

COLLECTIVE INVESTIGATION

Natural history of prostatic obstruction

A prospective survey

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THE aims of the investigation were set out in a letter by the secretary of the research committee of the Royal College of General Practitioners, East Anglia Faculty on 6 February 1961. These were to find out the answers to the following questions:

1. Which symptoms are indicative of prostatic obstruction and how long can surgery be reasonably delayed after the development of symptoms?
2. Whether an early operation would be most beneficial in the case of patients with chronic illnesses confining them to bed for long periods?
3. What proportion of patients develop acute retention without previous warning?
4. Whether prostatic obstruction is related to any particular occupation?
5. Whether any particular symptomatology is related to malignancy?

Material and method

General practitioners in East Anglia who had participated in an earlier survey into acute retention were invited to participate in the present investigation. They were asked to register, on specially-designed forms, all men over the age of 55 years who presented themselves after 1 April 1961, with any symptoms related to their bladder function.* In October 1961 and May 1962 follow-up information was requested on the patients already registered. This was obtained in the form of clinical notes. In May 1963 a third request was made for follow-up information, but this time on specially-prepared forms.

The position was reviewed in April 1967, when it was found that only 61 per cent of patients had been followed up at least once, which was insufficient for statistical analysis. It was therefore decided to ask doctors with patients who were not known to have died or to have had a prostatectomy to complete a final follow-up in order to standardize the information on all patients and to obtain a picture of their long-term prognosis. A group of patients with prostatic symptoms who did not have prostatectomy has not been reported upon before. This final follow-up involved 39 doctors and 122 patients. All the doctors replied and supplied what information they could on their patients. Final follow-ups were not informative on seven patients. Such follow-up information as had been collected in the first two years of the survey was used in these seven cases to give as long a follow-up history as possible.

Material

A total of 251 patients were initially registered by 59 doctors. Of these 251 patients, 39 had carcinoma of the prostate and were analysed separately. Of the remaining 212,

*Several doctors registered patients who had been seen prior to 1 April 1961, and also patients who were younger than 55 years. All these have been included in the analysis.

89 presented to their doctor with acute retention, and 123 with other urinary symptoms but no acute retention. However, eight patients subsequently developed acute retention. The initial age distribution of these various groups of patients is shown in table I.

TABLE I
AGE DISTRIBUTION AT REGISTRATION OF MALIGNANT AND NON-MALIGNANT PATIENTS WITH AND WITHOUT ACUTE RETENTION

Age in years	Non malignant				Malignant	Total
	Presented with acute retention	No acute retention	Subsequent acute retention	Total non-malignant		
	Per-No. centage	Per-No. centage	Per-No. centage	Per-No. centage		
< 55	4 4.5	10 8.7	— —	14 6.6	— —	14 5.6
55-59	4 4.5	17 14.8	— —	21 9.9	— —	21 8.4
60-64	10 11.2	12 10.4	3 37.5	25 11.8	3 7.7	28 11.2
65-69	14 15.7	22 19.1	— —	36 17.0	2 5.1	38 15.1
70-74	16 18.0	22 19.1	2 25.0	40 18.9	8 20.5	48 19.1
75-79	20 22.5	16 13.9	2 25.0	38 17.9	12 30.8	50 19.9
80-84	12 13.5	10 8.7	1 12.5	23 10.8	12 30.8	35 13.9
85-89	3 3.4	4 3.5	— —	7 3.3	2 5.1	9 3.6
90 +	2 2.2	1 0.9	— —	3 1.4	— —	3 1.2
Unknown	4 4.5	1 0.9	— —	5 2.4	— —	5 2.0
Total	89 100	115 100	8 100	212 100	39 100	251 100
Mean age	72.38	68.57	71.25	70.24	76.86	71.29

The length of follow-up is measured from the first visit to his doctor of the patient with urinary symptoms until the last follow-up unless previously terminated by prostatectomy or death. In some cases patients are known to have died after prostatectomy

TABLE II
FOLLOW-UP HISTORY OF PATIENTS IN THE SURVEY

Follow-up history of patients in the survey		Length of follow up from first visit to doctor										Total over survey
		0-	1m-	3m-	6m-	1y-	2y-	3y-	4y-	5y-	6y+	
Number in survey at start of each period ..		248	187	163	153	126	97	79	63	46	20	248ab
Termination of follow up	Prostatectomy ..	55	20	9	18	13	2	5	2	1	2	127a
	Died (without prostatectomy) ..	4	4	1	9	12	11	7	5	3	—	56b
	Follow-up discontinued ..	2	—	—	—	4	5	4	10	22	18	65
Continued in survey to start of next period ..		187	163	153	126	97	79	63	46	20	—	—

a—does not include one patient who had prostatectomy—date unknown.
b—does not include two patients who died—dates unknown.

but the date of prostatectomy is considered as the point of termination of follow-up. Table II shows the history of follow-up of all the patients by duration of follow up.

Carcinoma of the prostate

The patients with prostatic malignancy were considered to see in what way they differed from the non-malignant patients (table III). The only one of these symptoms occurring statistically significantly more often in either group was haematuria. Twenty-

TABLE III
NUMBER OF PATIENTS AND PERCENTAGE PRESENTING WITH EACH URINARY SYMPTOM

Urinary symptoms	Non-malignant				Malignant	Total
	Presented with acute retention	No acute retention	Subsequently acute retention	Total		
	Percent- No. age	Percent- No. age	Percent- No. age	Percent- No. age		
Abnormal frequency ..	58 65.2	96 83.5	8 100.0	162 76.4	29 74.4	191 76.1
Dysuria	24 27.0	45 39.1	3 37.5	72 34.0	15 38.5	87 34.7
Slowness in starting ..	58 65.2	76 66.1	6 75.0	140 66.0	26 66.7	166 66.1
Subnormal stream ..	60 67.4	79 68.7	5 62.5	144 67.9	28 71.8	172 68.5
Haematuria	7 7.9	16 13.9	1 12.5	24 11.3	10 25.6	34 13.5
Day incontinence ..	8 9.0	21 18.3	2 25.0	31 14.6	3 7.7	34 13.5
Night incontinence ..	7 7.9	15 13.0	2 25.0	24 11.3	3 7.7	27 10.8
Renal pain	4 4.5	7 6.1	— —	11 5.2	4 10.3	15 6.0
Total patients ..	89	115	8	212	39	251

six per cent of malignant group presented with haematuria compared with 11 per cent of the non-malignant patients ($0.05 > P > 0.01$) so that 29 per cent of patients with haematuria were found to be malignant. The prostate was found to be stony hard on rectal examination in 49 per cent of the malignant patients and in two per cent of the non-malignant patients. This implies that only half the malignant prostates were detected clinically at the initial examination.

The proportion presenting with acute retention was similar in both malignant and non-malignant groups. The average age of the malignant group was 77 years compared with 70 years for the non-malignant, and the proportion of deaths was doubled. Both these differences are statistically significant.

Benign hypertrophy of the prostate

Mortality

We can only study the mortality of patients who were not operated on. So in this section all patients who had a prostatectomy are excluded. Also excluded are eight patients who did not present with acute retention but who subsequently developed it, and six patients whose age or date of death is unknown.

The patients not operated on are divided into those presenting with acute retention and those without acute retention. The number and the expected number of deaths in these two groups of patients in each year of the follow-up are shown in table IV. The expected number of deaths in each of these two groups of patients in each year of the follow-up was derived from the death rates in England and Wales in 1961-1966 for men of comparable age. The calculations take account of the age distribution of each of the two groups of patients, the actual number of patients who survived to the beginning

of each year, the length of each follow-up and the increase in the age of the patients as the survey progressed. The method used is described elsewhere (Carpenter, R. G. and Cochrane, A. L. 1956).

Table IV(i) shows that an excess of deaths occurred in both groups in the first year (i.e. in the first year of follow-up measured from the time of first visit of the patient with urinary symptoms to the doctor). This excess is statistically significant in both groups ($0.05 > P > 0.01$ for patients without acute retention, and $0.01 > P > 0.001$ for patients presenting with acute retention). After the first year the numbers of deaths

TABLE IV
OBSERVED AND EXPECTED DEATHS EACH YEAR AMONG PATIENTS WHO DID NOT HAVE A PROSTATECTOMY
(i) including bed-rest patients

Acute retention initially	Deaths	Number of years from first visit to doctor							Total for years 2-7	Total for years 1-7
		1	2	3	4	5	6	7		
No	Observed	10	3	3	3	0	2	0	11	21
	Expected	4.71	3.76	3.42	2.75	1.99	1.04	0.03	12.99	17.70
Yes	Observed	9	3	1	4	0	0	—	8	17
	Expected	3.06	1.84	1.49	1.57	0.89	0.32	—	6.11	9.17
(ii) excluding bed-rest patients										
Both groups	Observed	10	3	4	5	0	2	0	14	24
	Expected	5.77	4.62	4.31	3.73	2.56	1.20	0.03	16.45	22.22

that occurred in both groups are close to expectation. Further analysis showed that bed-rest patients (i.e. patients with chronic illnesses confining them to bed for long periods) had a high mortality. The two groups were therefore combined, the bed-rest patients removed, and the calculations repeated. Again there was an excess of deaths in the first year, see table IV(ii), but this was not statistically significant, $P = 0.14$. Again after the first year, the number of deaths observed was close to expectation.

Subsequent acute retention

Of the 123 non-malignant patients who initially presented without acute retention, eight (6.5 per cent) subsequently developed acute retention. However, many of these had a prostatectomy and some died soon after they went to their doctor, and so were not long at risk of developing acute retention. The statistical method of life-table analysis may be used to correct for the changes in the population at risk of developing acute retention. This analysis showed ten per cent of these patients might be expected to develop acute retention in seven years if they survived and were not operated on. Ninety per cent of those who survived and were not operated on would not be expected to develop acute retention.

State of surviving patients who did not have a prostatectomy

Of the patients who did not have a prostatectomy, 29 out of 60 (48 per cent) had no urinary symptoms at their final follow-up four to seven years later. The percentage was similar for those with and without acute retention when first seen.

Indications for prostatectomy

Figure 1 shows the cumulative percentage of patients to have a prostatectomy by

length of time from first visit to doctor, for patients presenting with acute retention and for those without acute retention. The percentages have been corrected for deaths and incomplete follow-ups by the life table method of analysis. It can be seen from figure 1 that many more of the acute retention group came to operation and that the operation was performed earlier than in the other group. For example, 57.5 per cent of them had prostatectomy within three months compared with 13.5 per cent of those who did not present with acute retention.

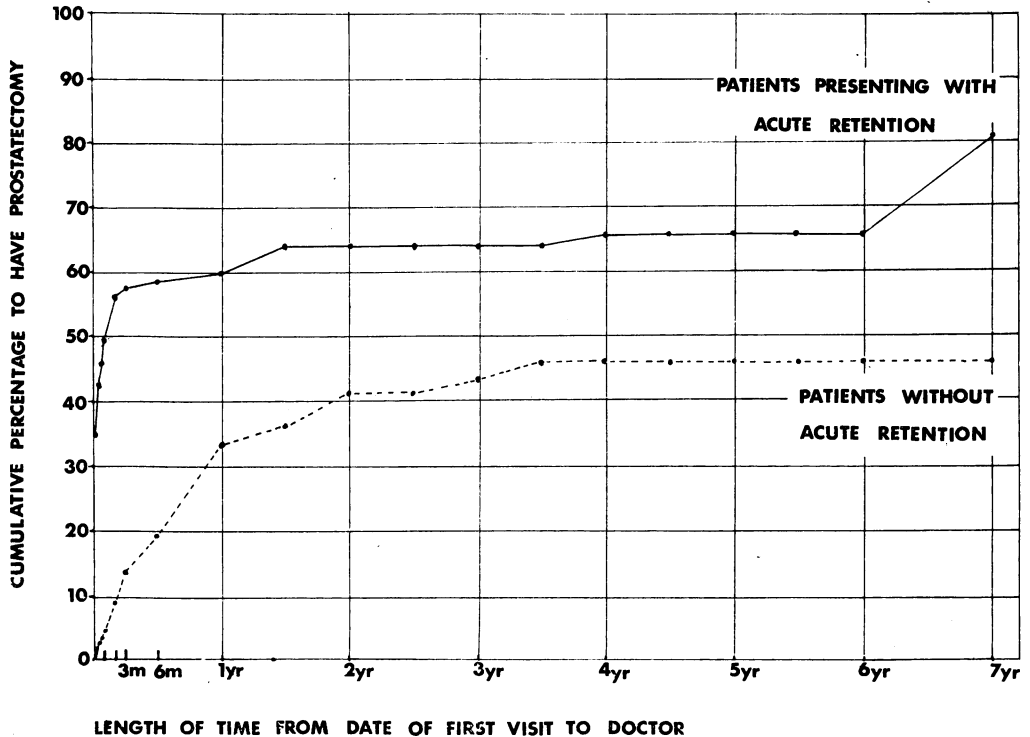


Figure 1

Cumulative percentage to have a prostatectomy by length of follow-up for patients presenting with acute retention and patients without acute retention

Of 115 patients who did not present with acute retention 48 were operated on and 67 were not. We have compared these two groups of patients to determine what presenting symptoms or other features were indicative of a prostatectomy. In this analysis we have not studied each symptom in isolation because they will tend to occur together and it seemed likely that combinations of symptoms rather than individual symptoms would be important. A multiple regression analysis (Dixon, W. J. 1965, Draper, N. R., and Smith, H. 1966) was therefore carried out to see which symptom or combination of symptoms indicated the need for a prostatectomy. This showed that the average age of the two groups is almost identical and that no symptom or combination of symptoms was statistically significant, nor was the total number of symptoms significant. The symptomatology was further investigated by coding the clinical impression of the overall severity of the patients' symptoms and the state of their general health on five-point scales. There was some suggestion that the operated groups had slightly more severe urinary symptoms and better general health, but these differences also are not statistically significant.

The findings of the rectal examination were investigated using a linear scale:

1 for 'small fibrous', 2 for 'normal', 3 for 'moderate hypertrophy' and 4 for 'gross hypertrophy'. The mean value for the operative group on this scale was 3.11 compared with 2.67 for the non-operative group, see table V. This difference is statistically significant, $0.001 > P$, but there is wide overlap in the two groups in the degree of hypertrophy and rectal examination in itself does not appear to provide the whole answer to the question of how a patient who does not suffer from acute retention is selected for prostatectomy. We have therefore examined some sociological factors. We found that

TABLE V
PATIENTS WITHOUT ACUTE RETENTION CLASSIFIED BY INITIAL RECTAL EXAMINATION AND WHETHER THEY SUBSEQUENTLY HAD A PROSTATECTOMY

Rectal examination	Prostatectomy				Total	
	Done		Not done			
	No.	Percentage	No.	Percentage	No.	Percentage
1 Small fibrous	2	4.4	3	4.7	5	4.6
2 Normal	1	2.2	19	29.7	20	18.3
3 Mod. hypertrophy	32	71.1	38	59.4	70	64.2
4 Gross hypertrophy	10	22.2	4	6.3	14	12.8
Total	45	99.9	64	100.1	109	99.9
Stony hard	2		1		3	
Unrecorded	1		2		3	
Total	48		67		115	
Mean size		3.11		2.67		2.85

the social class of the operative and non-operative groups was similar. The proportions in each of the Registrar General's classes I-V do not differ significantly from each other nor from the National average. Many of the patients had agricultural occupations but this is probably because the area covered by the survey is predominantly rural.

TABLE VI
NUMBER OF PROSTATECTOMIES BY DISTANCE OF DOCTORS SURGERY FROM HOSPITAL PATIENTS WITHOUT MALIGNANT DISEASE, ACUTE RETENTION OR ON PROLONGED BED REST

Distance miles	Prostatectomy				Total	
	Yes		No			
	No.	Percentage	No.	Percentage	No.	Percentage
< 10	36	51.4	34	48.6	70	100.0
10 +	10	29.4	24	70.6	34	100.0
Total ..	46		58		104	

Table VI shows the number and percentage of patients who had a prostatectomy by the distance their general practitioner, and hence the patient, lived from the nearest hospital. Table VI shows that 51.4 per cent of those whose doctors lived less than ten miles from hospital had a prostatectomy compared with 29.4 per cent of those more than ten miles from hospital. This difference is significant $0.05 > P > 0.01$.

Discussion

It will have been noted that of 212 non-malignant patients 89 (42.0 per cent) had

acute retention when they first came to their general practitioner with urinary symptoms. Sixty-seven per cent of these patients with acute retention had had symptoms of less than three months duration. In contrast, of those first presenting with urinary symptoms other than acute retention only ten per cent are estimated to be at risk of developing the condition. Thus acute retention, if it occurs, tends to occur at an early stage. Figure 1 shows that 65 per cent of patients who presented with acute retention were surgically treated within 18 months of the episode.

For patients who do not present with acute retention we cannot, from our data, offer any clear indication for surgery. Patients with severe symptoms, gross enlargement of the prostate or with obstruction of the urinary tract will require operation, but in our series this represents a small proportion of the patients. It is generally believed that patients with benign hypertrophy of the prostate ought to be offered operation early, partly to forestall the complication of acute retention and also because they will require prostatectomy in the end. It seems that patients of doctors with comparatively-close access to a hospital are more likely to be offered surgery for these reasons. This may be unnecessary since the danger of acute retention is only ten per cent, and 50 per cent of those patients not operated upon were symptomless after a long follow up. In addition, further analysis of our data did not suggest that to delay surgery increases the risk of mortality. Thus we conclude that it is reasonable to delay operation in patients with moderate symptomatology and moderate hypertrophy and to review at intervals.

Summary

1. With the help of 59 general practitioners a prospective follow-up survey of 251 patients presenting with symptoms of prostatic obstruction has been carried out.
2. The presenting symptoms of malignant and non-malignant patients are compared. Only half the malignant prostates were detected at the initial clinical examination.
3. Forty-one per cent of the patients presented with acute retention, but this condition seldom developed later.
4. Chronic sick excluded, the survival of non-malignant patients not surgically treated was close to the number predicted by the National death rates.
5. Initially there was little clinical difference between those treated surgically and the rest. Four to six years later 48 per cent of patients not operated on were symptom free.
6. It is concluded that it is reasonable to delay prostatectomy in patients with moderate symptoms and moderate hypertrophy and to review at intervals.

Acknowledgements

We are grateful to Professor A. Leslie Banks, professor of human ecology, University of Cambridge, for the unstinted use of his department, and for his help and advice. We are indebted to Mr J. F. R. Withycombe, consultant surgeon, Department of Urology, Addenbrooke Hospital, for his suggestions and continued advice and encouragement throughout the survey, to Mrs Ann Petrie for her statistical assistance in the first few years, and to Miss Helen Lloyd for drawing the diagram. Finally, but not least, we wish to thank all those doctors in East Anglia who recorded their cases and who responded to a man at the final follow up more than five years after their original reports. We are also grateful to Imperial College, London, for permission to use their I.B.M. 7090 computer for this analysis.

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