular ligament above the urethra and out through the anterior wall of the membranous urethra, then through the anterior wall of the bladder in the median line,

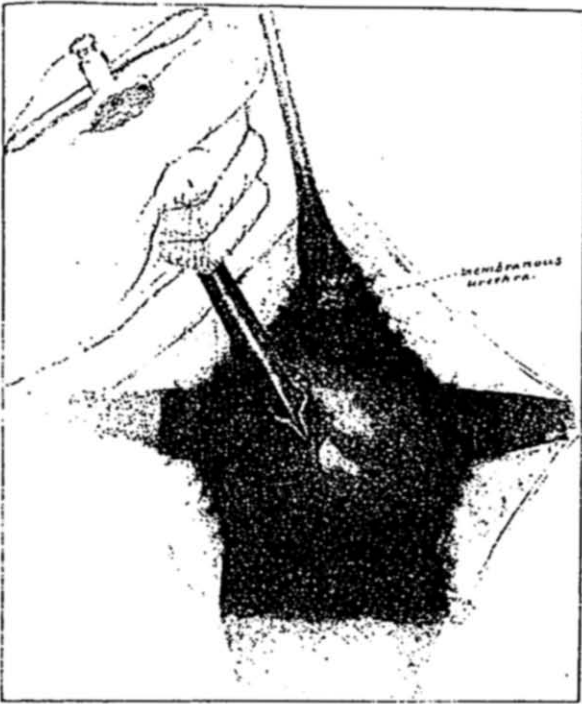


FIG. 1.

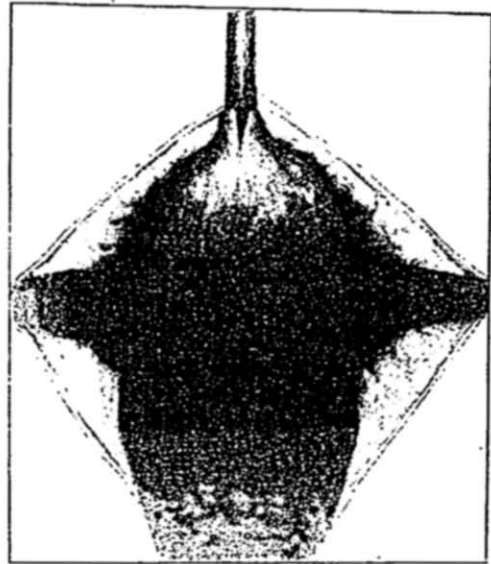


FIG. 2.

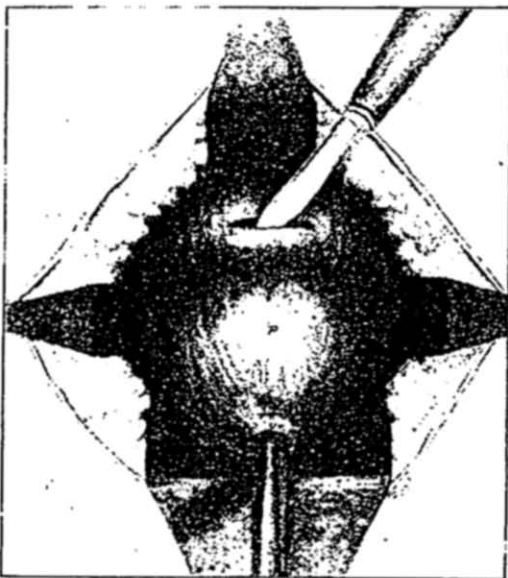


FIG. 3.



FIG. 4.

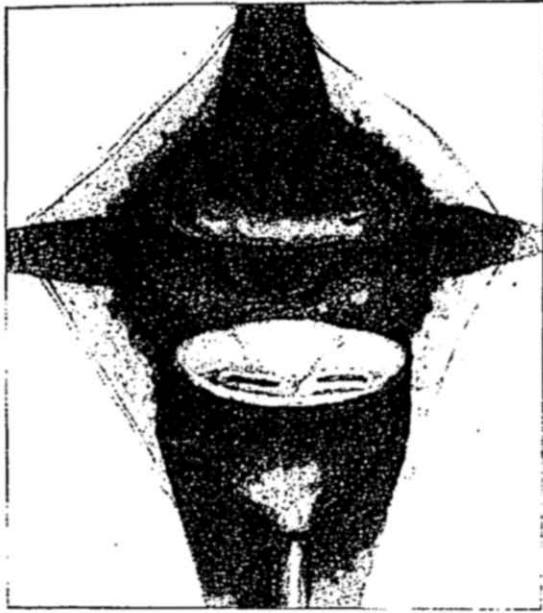


FIG. 5.



FIG. 6.



FIG. 7.

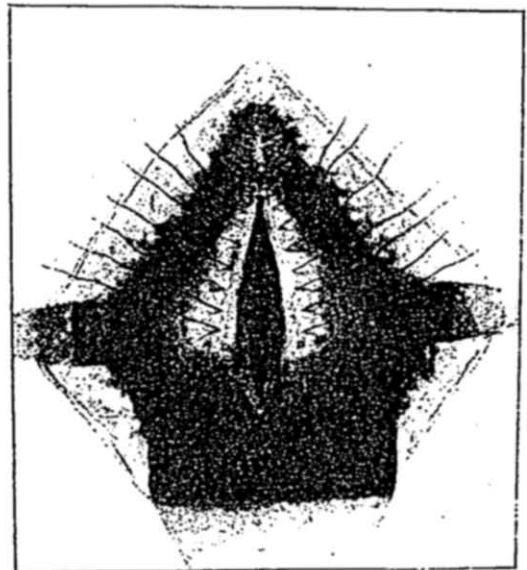


FIG. 8.

from within out, care being taken to include only the submucosa and muscle. When this suture was tied, the median line of the anterior wall of the bladder was drawn to meet the median line of the roof of the remaining membranous urethra, the knot outside, and the thread left long.

Lateral sutures, similarly placed (including the periurethral muscular structures below), and two posterior sutures completed the anastomosis of the membranous urethra with a small ring into which the anterior portion of the margin of the vesical wound had been fashioned by the tying of the sutures, as shown in Fig. 8. The remainder of the vesical wound now presented as a longitudinal opening which was easily closed by sutures, placed as shown in Fig. 8, thus completely closing the defect and replacing the prostatic urethra with a funnel-shaped process made from the bladder wall. The sutures used were silk, one end of each being left long and brought out of the wound so that they could be extracted later (since then I have found alternate sutures of catgut and silk-worm gut, also left long, the best). After light gauze packing had been placed in various portions of the wound, the levator ani muscles were drawn together with catgut (two sutures) in front of the rectum and the skin wound closed on each side with interrupted catgut sutures leaving only a small portion open at the angle in front for exit of the gauze drainage. The rubber catheter (which was of considerable service in making the anastomosis of the urethra and bladder) was fastened in place, by adhesive plaster around the penis, and the patient was returned to the ward. During the operation he received 1000 cc. salt solution infusion beneath the breast, and his condition throughout was good, pulse varying from 65 to 92, and 80 at the end of the operation which required two hours.

A study of the specimen removed showed adenocarcinoma involving the entire prostate, the region between the seminal vesicles and the inferior surface of the excised trigone and the vasa deferentia. The capsule of the prostate and the bladder at upper limit of excision were free, but along the left vas deferens the disease extended to the upper limit of the incision 4 cm. above the prostate.

Convalescence.—Patient convalesced well. Left the hospital May 30, 1904. Perineal wound healed tight; no difficulty in urination; able to hold his urine for three or four hours at night; incontinence in the day.

December 22, 1904. Condition of patient excellent until 2 months ago when he began to suffer pain in the urethra. Examination shows three calculi in the bladder. Operation, litholapaxy. One calculus was found attached to a silk ligature and in removing this the mucous membrane of the bladder was torn. This was followed by perineal abscess, extravasation of urine and death four weeks later. Autopsy showed excellent union between bladder and urethra. No recurrence in bladder, but behind bladder along left vas deferens was a small area of carcinoma. No carcinomatous glands present.

CASE VIII.—W. R., No. 16,675. Admitted September 14, 1904, aged 64. Frequency and difficulty of urination for three years. Has to use catheter now. No hematuria, no pain. Prostate moderately enlarged, smooth, very hard but not nodular. Between the two seminal vesicles an indurated plateau continuous with the prostate below. No indurated glands or lymphatics. Cystoscope showed slight intravesical enlargement of median portion. Diagnosis: carcinoma of the prostate. Operation September 23, 1904. Total excision of prostate, seminal vesicles, portion of the vasa deferentia, cuff of the bladder, the entire trigone including the ureteral orifices. The excision was carried above the ureteral orifices because the bladder wall there felt indurated and the operator thought it was involved. Examination of the tissue removed, however, showed that this was a mistake, and that only the anterior part of the trigone was invaded by the disease. Transplantation of the ureters was not necessary because the intramural

portion had not been completely removed. Anastomosis of anterior wall of bladder and urethra was made as in case VII. The patient convalesced badly, early showed symptoms of pyelitis and died November 8, 1904.

Autopsy showed ascending infection of both kidneys and besides that chronic endocarditis, perihepatitis, splenitis, pancreatitis. Careful examination showed that the carcinoma had been entirely removed at operation. No metastatic glands present. The patient would almost certainly have been cured had the operator not excised the ureteral papillae.

CASE IX.—S. R. B., aged 65. Admitted February 4, 1905. Frequency and difficulty of urination for four years. Now voids every few minutes. Intermittent pain in left hip and thigh for two years. Dull pain in back, bladder, perineum, and rectum. Has never had hematuria. Examination: No glandular enlargements. Prostate considerably enlarged, smooth but very hard. Induration involving the lower end of the seminal vesicle on each side with a narrow plateau between them above the prostate. Cystoscope shows very slight enlargement of the median portion of the prostate. Diagnosis of carcinoma of the prostate made upon the induration involving also the seminal vesicles and the area between them, and the absence of intravesical prostatic enlargement.

February 16, 1905. Radical operation was carried out as in case VII. Patient made an excellent recovery. Was entirely relieved of pain. Perineal wound healed tight. Urine comes entirely through the urethra.

Examination June 24. Condition excellent. Voids urine about every 2 hours. Has no incontinence at night, but in the day urination is imperative when desire comes on. Examination shows no evidence of recurrence.

Study of the tissue removed at operation shows adenocarcinoma involving the prostate, both seminal vesicles, vasa deferentia and the tissues between them and the excised portions of the bladder.

CASE X.—J. E. D., aged 64. Admitted May 12, 1905. Difficulty and frequency of urination for one year. For two months has had to use a catheter. No pain in region of bladder, rectum, back or legs. Has not lost weight. No hematuria. Healthy looking man. No glandular enlargement. Prostate considerably enlarged, particularly left lateral lobe which is very hard and tender. The seminal vesicle is indurated on this side. Residual urine about 400 cc. Cystoscope shows small enlargement of the median portion of the prostate. Diagnosis of carcinoma made on induration, extending into the region of the seminal vesicle and the absence of marked intravesical enlargement.

May 16, 1905. Radical operation carried out as in Case VII. The patient made an excellent convalescence. Perineal wound healed in 5 weeks. Discharged from hospital in six weeks. General condition excellent. Suffers no pain, urine passes entirely through the urethra. Rectal examination negative. Patient feels well, but as yet has no control over urine.

Examination of tissues removed at operation showed adenocarcinoma of prostate, of a portion of the seminal vesicle, and of lower portions of vasa deferentia. One excised gland was also carcinomatous. The trigone, the capsule of the prostate and perivesicular fat were free from disease.

III. A CLINICAL AND PATHOLOGICAL STUDY OF 40 CASES OF CANCER OF PROSTATE

Nineteen of these are taken from the records of the Johns Hopkins Hospital, service of Dr. Halsted, whom I wish to thank for the privilege of reporting them. Twenty-one are from the records of my private cases.

Age.—The ages were as follows:

1.	53 years.
8.	between 55 and 59.
12.	" 60 " 64.
11.	" 65 " 69.

6.....	"	70	"	74.
1.....		75		years.
1.....		76		"

As seen here 57% are between 60 and 70 years of age and 95% between 55 and 75.

Onset.—In 28 cases the first symptom was frequency of urination; in 11 associated with more or less difficulty in voiding. Pain was noted at onset in only 12 cases and in four of these was only a slight burning in the bladder. Hematuria occurred only three times at onset.

Later symptoms.—Pain was present in 27 cases, not present in 8, not noted in 5. It occurred 11 times in the bladder, 7 times in the penis, 4 times in the perineum and the rectum, three times each in the leg, thigh, sacrum, testicle, and abdomen, twice in the hip and groin and once each in the knee and sole of the foot. Cases in which a seminal vesicle was involved showed pain radiating at times down the sciatic nerve.

Hematuria.—This is stated to have been present in only 8 cases and in 4 of these the bladder was involved.

Retention of urine.—In all cases but one some residual urine was present. In 20 cases incomplete retention, varying from 50 to 850 cc. In 7 cases complete retention requiring catheter life and in 6 cases intermittent complete retention. In 8 cases no note was made on this point.

The prostate.—This was considerably enlarged in 24 cases, moderately enlarged in 9, slightly enlarged in 5, hard in 30, in places hard and in others soft in 5, and everywhere soft in 3 cases. It was nodular in 17 cases, smooth in most of the others. Marked tenderness was noticed only once in the 40 cases. In those cases which were not far advanced in the disease the prostate usually presented a smooth rounded surface, but was markedly indurated. This induration was often of stony hardness and the contrast with that of benign hypertrophy was very marked.

Seminal Vesicles.—It was in the region immediately above the prostate on each side in which the most significant changes were found, induration of one or both of the seminal vesicles being present in 29 cases. In recent cases, where more careful notes have been made, a plateau of induration in the intervesicular space has been noted in 10 cases. This induration is positive evidence of the spread of the disease between the vasa deferentia and the bladder after breaking through the capsule of the prostate at the base. Specimens show, however, that it is often well limited.

Rectum.—This was involved by the growth in but two cases and in only one of these was the mucous membrane ulcerated.

Bladder.—Careful cystoscopic examinations were made in 23 cases and in 7 the bladder wall was involved generally in the region of the trigone adjacent to one or both of the ureteral orifices, five times in the form of intravesical tumors, and twice of superficial ulceration. Examination of the bladder by suprapubic cystotomy showed a nodular elevation of the trigone in one case, the other case being normal. Two autopsies showed the bladder to be uninvolved. There was no intravesical enlargement of the prostate shown with the cystoscope in 5 cases. In 12 cases a very slight elevation of the median portion was present. In 3 cases a small median lobe, and in only one case a fairly large median lobe. The lateral lobes were at all intravesically enlarged in only four cases. In six cases the intravesical prostatic outgrowth was villous in type and associated with tumor of the bladder in 3 cases.

Glandular involvement.—Enlarged glands have been noted in only 11 of the 40 cases as follows: Deep pelvic glands four times, inguinal five times, iliac twice, sacral twice, axillary once, epitrochlear once. This corresponds to the findings of Kaufmann who discovered involvement of the pelvic glands in only 27 out of 100 autopsies. In one of our cases in which the tibiae, vertebrae, and ribs contained numerous

metastases, only one metastatic gland, and that a bronchial gland, was found.

Loss of weight was considerable in 18 cases.

Considerable increase in thickness of the suburethral portion of the prostate and also of the tissues between the trigone and the rectum has been shown in many of these cases by examination with the finger in the rectum and cystoscope in the urethra, the beak turned backward. In a number of cases the intervesicular mass and induration have prevented one from feeling the beak of the instrument in the bladder.

The pathology.—That carcinoma may begin in a benign adenomatous hypertrophy is shown in Case I. Generally induration is present in both lobes when the patient is first seen, but the disease remains localized within the prostatic capsule for months and often for several years. The capsule of the prostate is very thick and strong, especially in its posterior portion, where it is rendered much thicker and stronger by the incorporation of the aponeurosis of Denonvilliers, which covers intimately the posterior surface of the prostate and seminal vesicles. At the base of the prostate there is a space, between the seminal vesicles and the bladder, where the prostatic capsule is weakest and it is here in nearly all of the cases that the disease spreads first beyond the confines of the prostate. At the same time it usually travels up the lumina of the vasa deferentia and seminal vesicles forming a plateau of induration above the ordinary confines of the prostate, generally marked by a concave superior border and a notch on each side where it joins the lateral lobes. The posterior surface of the anterior part of the trigone becomes invaded from this mass, and it may finally penetrate the entire wall of the bladder and show itself intravesically generally as a small tumor or ulceration in the region of one or both ureteral orifices. The disease spreads laterally along the nerve sheaths and the lymphatics, indurated cords of which are often found leading upward and outward above the prostate along the lateral wall of the pelvis. The pelvic glands are, however, not often found involved.

Only occasionally does the disease present into the bladder in the shape of considerable intravesical enlargements around the prostatic orifice.

IV. A COMPARISON WITH THE CASES IN THE LITERATURE IN WHICH OPERATIONS FOR CARCINOMA WERE PERFORMED

I find 26 cases of primary carcinoma of the prostate reported, and to these six cases are here added, excluding those in which the Bottini operation was performed. Cases of carcinoma of the rectum involving the prostate and sarcoma of the prostate, which have been included by Oraison, Pousson, and Hawley, have no place here, but I have referred to them briefly to show why they should be excluded. I have grouped the cases according to the operation performed as follows:

Partial operations, (enucleation, partial excision or curettage), by perineal route, 12 cases, by the suprapubic route 9 cases.

Radical operations.—A. Complete excision of the prostate, the entire bladder and the seminal vesicles with transplantation of the ureters into the rectum, one case, by Küster, with death in 5 days.

B. Complete excision of the prostate, probably the seminal vesicles, most of the bladder with transplantation of the ureters into the remaining vertex of the bladder, one case, Harris. Recurrence and death two months later or pneumonia.

C. Complete excision of prostate, seminal vesicles, adjacent portion of the bladder leaving the ureters intact and anastomosing bladder opening to membranous urethra, four cases, Young (reported above).

D. Excision of prostate without seminal vesicles, three

cases. Immediate death, one case. Recurrence and death in the other two cases.

E. Rectum and prostate involved by carcinoma, 5 cases. Immediate death, 3 cases. Two cases of primary carcinoma of the rectum involving only slightly the prostate, said to be cured after operation.

F. Sarcoma of the prostate, three cases. Immediate death, one case. Recurrence and death 9 months and four years, two cases.

Remarks.—A study of these cases shows conclusively that partial operations are of no permanent utility in cancer of the prostate. Among the 12 cases in which partial operation was done through the perineum, 9 died of recurrence and the other three cases were followed only one, three and nine months respectively. Of the 9 operated upon by the suprapubic route 6 had recurrence, one was not followed and two were said to have been fully cured one year after the operation, although only a median lobe was removed in each case. In the three cases in which the prostate was completely excised, but the seminal vesicles and the adjacent portion of the trigone were not removed, death resulted in all three cases, once from operation, twice from recurrence.

Küster's case associated with multiple vesical tumors cannot rightly be included in the results of operations upon the cancerous prostate. His operation of complete excision of the bladder and prostate, with transplantation of the ureters into the rectum ended in death in 5 days. When the disease has spread beyond a localized invasion of the bladder adjacent to the prostate, a radical operation is out of the question, and such procedures as that of Küster are useless if not always certainly fatal. Those in which the rectum is invaded in the prostatic tumor are in the same category—useless and harmful. Of the five cases reported only one was cured and in this case the carcinoma started in the rectum and involved the prostate only superficially. Harris' case is very interesting, but simply shows the truth of the above statements. The remaining class—those in which the seminal vesicles and cuff of the bladder were excised in one piece with the prostate, comprises only the four cases of the writer. There has been no operative mortality. One case (VIII) died six weeks after the operation as a result of an operative mistake—excision of the lower half of the intramural course of the ureters along with the trigone because it felt like it was invaded. Careful study of the specimen removed, however, showed that this was a mistake; that the trigone was only invaded near the prostatic orifice, and that the excision had been much more extensive than was necessary. This was fully confirmed at autopsy as careful search failed to reveal any carcinoma, regional or glandular, and sections of structures adjacent to the prostate were negative microscopically. This case would probably have been cured by the operation had the valvular ends of the ureters not been removed.

Case VII died one year later as a result of litholapaxy. The operative specimen in this case showed cancer up to the upper limit of excision (above the left seminal vesicle) and the autopsy showed a very small area of carcinoma behind the bladder above this point. No invaded glands and no other evidence of cancer was to be found. The case had been subjected to a Bottini operation, in another city, three months before. A radical operation at that time would probably have cured him.

The other two cases (IX, X) have been operated upon 6 and 12 months respectively—too recent for consideration; however, both are comfortable and free from recurrence so far. It has been surprising to see how easily this deep and extensive operation can be carried out and particularly how little post-operative shock and discomfort is caused.

Early diagnosis.—The question of cure depends upon early diagnosis. As shown above, this is often difficult because of the absence of characteristic symptoms and signs. When severe pain and hematuria are associated with a very hard prostate with upward prolongation of the induration into the

region of the seminal vesicles on each side the nature of the disease is evident at once. When, however, the symptoms are those of ordinary hypertrophy and the seminal vesicles and the vesicular region are normal in feel the diagnosis is often difficult. After a careful review of these cases I now feel that a markedly indurated prostate producing obstruction in a man over 50 years of age should be viewed with suspicion. If it is of stony hardness it is very apt to be cancerous, especially if the cystoscope shows little or no enlargement intravesically as in the ordinary hypertrophy. In such cases I proceed to expose the posterior surface of the prostate as in the ordinary prostatectomy operations, palpate the prostate directly and if I find the posterior capsule more adherent to the rectum, the tissues more hemorrhagic and the consistency of the prostate much more indurated than in simple hypertrophy, I am able generally to make the diagnosis of carcinoma without cutting into it, and proceed at once with the radical operation.

In a recent case after exposing the prostate I was still uncertain as to malignancy and therefore made a longitudinal incision into the prostate on each side of the urethra as if for the usual prostatic enucleation, and then excised a slice of the lateral lobe parallel to the cut. Macroscopic examination of this showed the characteristic appearance of prostatic carcinoma—glandular yellowish dots and lines in a paler, more fibrous stroma, and a frozen section, made at once and stained, showed definite adenocarcinoma invading the intraglandular stroma. It only required 6 minutes to make and stain the frozen section, and I therefore propose the method as one of practical utility in all cases where the operator is in doubt as to the character of the enlargement. When the presence of cancer is demonstrated the capsular incisions are to be closed at once and the radical operation carried out.

In view of the six cases detailed at the beginning of this paper in which a mistaken diagnosis was made I propose in all cases in the future to study the cut surface of the prostatic lobes immediately after their enucleation at the operating table, and if there is the slightest suspicion of malignancy to have frozen sections made at once. In very few cases will the wait of 5 minutes or more make any difference to the patient. In cases where the prostate is indurated, if only in part, this operating-room-study of the fresh tissues is of the greatest importance. I feel sure that several of my first six cases might have been saved by the radical excision which would now follow such a course.

CONCLUSIONS.

The following conclusions may be drawn from this study of 40 cases. Carcinoma of the prostate is more frequent than is usually supposed—occurring in about 10% of the cases of prostatic enlargement, as shown also by Albarran. It may begin as an isolated nodule in an otherwise benign hypertrophy or a prostatic enlargement which has for many years furnished the symptoms, and signs of benign hypertrophy may suddenly become evidently malignant.

Marked induration, if only an intralobar nodule in one or both lobes of the prostate in men past 50 years of age should be viewed with suspicion, especially if the cystoscope shows little intravesicular prostatic outgrowth, and pain and tenderness are present.

The posterior surface of the prostate should be exposed as for an ordinary prostatectomy, and if the operator is unable to make a positive diagnosis of malignancy, longitudinal incisions should be made on each side of the urethra (as in prostatectomy) and a piece of tissue excised for frozen sections, which can be prepared in about six minutes and examined by the operator at once. If the disease is malignant the incisions may be cauterized and closed and the radical operation performed.

Cancer of the prostate remains for a long time within the confines of the lobes, the urethra, bladder and especially the posterior capsule of the prostate resting inviolate for a con-

siderable period. Extraprostatic invasion nearly always occurs first along the ejaculatory ducts into the space immediately above the prostate between the seminal vesicles and the bladder and beneath the fascia of Denonvilliers. Thence the disease gradually invades the inferior surface of the trigone and the lymphatics leading toward the lateral walls of the pelvis, but involvement of the pelvic glands occurs late and often the disease metastasises into the osseous system without first invading the glands.

Cure can be expected only by radical measures and the routine removal of the seminal vesicles, vasa deferentia and most of the vesical trigone with the entire prostate as carried out in four cases by the writer and fully described by the illustrations is shown to be necessary by the 40 cases, including 8 autopsies and 10 operations, reported above.

The four cases in which the radical operation was done demonstrated its simplicity, effectiveness and the remarkably satisfactory functional results furnished.