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Prostatic surgery

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"A review of cases of prostatectomies at the Omaha Veterans Administration Hospital over a period of twenty-three months from January 1966 through November 1967."

There were 302 cases reported during the above period. Of these 54 were diagnosed as having carcinoma of the prostate and/or bladder. Of this 54, 19 were diagnosed microscopically after the operative procedure. Of the remaining 248 cases, 56 were omitted from this study. Reasons included previous prostatectomy within one year, neurogenic bladder due to paraplegia and/or trauma, metastatic carcinoma from the rectum or other areas and several because of the unavailability of old records. The remaining 192 were operated upon because of benign prostatic hyperplasia and/or vesicle neck obstruction and are the main substance of this report.

These procedures were performed by various residents and staff members at the Omaha Veterans Administration Hospital. The methods of prostatectomy performed on these cases were, transurethral resection, perineal, transcapsular or retropubic, and transvesicle or suprapubic.

Table 1
Prostatectomy

Transurethral Resection	159
Perineal	12
Retropubic	19
Suprapubic	2
Total	192

Preoperative Evaluation

Although preoperative workup varied somewhat because of the preference of physicians and the status of individual patients, intravenous pyelograms were reported on all but 9 of the 192 cases. Bladder abnormalities were reported in 122 cases. Kidney abnormalities were reported in another 28 cases and the remaining 33 cases were reported as normal. Residual urine was reported in 90 of the 140 cases in which there was not complete urinary retention. In cases where patients could repeatedly pass several cc's of urine, regardless of the amount of residual, they were not classified as having acute retention. The largest residual recorded was 900 cc's, with the smallest being 0. The average amount was 135.6 cc's in those patients in which a residual was recorded. See table 2 below.

Table 2

Residule Urines

	No. of Cases	Average Amount of Residual
TUR'S	80	139.8 cc
Perineal	5	157.0 cc
Retropubic	4	44.0 cc
Suprapubic	1	60.0 cc
Total	90	135.6 cc

In attempting to determine the incidence of preoperative infection the following criteria were used:

1. A culture of urine with 1,000 or more organisms per ml. of urine.
2. Chills and fever with increased white blood cells in the urine sample.

These were determined before current hospital instrumentation. This also includes patients who entered the hospital with indwelling catheters and the above signs of infection. Seventy-seven of the 192 patients met the requirements stated above. This is probably a conservative estimate of preoperative infection because many of the patients admitted may have had increased white blood cells in the urine, but cultures were not obtained on all of these patients.

Nodules were felt in 19 of the prostates examined rectally. This does not appear to be excessive for a group of 170 cases of benign prostatic hyperplasia.

Increased tenderness was reported in 12 of the examinations in which 7 had a diagnosis of prostatitis on histological examination. Incidentally, prostatitis was reported histologically in 38 of the 192 cases.

As far as preoperative antibiotics are concerned, there was no set criteria for their administration preoperatively, but they were generally administered in the cases in which a definite preoperative infection was present and were occasionally administered prophylactically.

The ages of the patients ranged from the youngest of 40 to the oldest of 84, with about 70% between the ages of 70 and 79. The average age of the patient at the time of operation was 70.8 years. The following table gives a representation of age distribution according to the type of procedure performed.

Table 3

Age Distribution

Age	TUR	Retropubic	Perineal	Suprapubic	Total
40-49	6	0	0	0	6
50-59	13	1	0	1	15
60-69	28	3	3	0	34
70-79	108	15	8	1	132
80-89	4	0	1	0	5
Ave. Age	70.6	72.0	72.8	66.0	70.8
Youngest	40	53	61	59	40
Oldest	84	78	81	73	84

Table 4 shows the weight distributions as reported in the pathological reports. The range in the weight of the specimens from transurethral resections is from 1 gram to 50 grams. As was stated before, a certain amount of tissue is probably lost before the weight of these specimens is recorded. The average weight of the specimens resected in a transurethral resection is 16.7 grams. As is seen, this is considerably less than the weights of the specimens obtained from the other approaches. However, there were 8 specimens weighing over 40 grams, with the largest being 50 grams. As will be shown later, this increased amount of tissue may coincide with increased bleeding in these patients.

Table 4

Weight of Specimen

Wt. of Specimen in Grams	TUR	Retro-pubic	Perineal	Supra-pubic	Total
0-20 grams	93	1	0	0	94
20-40 grams	50	3	5	0	58
40-80 grams	8	6	6	2	22
above 80 grams	0	6	1	0	7
Smallest	1 gram	16 grams	25 grams	40 grams	1 gram
Largest	50 grams	227 grams	105 grams	65 grams	227 grams
Average	16.7 grams	75.8 grams	50.8 grams	52.5 grams	25.0 grams

The length of the postoperative hospital stay is a matter of concern to both physician and patient. In this series the average total postoperative hospital stay was 14.5 days for all procedures. The average postoperative stay for transurethral resections was 13.2 days, for retropubics 19.8 days, and for perineal 22.3 days. The longest postoperative stay was 114 days and the shortest was 3 days. In comparing these statistics with those of other reported studies, one must keep in mind that in this instance all patients were considered.

Many of these patients had other operative procedures performed during their hospital stay. Some were performed before the prostatectomies, while others were performed at the same time, and still others were performed during the postoperative period. This also includes chronically ill patients who were transferred from other wards specifically for a prostatectomy. However, some information is derived from comparing the length of the hospital stay in this study between the different types of procedures performed.

An evaluation of the patient's chief complaint was made in this study, and of the 192 cases, 139 presented with a chief complaint and/or signs and symptoms of bladder outlet obstruction. Of the 159 transurethral resections performed, 45 of these were incidental findings or were found in addition to other illnesses while the patient was in the hospital. Of the 31 other types of procedures performed, 25 of these cases were found to present with a chief complaint compatible with bladder outlet obstruction. Other reasons for admission were, inguinal hernias, neoplasms, fractures and other trauma, cerebral vascular accidents and lung disease. It was found on admission that some patients had had symptoms for as long as 10 years. There were a few patients who denied any symptoms or complaints even when confronted with suspicious findings by the physician. In some cases there were no complaints before complete urinary retention occurred. The average duration of symptoms of bladder outlet obstruction was 1 to 2 years. The following table presents a list of the most commonly occurring signs and symptoms.

Table 5

Symptoms

	Total	TUR	Open Procedures
Nocturia	132 (68%)		
Dysuria	67 (35%)		
Dribbling	56 (28%)		
Hesitancy	106 (56%)		
Frequency	58 (30%)		
Complete retention	52 (27%)	38 (24%)	14 (42%)
Gross hematuria	31 (16%)	23 (13%)	8 (26%)

Complete urinary retention was seen in 52, or 27%, of the cases. It occurred in 24% of the patients who underwent transurethral resections and in 42% of the patients who were operated upon by other routes. This could be explained by the fact that the larger adenomas were found in the patients who underwent open prostatectomies. A higher incidence of gross hematuria is also seen in the patients with the larger adenomas. Also of interest is the fact that 14 of the 52 cases of acute urinary retention occurred after another operative procedure had been performed prior to the prostatectomy.

Postoperative Complications

Vasectomies were performed on 103 of the 192 patients. Epididymitis developed in 4 of these. Three

of the 4 cases of epididymitis occurred in the open procedures, 2 after perineal prostatectomies, and 1 after a retropubic prostatectomy. In 2 of the 4 cases in which epididymitis developed after vasectomy, the vasectomy was performed after the enucleation of the prostate gland. In the 89 procedures in which vasectomies were not performed, 2 cases of epididymitis were reported.

Since it is difficult to ascertain the exact amount of blood loss, only a record of blood replacement is shown below. Forty-two of a total of 192 patients required blood replacement. As is seen in the table below, a significantly higher percentage required replacement in the open procedures than in the TURs. Also of interest is the average size of the gland in the transurethral resections which required blood replacement (27.2 grams) as compared to the average size of the gland in the transurethral resections which did not require blood replacement (15.3 grams). The difference in the size of glands in the open procedures in which the patients required blood replacement, as compared to those who did not, does not appear to be significant.

In reviewing the charts of these 192 cases, I was unable to come up with any uniform criteria for determining the incidence of postoperative infection. However, since there is nearly always a record of the patient's postoperative temperature, I thought it might be of some interest to use this as a possible monitor of the patient's postoperative infection. Table 7 below shows the number of patients who had a temperature above 100° fahrenheit, beginning with the operative day.

Table 6

Blood Replacement

	TUR	Retro-pubic	Perineal	Supra-pubic	Total
No. Requiring Replacement	20 (13%)	16 (84%)	4 (25%)	2 (100%)	42 (22%)
Total Amount	30 units	43 units	6 units	3 units	82 units
Least	1 unit	1 unit	1 unit	1 unit	1 unit
Most	4 units	9 units	3 units	2 units	9 units
Average	1.5 units	2.7 units	1.5 units	1.5 units	2.0 units
Ave. Size of Gland in Which Blood Replacement Required	27.2 grams	83.2 grams	39.0 grams	52.5 grams	50.9 grams

Table 7

Temperature Above (100°)

	TUR	Retor-pubic	Perineal	Supra-pubic	Total
No. of Patients	85 (54%)	17 (89%)	7 (58%)	2 (100%)	111 (58%)
Total No. of Days	221	71	23	9	324
Average	2.6 days	4.2 days	3.3 days	4.5 days	2.9 days
Ave. of All Patients	1.4 days	3.7 days	1.9 days	4.5 days	1.7 days

Using as a criteria, death from any cause during the postoperative hospital stay, there was a mortality rate of 1.6% in this study. Two deaths occurred after transurethral resection and 1 after a suprapubic prostatectomy. Two of the deaths were attributed to myocardial infarction, one occurring 4 days postoperatively, and the other occurring 10 days postoperatively. The other death occurred 1 day after a transurethral resection was performed, and at autopsy, a perforation of the urinary bladder was noted. However, the exact cause of death was not stated.

Perforations occurred 4 times during transurethral resections, the first being noted above. Of the other 3, a cystotomy was required for 2 of them and one small perforation merely required prolonged catheter drainage and healed well. There were strictures requiring subsequent prolonged dilatation and treatment in 8 cases following transurethral resections. Six patients required another transurethral resection within 1 year. Reasons for this varied, but included strictures, subsequent retention and removal of fragmented chips of tissue left at previous operation. There were 2 cases of acute retention within one month postoperatively. Incontinence was a prolonged problem in only 3 cases of the 159 transurethral resections. The criteria for determining this is that a patient continue to wear an incontinence device 3 months postoperatively. It was noted that 10 of the patients who underwent transurethral resections had had at least 1 resection sometime previously. However, no patients were included in this study who had had a resection within 1 year prior to their current admission.

In a review of the open prostatectomies no patient had a prolonged problem with incontinence. Three of the patients who underwent retropubic prostatectomies developed wound infections, and there was one case of wound infection following a perineal prostatectomy. There was also one case of acute retention, and hemorrhage when a catheter was removed after surgery and a cystostomy had to be performed. This was following a retropubic prostatectomy. Also, a fistula developed through a penrose drain site following a retropubic procedure. This healed well, but did require prolonged hospital stay. One case of osteitis pubis was reported following a retropubic prostatectomy. The following in Table 8 is a list of complications.

Table 8

Complications

	TUR	Retro-pubic	Perineal	Supra-pubic	Total
Mortality	2			1	3
Perforation	4				4
Incontinence	3				3
Stricture	8				8
Wound Infection		3	1		4
Antibiotic Reaction	1				1
Acute Retention	2	1			3
Fistula		1			1
Osteitis Pubis		1			1
Pulmonary Embolism		1			1

Discussion

Turner and Waller[12] report on a review of 1200 operations from the Department of Urology at the Hertsler Clinic. Of the 1200 prostatectomies in their series, 1021 were transurethral resections, 143 were suprapubic prostatectomies, and 18 were retropubic prostatectomies. There were also 18 perineal operations. The largest adenoma in this series weighed 260 grams and was removed suprapubically. There were 616 specimens weighing under 20 grams and 283 weighing between 21 and 40 grams. Most of the specimens in this weight range were removed transurethrally. However, it is pointed out in comparing the weight of closed versus open prostatectomy that the electric current used in transurethral resection does reduce the weight of the tissue by its coagulation and dehydration action.

Most of the patients in this series had bilateral vasectomies at the time of operation. However, no figures were given as to the incidence of epididymitis. The mortality in this series was 1.6% or 19 deaths occurring out of the 1200 cases.

Although again no specific figures were given, it was reported that patients in this series were kept in the hospital until about 14 days postoperatively. The 14.5 day postoperative period required in the current study at Omaha Veterans Administration Hospital would seem to compare favorably with this 14 day stay. This is especially true since the Hertzler Clinic survey points out that patients in their study received only associated surgery such as revision of bladder neck, diverticulectomy, suprapubic cystolithotomy, hydrocelectomy and orchiectomy.

Holtgrewe and Valk have published two interesting papers, from the Department of Urology at Kansas University Medical Center, dealing with transurethral resections. The first of these is entitled "Factors Influencing the Mortality and Morbidity of Transurethral Prostatectomy" and is a study of 2015 cases.[6] These cases constitute a five and one-half year period, from January 1955 through June 1960. As in the current study at the Omaha Veterans Administration Hospital, low spinal anesthesia was used in most cases.

Interest in this study was focused chiefly on complications of the procedure influencing mortality and morbidity. The mortality rate was 2.5% in this series. Myocardial infarction and pulmonary embolus made up more than half of the mortality. There were 3 deaths attributed to hemorrhage. Seven hundred thirty-eight of the patients, or 37% of the series, received one or more units of blood. There were 120 cases of postoperative epididymitis, (6%). One thousand eight hundred twelve patients received no vasectomy, and in this group there were 111 cases of epididymitis, (6.1%). Ninety-one patients received a crushing type of vasectomy, and there was a reported 5.5% rate of epididymitis. Of the 112 patients who received vasectomy ligation there was only 1 reported case of postoperative epididymitis, for a significantly decreased rate of 0.9%. Sixty-eight patients received secondary transurethral resections necessitated by poor postoperative voiding. This is a recurrence rate of 3.4%. Also of note is the fact that the postoperative morbidity rate was elevated to 19% due to a 12% incidence of epididymitis. This would indicate that the second procedure carried no untoward effect aside from doubling the

likelihood of epididymitis. The morbidity rate for the entire series was 18%, not taking into account the 2.5% mortality rate. This is a combined 20.5% morbidity-mortality rate.

Among other complications listed are pneumonia, pyelonephritis and extravasation. Twenty-three patients sustained perforations at the time of operation for an occurrence rate of 1.1%. Four of these died, which would be a mortality rate of 17.5% for those patients with extravasation. Of interest is the fact that all four of these patients were in a group of 12 in whom supra-pubic cystostomy and drainage were delayed for more than 2 hours following the perforation. The 11 patients in whom drainage was instituted within 2 hours following surgery all recovered without further incident or complication.

In evaluating the role of adenoma size, a mortality rate of 2.4% was found for resections done on glands weighing under 40 grams, while a rate of 2.9% was found on those weighing over 40 grams. Thirty-three patients in the series had a resection of specimens weighing over 80 grams and of these 2 died postoperatively, for a mortality rate of 6%. However, because of the small number of patients in this group, not too much emphasis was placed on this by the authors.

In this study advancing age would appear to coincide significantly with a rising mortality rate. Patients were placed into 4 age groups including those below 60, 60-69, 70-79, and above 80. The mortality rates correspondingly are 0.4%, 0.9%, 4.0%, and 6.7% for the latter group. These investigators concluded therefore that, "the size of the prostate gland appeared to exert far less effect on mortality than did the patient's age."

The second paper presented by these authors in 1964 (2 years later than the first) deals with the long term results of transurethral prostatectomy in the same group of patients.[7] However, accurate information was obtained on only 840 of the original 2015. Death had occurred in 323 of the patients and the remaining 800 patients in the original series were either lost to follow up or the information obtained was incomplete and too unreliable to be included.

Twenty-three of the 840 patients were found to have a urethral stricture postoperatively in a previously normal urethra. In a search for factors which significantly affected stricture formation it was found that those patients who had more than 40 grams of tissue resected, through the entire penile urethra, sustained strictures at the rate of 29%, while in patients who had less than 40 grams resected through the entire penile urethra, the rate was less than 1%. In patients who were resected through an external perineal urethrotomy, regardless of size, stricture formation was also found to be less than 1%.

In the assessment of incontinence, criteria similar to those already mentioned in the current study at the Omaha Veterans Hospital were used, namely that the patient was required to wear an appliance to catch urine leakage. Incontinence occurred in 1% of the patients with benign disease, while in the 92 patients who were found to have carcinoma, incontinence was a complication in 5%.

Although sexual function is a very difficult entity to ascertain objectively, some subjective information was obtained. Of the 382 patients who stated that they were enjoying satisfactory sexual performance before

operation, 60% stated that they had no change postoperatively, except for retrograde ejaculation which was nearly uniformly reported. Complaints of the 40% who experienced declining sexual function postoperatively included impotence, incomplete erection and inability to sustain erection.

Fifty-four patients out of this 840, on whom accurate information was obtained, required another transurethral prostatectomy because of the recurrence of obstructive disease. More than half of these were performed during the first year following prostatectomy.

Although adenocarcinoma of the prostate is not included in the study at the Omaha Veterans Administration Hospital, I feel that a report by Denton and Associates[3] is of sufficient interest to discuss at this point, in relation to transurethral resections. Their study deals with 300 cases in which perineal needle biopsies were performed prior to or at the time of transurethral prostatectomies. In every case in which the needle biopsy was positive for carcinoma, the surgical specimen of the transurethral prostatectomy was also positive. The 300 cases were broken down into 3 groups. The first group included 239 clinically benign cases. Fifteen carcinomas were diagnosed by transurethral prostatectomy and 6 of the 15 by needle biopsy. In the clinically suspicious group of 48 cases, there were 25 positive surgical specimens and only 16 of these 25 were diagnosed by needle biopsy. In the clinically obvious group, including 13 cases, both the surgical specimens and the needle biopsies were 100% positive.

In all cases in which the needle biopsy was positive for carcinoma, the surgical specimen from the trans-

urethral prostatectomy was also positive. Using the 53 cases in which diagnosis of carcinoma by transurethral resection was obtained as a standard, the relative accuracy of the needle biopsy was 66% (35 cases).

Allan and Coorey[1], in a report from England of 1000 consecutive cases of retropubic prostatectomies, point out in their study, as did Valk and Holtgrewe, that the age of the patient increases the mortality. Allan and Coorey also state that the mortality rate in their series was three and one-half times greater in operations on patients with acute retention of urine, than those with only symptoms of obstruction. The relative figures of mortality being 6.1% in acute retention, 9.0% in chronic retention, and 1.9% in those patients with obstructive symptoms alone. Patients came to them in a ratio of acute retention 69%, chronic retention 11%, and obstructive symptoms 20%. The presentation of 69% of the cases with acute retention could certainly be a significant factor in the overall operative mortality rate of 5.2%.

Postoperative urinary tract infection was reported as being present in virtually 100% of the patients directly following operation. This seems to be present regardless of the type of prostatectomy performed. Persistent stricture of the urethra was reported in only 3 cases. Permanent incontinence was found in 5 cases, (.5%). A record of blood replacement was not presented, but 7 patients were returned to the operating room shortly after the original procedure because of bleeding.

In another review from England, Hickinbotham and associates[5] report on a method of retropubic prosta-

tectomy, without catheter drainage, in 150 patients. They maintained that hemorrhage and infection are significantly reduced when performed under hypotensive anesthesia and without a postoperative catheter. Under this method the systolic blood pressure is reduced to 70-80mm of mercury, and postoperatively it is allowed to return slowly to its preoperative level. Under this type of anesthesia, even minor degrees of anoxia must be avoided. These authors point out that often only a small amount of urine is secreted during the first 12 postoperative hours, and they state, "The indication for catheterization is a painful full bladder, not a certain number hours after operation."

Mortality rate in this series was 4 deaths, (3.7%). Blood transfusions were required in only 4 patients, and the authors state that 2 of these were for anemia and 2 for excessive blood loss. They also have reported no cases of postoperative retention caused by bleeding and no complications attributable to the hypotension.

Fifty-six of the patients in the above series presented with acute retention. Antibiotics were not used routinely and were generally reserved for cases with a specific indication such as a severe urinary infection, wound infection and chest lesions. There were, incidentally, 24 cases of wound infection.

Although the average postoperative stay was not given, 44 patients were discharged within 6 to 8 days, 34 within 9 to 11 days, 7 within 12 to 14 days, and 17 required more than 14 days hospital stay postoperatively.

As far as catheterization is concerned, 18 of the 106 patients did require catheterization at some time

during their hospital stay. Four of these were at the time of operation because of fear of prostatic capsular leakage. Eight were necessary because of postoperative suprapubic leakage, and 6 because of inadequate passage of urine. These catheters were left in for from 2-4 days, and there were no subsequent complications reported.

Shargel[11] reports 103 cases in which Y-V closure was used with the retropubic procedure. Again, they do not state specifically the number of patients requiring blood replacement, but there are 3 cases of secondary hemorrhage controlled by transfusions listed as postoperative complications. Wound infection is reported in 4 cases, a tear in the prostatic capsule in 2 cases, 1 case of epididymitis (vasectomies were done routinely), and 3 cases of osteitis pubis were reported. There were no reports of stricture of the urethra or persistent incontinence. Two patients required secondary revisions transurethrally. Eighty-one percent of the patients were between the ages of 60 and 80. Although the average postoperative hospital stay is not given, these investigators indicate that many patients are able to leave the hospital on the eighth postoperative day.

A rather broad report on results in 2050 consecutive patients, and the progress of perineal prostatectomies in general, is presented by Davis and Lee[2]. They pointed out that the decision as to mode of operative approach should depend chiefly upon the size of the obstructing prostate, evidence of malignancy, and to a lesser degree upon the specialized skill of the surgeon. Through their experience in these 2050 cases, dating back over 34 years, and in which time they also

performed more than 900 transurethral resections, they maintain that perineal resection, "in our hands is followed by smoother, easier convalesence without the secondary hemorrhage hazzard, and offers better assurance of complete and lasting symptomatic relief", than the transurethral route. In evaluating preoperative patients, "Simply stated and assuming no evidence of circulatory disorder, our green-light criteria consist essentially of nonprotein nitrogen below 40mg, normal temperature, and good appetite." In regard to convalesence, ambulation is routinely started on the first or second postoperative day. The average postoperative hospital stay for the last 50 patients in this series was 11.3 days. The overall mortality rate reported in this series is 2.9%. However, these investigators point out that the average mortality rate from all causes during the two decades between 60 and 80 (the age range at which the bulk of these operations were performed) is .5% per month. Therefore "indulging in fancy and estimating an average hospitalization of 1 month, one would attain a more nearly accurate index of the actual prostatectomy risk by deducting .5% from his over-all mortality rate." In regards to blood replacement, these investigators report that immediate postoperative hemorrhage is no longer a problem, and only twice during the past 9 years has transurethral aspiration of clots and fulguration of bleeding been necessary. "Postoperative transfusion has been conspicuously rare, and in no instance has transfusion been necessary during the operation." There has not been a case of massive secondary hemorrhage in the past 6 years in this series. "In our own experience, the frequency of delayed hemorrhage has been such that we consider it important to keep transurethral patients

hospitalized, or at least under observation for 14 postoperative days. Thus it has tended to be that it is now the perineal patient claiming the advantage of shorter hospitalization or at least a shorter period of postoperative observation."

Concerning incontinence, the authors of this series maintain that weakness or atrophy of disuse of the external sphincter fibers, rather than mechanical injury of muscle fibers or nerve supply, is the major etiological factor. Therefore, "with external sphincter and nerve supply intact following faultless technique by any route, the problem then is merely that of measures directed toward rejuvination of the muscle fibers by exercise." They also report that the problem of perineal urinary fistula has become insignificant with the advent of antibiotics and the adoption of routine plastic closure, and that secondary closure has not been necessary during the past eight years.

Acute suppurative epididymitis was a problem during the first 378 operations in this series, in which 42 cases were reported. These authors report that this complication may be eliminated by routine vasectomy if it is performed when catheter drainage is initiated. It is reported that postoperative urethral stricture in this series of perineal prostatectomies has been extremely rare. This being recognized as a distinct advantage over transurethral resection.

The problem of postoperative vascular "accidents," including cerebral, coronary, and pulmonary, is one that continues to plague the authors of this series. These "uncontrollable, and in large percentage, unrelated vascular 'accidents' are responsible for approximately half of the deaths."

In a report by O'Connor and associates[10], in a group of 142 patients in which low suprapubic prostatectomy technique was used, they reported that the major advantage of the low approach was that it offered better visualization of the prostatic fossa and hence more adequate control of bleeding. The operative technique used in this series included a transverse incision just above the junction of the bladder neck and prostate.

A mortality rate of 2.1% was reported in this series. A comparison of the results obtained in this group of patients is made with those in a group of patients subjected to the old standard suprapubic prostatectomy. Both groups were cared for by the same personnel and both were after the advent of antibiotic therapy. On the next page in Table 9 is a comparison of postoperative complications in the two groups.

The authors believe that the greatest advantage of the low suprapubic approach is that it offers more adequate visualization and therefore more complete hemostasis than can be affected by the "blind approach."

Although the table on the next page lists only 3 cases under "hemorrhage requiring transfusion only," actually 51 of the 142 patients in this series did receive blood.

Kelly and associates[9] report on a group of 337 patients at Veterans Administration Hospital in Deerborn, Michigan, who underwent suprapubic prostatectomies. Indications for operations were symptoms of vesicle outlet obstruction with clinical and x-ray evidence of benign prostatic hypertrophy. Acute urinary retention was the chief complaint in 62 patients and gross hematuria was present in 31 patients.

Table 9

Postoperative Complications	Standard Supra-pubic Prostatectomy 1942-1950 142 Patients	Low Supra-pubic Prostatectomy 1953-1961 142 Patients
Hemorrhage, severe	5 (2 fatal)	1
Hemorrhage requiring transfusion only	0	3
Contracture of vesicle neck requiring added treatment	11	5
Pyelonephritis	4 (2 fatal)	1
Pulmonary embolism	5 (4 fatal)	0
Pelvic thrombophlebitis	0	1
Cardiac failure	3 (3 fatal)	0
Coronary occlusion	2 (1 fatal)	1 (fatal)
Pneumonia	4	1 (fatal)
Persistent suprapubic fistula, over 3 mos	3	0
Epididymitis	3	7
Wound infection	0	1
Acute renal failure	0	1
Cerebrovascular accident	0	1
Staphylococcal enterocolitis	0	1 (fatal)
Foreign body requiring cystoscopic removal	0	1
Urethal stricture	1	0
Mortality rate	8.5%	2.1%

Except for 11 cases in which transurethral resections were performed, this series consists of 337 consecutive cases of suprapubic prostatectomies for benign prostatic hyperplasia, regardless of the size of the gland and the age of the patient. This is in contrast to the previous study during which time approximately 700 transurethral resections were performed while compiling a group of 142 low suprapubic prostatectomies. The mortality rate in this latter group was 8.3%. On the next page, in Table 10, is a list of postoperative complications and mortality.

Transfusions were used in 60% of the cases with an average of 2 units of blood per case. A complication of major hemorrhage was reported when 5 or more units of blood were given. It is of interest to note that with major hemorrhage the mortality rate was 20%.

Table 10

Complications and Mortality

Complication	No. Cases	No. Died
Major Hemorrhage	43	9
Septicemia	14	6
Cerebral Vascular Accident	8	5
Pneumonia	10	7
Myocardial Infarction	6	5
Uremia	5	4
Pyelonephritis	9	7
Congestive Heart Failure	3	2
Thrombophlebitis and Pulmonary Infarction	1	0
Urinary Extravasation and Peritonitis	1	1
Staphylococcal Enteritis	1	0
Epididymitis	12	0
Fistula (Vesicocutaneous)	9	0
Wound Infection	6	0
Urethral Stricture	8	0
Cellulitis of Scrotum	1	0
Radial Nerve Palsy	1	0
Incisional Hernia	1	0

Conclusion

The records of 192 patients who underwent various types of prostatectomy for benign prostatic hyperplasia over a 23-month period at the Omaha Veterans Administration Hospital were reviewed. A relatively small ratio of open procedures (33 of a total of 192) were

performed. The author realizes that this may somewhat diminish their statistical significance. A comparison of the various procedures was made, including presenting symptoms, adenoma size, age distribution, amount of residual urine, blood replacement, and postoperative complications. A review of the recent literature involving these various types of procedures was then presented. The mortality rate of 1.6% and the overall morbidity rates compare favorably with the other studies presented.

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