

Benign Prostatic Hyperplasia: Evaluation of Predictive Factors of the Outcome of the Catheter Ablation Test After Afluzosin Treatment in a Senegalese University Hospital

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Abstract: *Introduction:* The use of alpha-blockers facilitates catheter ablation testing (CAT) in patients with benign prostatic hyperplasia (BPH) complicated by complete retention of urine. The aim of our study was to determine the predictive factors for failure of CAT in these patients. *Patients and Method:* This was a single-centre prospective study conducted at the Urology Department of Aristide Le Dantec Hospital in Dakar from January 1st 2021 to December 31st 2021. The parameters studied were: age, digital rectal examination, PSA, CBEU, prostate biopsy, ultrasound and therapeutic results. We tried to determine the factors associated with failure of the urinary catheter removal test. *Results:* The mean age of the patients was 67.9 +/- 9.2 years (44-93 years). The mean prostate volume was 89.7 ml +/- 42.5. A median lobe was observed in 27.6% of patients. The success rate was higher in the first than in the second CAT (34.2% vs 6%). A higher failure rate was observed (68.9% vs 33.3%) in patients with a PSA > 4 ng/ml (p=0.01). Patients with a prostate volume > 80 ml had a significantly higher failure rate (77.5%) (p<0.01). The failure rate on CAT was higher (p=0.03) in patients who had a median lobe on suprapubic ultrasound (36.2% vs 13.8%). *Conclusions:* PSA level (threshold ≥ 4 ng/ml); prostate volume (>80 ml); presence of a median lobe were predictive factors of CAT failure. We found no interest in performing a second CAT.

Keywords: Prostate, BPH, Bladder Retention, Alfuzosin, Senegal

1. Introduction

Bladder retention is a frequent finding in benign prostatic hyperplasia (BPH). [1-3] Several factors may be responsible for these complications. These are mainly related to mechanical obstruction of the prostate tumour on the lower urinary tract due to either the static or the dynamic component

of BPH. In addition to these different phenomena, there is an inflammatory process within BPH that can increase the risk of bladder retention [4]. One of the major risks of this obstruction is the eventual development of chronic obstructive renal failure, which can be prevented by the use of bladder drainage while awaiting etiological treatment.

The occurrence of complete retention of urine (CRU) in

BPH has long been considered a formal indication for surgery. However, a better understanding of the pathophysiology of BPH has led to a more conservative approach, with test tube removal after the initiation of medical treatment with an alpha-blocker [4-6]. Alfuzosin is one of the most widely used families of alpha-blockers for the treatment of BPH, mainly in Europe in the early 1990s, and has since been shown to be effective in the management of this condition [6, 7]. They allow rapid and stable management of lower urinary tract symptoms associated with BPH for several months to years and increase the success rate of catheter weaning after complete bladder retention, allowing surgical treatment to be postponed for a variable period [8]. The onset of action of alpha-blockers generally varies between 48 hours and 3 weeks; however, to our knowledge, there is no consensus protocol for catheter weaning after complete bladder retention [6].

Our work was initiated as part of the evaluation of our daily practice. Its aim was to determine the factors that could predict the outcome of the catheter removal test in patients followed for benign prostatic hypertrophy complicated by complete bladder retention and placed on alfuzosin.

2. Patients and Method

This was a prospective study of a consecutive series of patients followed up for BPH complicated by complete urinary retention in the urology department of a Senegalese university hospital, during a period from January 1st, 2021 to December 31st, 2021. The parameters studied were: age, digital rectal examination, total prostate specific antigen (PSA), cytobacteriological exam of urine (CBEU), prostate biopsy, ultrasound of the urinary tract, and therapeutic results.

Selected patients had a first episode of complete bladder

retention.

Patients were excluded if they had a history of complete obstruction or a complication that could be an immediate indication for surgery for BPH (ureterohydronephrosis, bladder lithiasis or haematuria) or factors that could alter voiding (abnormal neuro-urological examination, use of drugs such as neuroleptics or anticholinergics). All patients received alfuzosin 10 mg (one tablet per day at bedtime) after bladder drainage via an indwelling tube. They were seen 7 days later for a first test of bladder catheter removal. A second tube removal test was performed 3 weeks later if the first attempt failed.

The catheter ablation test was considered:

A success: when the patient had voiding recovery with a clear stream and a non-significant post-void residue on ultrasound (≤ 100 ml).

Failure: if the patient had any another outcome (surgical treatment was suggested if necessary).

An association was sought between treatment outcomes and the following variables: age, total PSA and ultrasound data. Statistical analysis was performed using the following software: Excel 2010 and Epi Info 7.2. Bivariate analysis was performed using the appropriate tests comparing proportions (Chi2 and Fisher's test) and means (ANOVA) according to their conditions of applicability. The alpha risk of error was set at 5% and the confidence interval (CI) at 95%.

3. Results

Seventy-six patients were selected and 26 patients were not included in our work. The mean age of the patients was 67.9 \pm 9.2 years, with extremes of 44 and 93 years (figure 1).

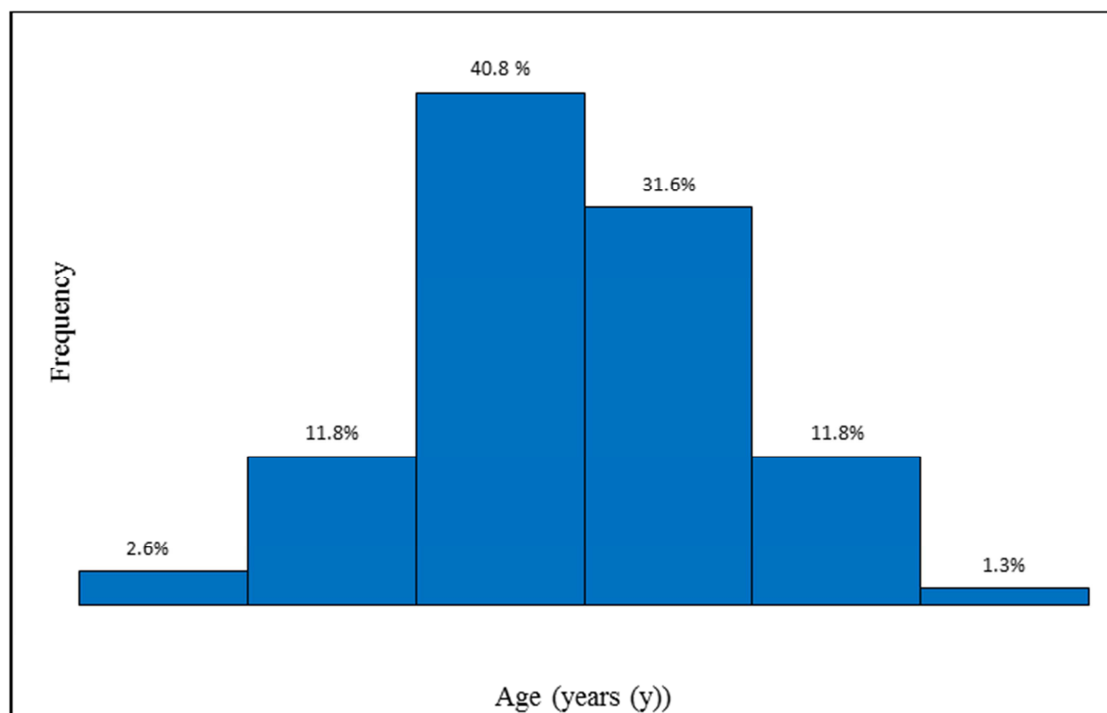


Figure 1. Distribution of patients according to age.

A typical benign prostatic hyperplasia appearance was noted on digital rectal examination in 88% of patients and a normal prostate appearance in 12% of patients. The mean total PSA level in the series was 9.4 ng/ml \pm 7.8 (0.8-43.4ng/ml).

CBEU was positive in 54% (n=41) of patients. These patients had all received antibiotic treatment according to the results of the antibiogram. Prostate biopsies were performed in 16 patients (21%). Biopsies were indicated in the presence of an elevated PSA level and were all negative (Table 1).

The mean prostate volume was 89.7 ml \pm 42.5 with extremes of 30 ml and 223 ml. In 27.6% of patients (n=21) a median lobe was present. The success rate at the first attempt was higher than at the second attempt (34.2% vs 6%). The overall CAT success rate was 40.2% (n=29) (Table 2).

Patients with an age \leq 65 years had a higher CAT success rate than patients with an age $>$ 65 years (50% vs 30.4%). A higher rate of CAT failure was observed in patients with an age \leq 65 years (50% vs. 30.4%).

A higher rate of CAT failure was observed in patients with a PSA $>$ 4 ng/ml compared to patients with a PSA \leq 4 ng/ml (68.9% vs 33.3%). A PSA level $>$ 4 ng/ml increased the risk of CAT failure by a factor of 4.5 (table 3).

Patients with a prostate volume $>$ 80 ml had a higher failure rate at CAT than those with a prostate volume \leq 80 ml (77.5% vs 44.4%). A prostate volume greater than 80 ml increased the risk of failure at CAT by 4.3 times.

The failure rate of CAT was higher in patients who had a median lobe on suprapubic ultrasound than in those who did not (36.2% vs 13.8%). The presence of a median lobe on ultrasound increased the odds of CAT failure by a factor of 3.6 (Table 3).

Table 1. Distribution of patients according to the results of additional examinations before CAT.

Variables	Patients (n)	Frequency (%)
CBEU		
Positive	35	46
Negative	41	54
Prostatic biopsy		
Yes	16	21
No	60	79
PSA		
$<$ 4 ng/ml	15	19.7
[4 – 10 ng/ml]	36	47.4
\geq 10 ng/ml	25	32.9

Table 2. Distribution of patients according to the result of the different CAT attempts.

Variables	CAT				P value
	Success		Failure		
	N	%	N	%	
1st attempt	26	34.2	50	65.8	<0.01
2sd attempt	3	6	47	94	
Total	29	40.2	47	59.8	

Table 3. Parameter analysis based on CAT results.

Variables	Catheter ablation test				Total	P value	OR [CI 95%]
	Failure		Success				
	N	%	N	%			
Age						0.08	
≤ 65 years	15	50	15	50	30		
> 65 years	32	69.6	14	30.4	46		
Prostatic Volume						< 0.01*	4.3 [1.6 – 11.6]
≤ 80 ml	16	44.4	20	55.6	36		
> 80 ml	31	77.5	9	22.5	40		
Median lobe						0.03*	3.6 [1.1 – 12.5]
Yes	17	81	4	19	21		
No	30	54.5	25	45.5	55		
PSA						0.01*	4.5 [1.3 – 16.7]
> 4 ng/ml	42	68.8	19	31.2	61		
≤ 4 ng/ml	5	33.3	10	66.7	15		

*: Statistically significant link

4. Discussion

The identification of alpha adrenergic receptors in the bladder neck and prostate tissue was instrumental in the use of alpha-blockers in the medical treatment of BPH to reduce the dynamic component of prostate tumour obstruction [9]. Since the late 1980s onwards, their indications in the treatment of BPH have evolved considerably, both for patients with low

urinary tract symptoms and for patients with urinary retention [5, 8, 10]. The use of alpha-blockers has meant that surgical treatment is no longer systematically required for all cases of urinary retention in BPH. They help to promote micturition during the voiding process. The various protocols for this type of CAT are based on their rapid symptomatic action, with two-thirds of the effects being achieved within the first few weeks [8, 11].

However, there is little consensus on the modalities of this

CAT with regard to the duration of treatment with alpha-blockers [6]. Under these circumstances, we decided in our department to limit ourselves to two attempts at CAT the first at one week and the second at 4 weeks after complete bladder retention. We decided to evaluate this practice in this study, taking care not to include patients with other factors likely to affect voiding (anticholinergic medication or known neurological disorders). This attitude was motivated by the unavailability in Senegal of urodynamic assessment (in particular cystomanometry) at the time of our study. Urodynamic testing (particularly pressure-flow testing) provides information on bladder contractility and allows the diagnosis of voiding dysfunction associated with peripheral damage to detrusor innervation. This test is useful in cases where BPH is associated with a neurological disorder, as it allows the involvement of each of these entities in a voiding disorder to be established, especially in older patients.

BPH is a common tumour in men from the age of 50 onwards and the risk of developing complete retention of urine would be related to the increasing age of the patients [4, 8, 12]. In our study, the mean age of the patients was 67.9 years. Failure of the ablation test was noted in 69.6% of patients over 65 years of age, compared to 50% of patients under 65 years of age. This trend has been reported by other authors with significant differences [13, 14].

Furthermore, there is an association between patient age and prostate volume in BPH with a variation of both parameters in the same direction [15]. The mean prostate volume of our patients was 89 ml. Patients with a prostate volume > 80 ml had a higher failure rate than those with a prostate volume ≤ 80 ml (77.5% vs. 44.4%) on CAT. Prostate volume is thought to play an important role in the success of CAT, and some authors have suggested a threshold prostate volume between 40 and 60 ml, above which CAT should not be attempted [16-18].

The presence of a median lobe on ultrasound was also associated with a higher risk of CAT failure in our patients. However, the measurement of the intravesical prostatic protrusion index (PPI), which is the protrusion of the median lobe or prostatic lateral lobes into the bladder, seems to be more reliable than the simple assessment of the median lobe. In fact, PPI not only appears to be a better prognostic factor for sub-bladder obstruction in BPH, but also predicts catheter weaning failure after acute urinary retention, with a 6-fold higher risk for grade ≥ 2 [19].

Urine retention is known to increase total PSA levels. Similarly, the higher PSA level is increased the risk of complete bladder retention with a linear increase in patients with BPH [20-22]. The mean PSA level in the series was 9.4 ng/ml and a higher failure rate on CAT was observed in patients with a PSA level >4 ng/ml compared to those with a PSA level ≤ 4 ng/ml (68.9% vs 33.3%). This finding could be explained either by the frequent association between large prostate volume and PSA elevation or by the presence of a more or less extensive infarct within the BPH [23].

However, other authors have not reported an association between total PSA and CAT results [24, 25]. This discrepancy

between PSA levels and CAT results could be explained by the low specificity of PSA, which can vary according to certain factors that are more or less associated with it (age, urinary tract infections, prostate cancer or urinary retention). The PSA level is therefore less reliable in predicting CAT failure and this despite its good correlation with prostate volume.

The duration of bladder catheterisation prior to CAT is still controversial and varies from 1 to 7 days or even a few weeks [10, 26]. However, a shorter duration of bladder catheterisation has the advantage of reducing complications such as urinary tract infections or haematuria, and the length of hospital stay of patients [10]. In our study, we observed an overall success rate of 40.2% with CAT. This rate would have been better with a better patient selection by systematic urodynamic examination in patients under 50 or over 80 years of age.

The success rate of CAT was higher at the first attempt than at the second attempt (34.2% vs. 6%). Desgranchamps [10] reported a better success rate of 29.6% for the second attempt of CAT (n= 316). This last attempt is particularly necessary for patients in whom surgery could have adverse consequences such as the risk of infertility due to retrograde ejaculation or serious risks due to comorbidities. In the latter group of patients, the combination of a 5-alpha reductase inhibitor with an alpha-blocker would be an interesting alternative to improve the success rate of CAT. Indeed, Hagiwara et al [27] reported an overall success rate of 88.8% in CAT when silodosin was combined with dutasteride for 12 weeks, with the main disadvantage of prolonged catheter wear.

5. Conclusions

In our prospective evaluation, the predictive factors for the outcome of CAT were: a PSA level ≥ 4 ng/ml, a prostate volume > 80 ml or the presence of a median lobe on ultrasound. We found no interest in a second attempt at CAT. However, to validate these observations, an independent study with a larger number of patients with urodynamic testing when indicated would be needed.

List of Abbreviations

CAT: catheter ablation testing
 CRU: complete retention of urine
 CBEU: cytobacteriological exam of urine
 PSA: prostate specific antigen
 BPH: benign prostate hyperplasia

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