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### Symptom Status and Quality of Life Following Prostatectomy

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# Symptom Status and Quality of Life Following Prostatectomy

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When prostatectomy is proposed as treatment for the symptoms of prostatism, the decision to operate should depend on how patients evaluate their symptoms and on objective information about the outcomes. We undertook a health interview study to determine the probabilities for symptom relief, improvement in the quality of life, and complications following surgery and to evaluate patient concern about the symptoms of prostatism. The operation was effective in reducing symptoms: 93% of severely and 79% of moderately symptomatic patients experienced improvement; however, a statistically significant improvement in indices of quality of life occurred only among patients with acute retention or severe symptoms prior to surgery. Short-term complications of varying severity occurred in 24% of patients; in addition, 4% reported persistent incontinence and 5%, impotence. Patients with similar symptoms reported considerable difference in the degree to which they were bothered by their symptoms. The result emphasizes the importance of patient participation in the decision to undergo prostatectomy.

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PROSTATIC resection for benign prostatic hypertrophy (BPH) is one of the most common surgical procedures performed in the United States.<sup>1</sup> Rates of prostatectomy vary among small geographic areas in the United States and in other Western countries, more than would be expected due to variations in BPH incidence or access to care,<sup>1,4</sup> and the variations have been interpreted as evidence for professional uncertainty concerning the appropriate method for treating BPH.<sup>4,5</sup> The lack of clinical tri-

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als and prospective cohort studies and failure to document the expected reduction in symptoms and improvement in quality of life following prostatectomy account for much of the professional uncertainty.

The Maine Medical Assessment Program has been organized to investigate the clinical significance of variations in treatment rates among geographic areas in Maine.<sup>6</sup> Under the aegis of the Maine Medical Assessment Program, we have assessed the outcomes associated with medical or surgical approaches to BPH.<sup>7</sup> The initial step was to review the literature to evaluate the strengths and weaknesses of the published scientific database with the specific objective of identifying gaps in the information about the outcomes. We then undertook our own studies to help improve the information about out-

comes following prostatectomy. Using health insurance claims data, we followed the postoperative course of a large cohort of patients undergoing prostatectomy to document the probabilities for outcomes that are well defined in the claims data, such as death or reoperation.<sup>8</sup>

However, the claims data were not useful for estimating the probabilities for several relevant outcomes or for assessing the importance of patient attitudes toward their symptoms as a determinant of the need for operation. Using patient interview studies before

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See also pp 3010 and 3027.

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and after surgery, we ascertained the symptom status of patients before their operations, estimated the probabilities for improvement or deterioration in symptoms and quality of life up to one year following prostatectomy, and investigated patient attitudes toward their symptoms prior to surgery. We then used the information from our studies and the literature review to construct a decision analysis to test the theory that early operation results in improvement of life expectancy and to identify the clinical factors critical to rational decision making when prostatectomy is undertaken to improve the quality of life.

This article reports the results of the patient survey; a second gives the results of the decision analysis.<sup>9</sup> In a third, we summarize the results of the prostatectomy assessment project and discuss our approach for reducing uncertainty about appropriate care.<sup>10</sup>

## METHODS

### Patient Sample

Beginning in July 1983, twenty-three of the 33 practicing urologists in the state of Maine agreed to ask each patient for whom prostate surgery for symptoms of BPH was planned if he would be willing to participate in a prospective patient interview study of outcomes. The study consisted of a personal interview at the time of surgery and at three months after surgery, followed by a telephone interview at six and 12 months after surgery. Self-administered questionnaires (returned by mail at six and 12 months) were used to obtain ratings for symptoms, complications, and quality of life at each of these points. Physicians also completed a form giving the reasons for the operation and reporting laboratory and roentgenographic findings before and after surgery.

Of the 471 patients asked to participate, 434 patients completed the initial interview. Of those, 55 were eliminated from the analyses presented herein because their urologists reported elevated creatinine ( $>180 \mu\text{mol/L}$  [ $>2.0 \text{ mg/dL}$ ]) or serum urea nitrogen ( $>12.5 \text{ mmol/L}$  of urea [ $>35 \text{ mg/dL}$ ]) readings or the presence of hydronephrosis. An additional 61 patients had a postsurgical pathology report indicating malignancy of the prostate and are excluded from the analyses as well. Of the remaining 318 patients completing the initial interview, 263 (83%) completed all three postoperative interviews. Of the 47 who failed to complete all interviews, 24 (7%) died and eight (3%) were too ill to respond to questions about symptoms. Twenty-three (7%) were unavailable for follow-up on one or more postoperative interviews.

To provide the best profile of who is receiving the procedure, analyses of the presurgical patients are based on all 318 patients who completed the initial interview. Data on complications and changes in symptoms and quality of life after surgery are based on the 263 patients who completed all interviews. That group did not differ significantly from the initial total sample in reported presurgical symptom severity or whether they had acute retention. However, those older than 80 years of age and those whose health was rated "fair" or "poor" prior to surgery were less likely to provide data for all four waves, since they were most likely to die or to be too ill to respond. Hence, the quality-of-life outcome analyses describe the results for those who were healthy enough a year after surgery to fill out a questionnaire.

Table 1.—Reported Presurgical Symptoms of Benign Prostatic Hypertrophy for Prostate Surgery Patients\*

Presurgical Symptoms	Frequency of Symptoms in Past Month				Total, %
	Not at All	A Few Times	Fairly Often	Usually/ Always	
Have to urinate again shortly after urination	13	31	35	16/5	100
Stop and start when urinating	22	33	26	13/6	100
Dribble after urination	25	37	22	11/5	100
Strain to urinate	33	29	22	11/5	100
Burning when urinating	40	34	19	4/3	100

\*N = 318; numbers for any particular distribution may vary slightly due to item nonresponse.

Table 2.—Reported Effects of Prostate Condition on Quality of Life by Presurgical Symptom Profile\*

Presurgical Responses	Presurgical Symptom Profile				P
	Acute Retention, % (n = 87)	Mild Symptoms, % (n = 36)	Moderate Symptoms, % (n = 104)	Severe Symptoms, % (n = 86)	
Limited day-to-day by prostate					
A lot	20	14	11	21	...
Some	8	11	15	28	<.01
Little	24	8	23	19	...
None	47	67	51	32	...
Discomfort from prostate					
A lot	40	11	2	34	...
Some	19	17	31	48	<.001
Little	21	28	29	14	...
None	19	44	19	4	...
Worry about health due to prostate					
A lot	21	17	16	19	...
Some	9	11	21	38	<.001
Little	28	28	22	24	...
None	42	44	41	19	...
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>...</b>

\*Five respondents did not provide codable answers.

As with all surveys, there are missing data for individual questions; this particularly affects multi-item scales. In our analysis, percentage distributions are based only on those for whom data were complete, which effectively assigns individuals with missing data a mean score for their group. Item nonresponse is the reason numbers in some tables vary slightly from the total number of patients followed up.

### Questionnaire Design

The presurgical interview included questions about past history of prostate symptoms and other health problems that might affect patient outcomes as well as questions about how much patients were bothered by their symptoms. The postsurgical interview covered current symptom status, complications of surgery, and the process of recuperation.

The specific questions concerning the symptoms and complications of prostatism were developed and pretested in consultation with participating urologists. For symptom severity, patients were asked to rate the frequency with

which they experienced (1) having to urinate again shortly after urination, (2) starting and stopping during urination, (3) having to push or strain to begin urination, (4) dribbling after urination, and (5) burning after urination. Ratings on each five-point scale were summed, producing a Symptom Index that ranged from 5 to 25. The equal weighting of symptoms is supported by the fact that correlations of individual items with the total score are similar, ranging from .60 to .81. The high degree of internal-consistency reliability of the index was reflected in a value of Cronbach's  $\alpha$  of .78.<sup>11</sup> Values in excess of .50 are considered acceptable for group comparisons.<sup>12</sup> The relationship between the Symptom Index and responses to questions about the degree of discomfort and disability due to the prostatic condition, as well as postsurgical ratings of the success of the surgery, provided a basis for using the index as a three-category variable: 5 to 8 (mild symptoms), 9 to 12 (moderate symptoms), and 13 or higher (severe symptoms). It is appropriate to note that the labels are somewhat arbitrary and describe the comparative severity of symptoms in this population

Table 3.—Reported Symptoms of Benign Prostatic Hypertrophy Before and 12 Months After Prostate Surgery for Prostate Surgery Patients\*

Symptom	Frequency of Symptoms in Past Month					P
	Not at All	A Few Times	Fairly Often	Usually	Always	
Have to urinate again						
Before surgery	11	31	35	17	6	
12 mo after surgery	50	37	8	4	1	<.001
Stop and start						
Before surgery	21	34	26	12	7	
12 mo after surgery	68	26	3	3	...	<.001
Dribble after urination						
Before surgery	23	37	23	11	6	
12 mo after surgery	47	42	6	3	2	<.001
Strain to urinate						
Before surgery	33	29	24	10	4	
12 mo after surgery	81	15	3	1	...	<.001
Burning when urinating						
Before surgery	40	35	17	4	4	
12 mo after surgery	83	12	2	2	1	<.001

\*N = 254; includes only patients who responded to all questions.

Table 4.—Symptom Index 12 Months After Surgery by Presurgical Symptom Profile\*

Symptoms Index 12 mo After Surgery	Presurgical Symptom Profile				All Patients, % (N = 259)†
	Acute Retention, % (N = 70)	Mild Symptoms, % (N = 30)	Moderate Symptoms, % (N = 86)	Severe Symptoms, % (N = 73)	
Mild	83	80	79	72	78
Moderate	11	17	15	21	16
Severe	6	3	6	7	6
Total	100	100	100	100	100

\* $\chi^2 = 2.88$ ;  $df = 6$ ;  $P = .82$ .

†Four patients did not provide codable answers.

rather than reflect patient or physician assessment of their disutility.

We used three other sets of questions to obtain measures of patients' quality of life. An *Activity Index* was created by a summation of the frequency with which patients said they were able to do work around the house, go where they wanted to go outside of the house, and do things they wanted to do for fun and recreation. A *Mental Health Index* consisting of five items rating the way the patient felt (happy, relaxed, depressed) during the previous month was adopted from Ware and Davies<sup>13</sup> and Veit and Ware.<sup>14</sup> A *General Health Index*, adopted from Brook et al,<sup>15</sup> is a three-item index based on ratings of the frequency of being worried or bothered by illness. These indices are available for all four measurement points. They are used as continuous variables. (The Cronbach  $\alpha$  values for the latter three scales were .87, .80, and .60, respectively.) A copy of the questionnaires used in this study can be obtained from the first author (F.J.F.).

## RESULTS

### Patient Profile

Seventy-one percent of patients were 65 years of age or older; 11% were 80 or

older. Twenty-eight percent had had one or more episodes of acute retention that required catheterization, 22% within a month of surgery; 16% reported they had had a heart attack, and 20% rated their health as only "fair" or "poor." Patients with a history of acute retention were not significantly different in age, history of heart attack, or reported health status.

### Preoperative Symptom Status

Table 1 presents the frequency with which patients experienced prostate-related symptoms in the month prior to surgery. The majority of patients reported some experience with each symptom. Having to urinate again after urination (frequency), which affected 87%, was the most common complaint; burning on urination, the least common, was reported by 60%. The five symptoms listed in Table 1 were combined into the three-category Symptom Index described in the "Methods" section. Among those without a history of retention, 16% were classified as mildly symptomatic, while 46% were moderately and 38% severely symptomatic. Among those with retention, 30% were mildly symptomatic, with 33% and 37%

moderately and severely symptomatic, respectively.

### Patient Responses to Their Symptoms

As might be expected, the greater the severity of the symptoms, the more they affected patients' lives. Table 2 shows clear, significant relationships between the profile of presurgical symptoms and the answers to questions about how limited, uncomfortable, and worried patients were due to their prostate condition. However, we noted considerable interpersonal differences in response. Some patients with severe symptoms reported little or no limitation in daily activity, discomfort from their prostate, or worry about their health because of their prostate condition, while some with mild symptoms were bothered "a lot." Patients with a history of acute retention also demonstrated considerable differences in their responses to their condition. It is implicit in Table 2 that the severity of symptoms alone is not a valid index for the extent to which or way in which those symptoms may affect the life of an individual patient.

### Symptom Status One Year After Surgery

Prostatectomy proved effective in reducing symptoms for most patients. Table 3 compares the distribution of symptoms before and 12 months after surgery, and Table 4 shows the value of the Symptom Index before and after surgery. Seventy-eight percent of those we followed up reported only mild symptoms a year after surgery. However, for a minority, symptoms remained the same or worsened. For example, at the end of one year, 79% of patients who reported moderate symptoms before surgery reported fewer symptoms, but 15% remained the same and 6% reported symptoms that were worse; for those who were severely symptomatic, 93% reported improved symptoms, but 7% remained severely symptomatic. Twenty percent of those who were mildly symptomatic before the operation reported moderate or severe symptoms at the end of the year. The distribution of symptoms reported one year after surgery was virtually identical for patients with and without acute retention before surgery.

### Improvements in the Quality of Life

Table 5 shows the baseline values and changes in the Activity and Physical and Mental Health indices. The overall improvement was statistically significant for each index, but improvements were

Table 5.—Indices of Quality of Life by Presurgical Symptom Profile

Presurgical Profile Symptoms	Activity Index				N*
	Before Surgery	After Surgery, mo			
		3	6	12	
Acute retention	11.4	12.5†	12.4†	12.8†	71
Mild symptoms	12.5	12.3	11.2	11.9	30
Moderate symptoms	12.3	12.2	12.9	12.8	89
Severe symptoms	10.7	12.1†	12.4†	11.9†	73
Total	11.6	12.3†	12.6†	12.4†	263

  

Presurgical Profile Symptoms	General Health Index				N*
	Before Surgery	After Surgery, mo			
		3	6	12	
Acute retention	14.0	15.7‡	15.7‡	15.3†	71
Mild symptoms	14.3	14.5	14.4	13.5	30
Moderate symptoms	14.3	15.0	14.9	14.7	89
Severe symptoms	13.1	14.5†	13.9	13.9	73
Total	13.9	15.0‡	14.7‡	14.5†	263

  

Presurgical Profile Symptoms	Mental Health Index				N*
	Before Surgery	After Surgery, mo			
		3	6	12	
Acute retention	23.6	25.4†	25.2†	25.4†	71
Mild symptoms	24.8	24.4	24.7	23.6	30
Moderate symptoms	24.5	25.3	25.1	25.0	89
Severe symptoms	22.8	24.0	24.3†	24.0	73
Total	23.8	24.9†	24.8†	24.6†	263

\*Numbers vary somewhat across periods and indices due to nonresponse to individual items that went into indices. Table includes data only from the 263 respondents who completed questionnaires on all four waves of data collection.

†Significantly different from presurgical values,  $P < .05$ .  
‡Significantly different from presurgical values,  $P < .01$ .

Table 6.—Having Erections\* and Major or Minor Incontinence† Problems Before and After Prostate Surgery

Presurgical Report‡	Reported Problems After Surgery			Total	N
	No Erections Reported at 3, 6, and 12 mo	Erections Reported at 3, 6, or 12 mo (But Not All)	Erections Reported at 3, 6, and 12 mo		
Erections	5	21	74	100	163
	Incontinence Problem Reported at 3, 6, and 12 mo	Incontinence Problem Reported at 3, 6, or 12 mo (But Not All)	No Incontinence Problem Reported at 3, 6, and 12 mo		
Dripping: No problem	4	16	80	100	164

\*The question was whether the respondent reported having erections at all when he was sexually stimulated during the preceding month.

†Most of these reports did not involve total incontinence. A person was counted as having a problem if he said dripping or wetting pants was a "small," "medium," or "big" problem.

‡There were 15 and 11 respondents, respectively, who failed to give a codable answer to the relevant questions on one or more of the four data collections.

highly contingent on the presurgical profile of the patients. Those who had had acute retention showed statistically significant postsurgical improvement on all measures of all the indices. For those operated on for severe symptoms, there are consistent positive effects on all indices, although some do not reach statistical significance. However, for those operated on for moderate symptoms, there are no statistically significant effects of the surgery on any of the quality-of-life indices. For those mildly symptomatic, there is no trend toward

improvement in quality of life. The reason appears to be that since their symptoms, on average, had so little effect on their daily lives as measured by these indices, there was little potential for postoperative improvement.

### Complications

Prostatectomy produces a number of short-term negative effects on patients. Within three months after surgery, 15% of patients reported that they had one or more episodes of acute retention due to blood clots; for 9%, catheterization was

needed to relieve the problem. Twenty percent of patients reported a postsurgical infection, and for 7% of patients the infection lasted two or more weeks. Altogether, about 24% reported a non-routine visit to a physician for a prostate problem (within three months after surgery) and 8% a readmission to the hospital for a prostate-related problem during that period.

There was evidence of continuing problems on a smaller scale after the third month. Eleven percent of patients reported nonroutine visits to their physicians, and 3% were hospitalized for problems related to their prostate condition in the fourth through the 12th postoperative months.

Incontinence and impotence are two complications of prostate surgery that may be of longer-term significance to a patient. About 5% of patients who reported having erections before surgery reported at all three postsurgical interviews that they were unable to have an erection. About 4% who reported no problem with dripping or wet pants prior to surgery reported it as a problem at all three postoperative data-collection points. A substantially greater number of patients reported these problems at one time or another but not at all times after surgery (Table 6).

### COMMENT

For most patients, prostatectomy works well in reducing the symptoms of prostatism in the year following surgery. The improvement reported by patients is far in excess of that observed among patients who receive no treatment<sup>16-18</sup> or a placebo.<sup>19-22</sup> The operation is particularly effective for the most severely symptomatic: after one year, 93% of patients who survived and could be followed up report a reduction in symptoms. There was also an improvement in the quality of life associated with the operation, but only for those who had had acute retention or who were most symptomatic. For these patients, there were statistically significant gains in all three measures of the quality of life—the General Health, Mental Health, and Activity indices.

Symptoms were not improved for all patients, however. Seven percent of those with severe and 5% of those with moderate symptoms before surgery reported severe levels of symptoms at the end of the first postoperative year. Those who were only mildly symptomatic prior to surgery could not experience much symptomatic improvement as a result of the surgery, but 20% ended the first year with moderate or severe symptoms. Moreover, those whose presurgical symptoms were rated mild

or moderate exhibited little or no improvement in the measures of quality of life.

There were negative effects of surgery. Acute morbidity was high in the first three months after surgery, when 8% reported a readmission to the hospital for prostate-related problems. Prostate-related problems persisted for some throughout the remainder of the year, with 3% reporting rehospitalization and 12% reporting unscheduled visits to their physicians for continuing problems. Long-term incontinence was a persistent problem for about 4% of patients who had not had any such previous problem, and 5% of men who reported themselves sexually active prior to the operation were unable to have an erection during the year after surgery.

Patients differ in their attitudes toward their prostate condition, as evidenced by the degree to which they were worried about their health, felt limited in their day-to-day activity, or felt discomfort because of their prostate condition. While we found a general relationship between severity of symptoms and the degree to which patients were bothered by them, a substantial number of severely symptomatic patients were not very concerned about their condition. A clear majority of patients who were mildly or moderately symptomatic at the time of their operation reported little or no discomfort from their prostate condition. It is reasonable to infer that patients who are not bothered very much by their symptoms would feel less strongly about the need for the operation to reduce symptoms and improve the quality of life than would those who are bothered more.

It is important to understand the strengths and limitations of this study. The patients are those who are now receiving the procedure from a group of physicians interested in assessing outcomes. They are not selected to represent a defined patient subgroup as is customary in a clinical trial. We wanted to know who is getting the operation and how patients assess their symptoms and to learn from their experience how

well the operation works across the broad range of patient subgroups now undergoing the operation. There is no "control" or unoperated comparison group because it was not our purpose to evaluate the relative value of prostatectomy and watchful waiting for improving symptoms. The literature already shows a clear "average" advantage for prostatectomy, but the magnitude of the effect of the operation on symptoms and quality of life according to preoperative patient symptom status and the failure rate in terms of symptoms not improved or complications incurred had not been well documented.

Our study employed a wide range of measures of patient symptoms and quality of life. The data we have generated should be useful for advising patients in various situations how their lives are likely to be affected by the operation. When the operation is proposed to improve the quality of life, the decision to operate should primarily depend not on medical evaluation and opinion but on the values of the specific patient. In our view, the decision about whether prostate surgery will benefit a particular patient will depend on how significant the symptoms of BPH are to the patient, the probabilities of various positive and negative outcomes, and the significance of those outcomes to that patient. Data on probabilities of benefits and adverse outcomes derived from direct interviews with patients are critically needed to help rationalize the surgical decision process.

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#### References

1. Barnes BA, O'Brien E, Comstock C, et al: Report on variation in rates of utilization of surgical services in the Commonwealth of Massachusetts. *JAMA* 1985;254:371-379.
2. Wennberg JE, Gittelsohn A: Health care delivery in Maine: I. Patterns of use of common surgical procedures. *J Maine Med Assoc* 1975;66:123-130, 149.
3. McPherson K, Wennberg JE, Hovind OB, et al: Small-area variation in the use of common surgical

procedures: An international comparison of New England, England, and Norway. *N Engl J Med* 1982;307:1310-1314.

4. Wennberg J, Gittelsohn A: Variations in medical care among small areas. *Sci Am* 1982;246:120-134.
5. Wennberg JE, Bunker JP, Barnes B: The need for assessing the outcome of common medical practices. *Annu Rev Public Health* 1980;1:277-295.
6. *Confronting Regional Variations: The Maine Approach*. Chicago, Dept of Health Care Review, Division of Health Policy and Program Evaluation, American Medical Association, 1986.
7. McAfee RE: The hospital 'surgical signature': A quality-assessment tool. *JAMA* 1987;257:972.
8. Wennberg JE, Roos N, Sola L, et al: Use of claims data systems to evaluate health care outcomes: Mortality and reoperation following prostatectomy. *JAMA* 1987;257:933-936.
9. Barry MJ, Mulley AG, Fowler FJ, et al: Watchful waiting vs immediate transurethral resection for symptomatic prostatism: The importance of patients' preferences. *JAMA* 1988;259:3010-3017.
10. Wennberg JE, Mulley AG, Hanley D, et al: An evaluation of prostatectomy for benign urinary tract obstruction: Geographic variations and the assessment of medical care outcomes. *JAMA* 1983;259:3027-3030.
11. Cronbach LJ: Coefficient alpha and the internal structure of tests. *Psychometrika* 1951;16:297.
12. Helmstadter GD: *Principles of Psychological Measurement*. New York, Appleton-Century-Crofts, 1964.
13. Ware J, Davies A: *Scoring the Short-Form Mental Health Inventory (MHI-5)*. Santa Monica, Calif, The Rand Corporation, 1983.
14. Veit CT, Ware JE: The structure of psychological distress and well-being in general populations. *J Consult Clin Psychol* 1983;51:730.
15. Brook RH, Ware JE, Davies-Avery A, et al: *Conceptualization and Measurement of Health for Adults in the Health Insurance Study: Vol 3, Overview*. Santa Monica, Calif, The Rand Corporation, 1979.
16. Birkoff JD, Weiderhorn AR, Hamilton MC, et al: Natural history of benign prostatic hypertrophy and acute urinary retention. *Urology* 1976;7:48-52.
17. Ball AJ, Feneley RC, Abrams PH: The natural history of untreated 'prostatism.' *Br J Urol* 1981;53:613-616.
18. Craigen AA, Hickling JB, Saunders CRG, et al: Natural history of prostatic obstruction. *J R Coll Gen Pract* 1969;18:226-232.
19. Resnick M, Jackson JE, Watts LE, et al: Assessment of the antihypercholesterolemic drug, probucol, in benign prostatic hyperplasia. *J Urol* 1983;129:206-209.
20. Hedlund H, Anderson KE, Ek A: Effects of prazosin in patients with benign prostatic obstruction. *J Urol* 1983;130:275-278.
21. Castro JE, Griffiths JH, Edwards DE: A double-blind, controlled clinical trial of spironolactone for benign prostatic hypertrophy. *Br J Surg* 1971;58:485-489.
22. Geller J, Nelson CG, Albert JD, et al: Effect of megestrol on uroflow rates in patients with benign prostatic hypertrophy. *Urology* 1979;14:467-474.