

## Prostate Gland Volume and Its Relationship to Complications of Benign Prostatic Enlargement

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**Abstract:** 82 men with Benign Prostatic Enlargement(BPE) who underwent TURP were retrospectively analysed for Prostatic volumes and complications related to BPE. The Volumes were measured by Transabdominal USG (TAUS) with 3.5 MHz Curvilinear probe . The mean age , gland size , and PSA were 65.3 yrs , 55.70 ml (range from 21 to 170 cc) and 11.41ng/ml in our study population respectively. Analysis revealed significant correlation of patients age with prostate volume ( $p = 0.009$ ). PSA and Acute urinary retention(AUR) showed significant positive correlation ( $p= 0.004$ ). Bladder calculus incidence correlated significantly with Prostate Volume ( $p = 0.026$ ) rather than , recurrent UTI ,AUR and PVR .Comparison of hematuria ( $p =0.888$ ) and gland size was insignificant. Upper tract changes with renal failure and Recurrent UTI did not show any significant association with prostate volume. Men with BPE having gland size >50ml measured using TAUS are at increased risk for Spontaneous AUR , Bladder stone formation and Bladder wall changes.

### I. Introduction

BPH is ubiquitous and a significant health problem in aging males .It reduces quality of life for many years with definite morbidity and complications. The Olmsted County Study stated that prostatic volumes more than 30 ml had 3 to 4 times more risk of developing AUR<sup>1</sup>. This 12 year study which comprised males of age group 40 to 79 yrs ( n = 2115) showed a median prostate growth of 1.9 % per year. The MTOPS Placebo arm<sup>2,3</sup> study showed a significantly greater risk of clinical progression with baseline Prostate Volume of 31 ml of about 17.4 % (over 4 years) , 4 points increase in the IPSS with increased risk of development of AUR ,development of renal insufficiency, recurrent urinary retention and socially or hygienically unacceptable urinary incontinence . The Scandinavian Reduction of the Prostate Study, Proscar Safety Plus Efficacy Canadian Trial, Proscar Worldwide Efficacy and Safety Study are the long-term, reliable data characterizing prostate volume as a risk factor for AUR . Proscar Long-Term Efficacy and Safety Study (n=3040) with FINASTERIDE or Placebo over 4 years; the largest randomized, placebo-controlled trial of medical therapy for BPH confirmed the relationship between Prostate Volume and the development of AUR. BPH progression is dynamic with multiple effects of increased prostatic size that includes deterioration of LUTS, AUR/CUR, renal insufficiency , hematuria , calculi formation and recurrent UTIs. All these factors are examined in our study.

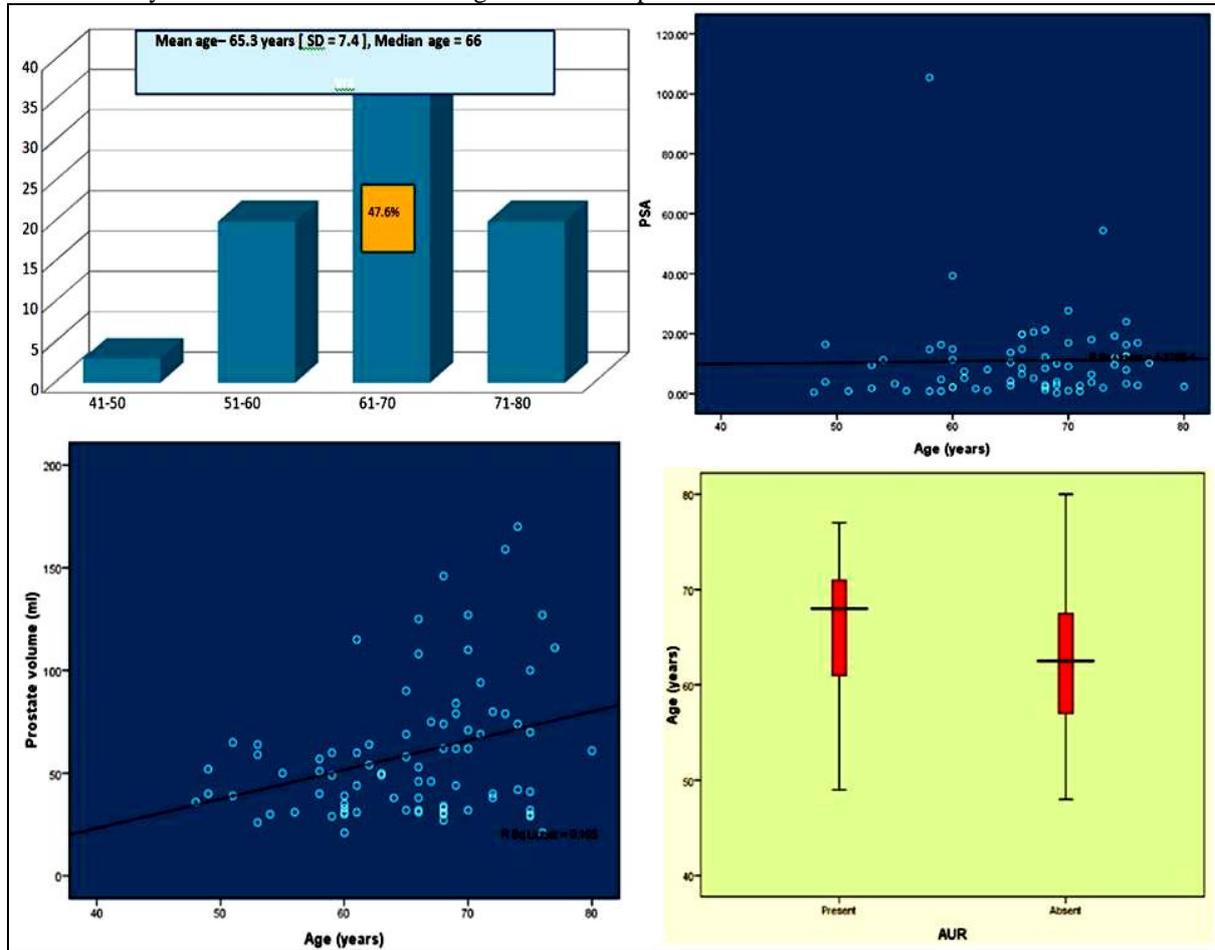
### II. Objective And Methods

To assess the relationship between prostate gland size measured using TAUS ( SIEMENS Accuson X300 with 3.5 MHz probe ) and the various complications of Benign Prostatic Enlargement during a period of one year in a tertiary care center. Retrospective analysis was done based on case records .Inclusion criteria includes Men admitted with LUTS suggestive of BPE. Exclusion criteria : Ca Prostate , LUTS other than due to BPE. SPSS 16 was used for statistical analysis .The study confirms to standards of declarations of Helsinki.

### III. Results

82 men who underwent TURP were included in the study . The mean age , gland size ,PSA and PVR were 65.3 yrs , 55.70 ml (range from 21 to 170 cc) ,11.41ng and 177 ml in our study population respectively. Analysis revealed significant correlation of patients age with prostate volume ( $p = 0.009$ ).The correlation between Serum PSA Levels with age and prostate volume were not significant( $p= 0.128$ ) and ( $p=0.087$ ) respectively. Out of 82 men, 62 had AUR with mean age of 68 compared to 62 which was insignificant (Mann

Whitney U test  $p = 0.087$  . Age did not correlate significantly with AUR ( $p = 0.548$ ) . However PSA and Acute Urinary Retention showed significant positive correlation ( $p = 0.004$ ) . The Correlation of Prostate size and Acute Urinary Retention was found to be significant with  $p$  value 0.007 .



Prostate size more than 50 ml were 37 and less than 50 ml were 25 who had AUR. The correlation of Prostate size and AUR was found to be significant with  $p$  value 0.007 . Prostate volumes 50 ml and more had significant correlation with recurrent UTI ( $p = 0.071$ ).

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PSA (ng/ml)	AUR		OR
	Present	Absent	
< 4	14	12	1
4 - 7.9	7	2	3
8 or more	31	4	6.64

Gland Size	AUR		Total
	Present	Absent	
50 ml and above	37 (88.1%)	5 (11.9%)	42 100.0%
<50 ml	25 (62.5%)	15 (37.5%)	40 100.0%
Total	62 (75.6%)	20 (24.4%)	82 100.0%

Pearson Chi square = 7.27  
OR = 4.4 (95% CI: 1.43 – 13.7)

Gland size	Recurrent UTI	
	Present	Absent
50 ml & above	16 (38.1%)	26 (61.9%)
< 50 ml	14 (35.0%)	26 (65.0%)

Gland size	Upper tract changes with Renal Failure	
	Present	Absent
50 ml & above	1 (2.4%)	41 (97.6%)
< 50 ml	5 (12.5%)	35 (87.5%)

Age	Bladder wall changes		Odds Ratio
	Present	Absent	
60 and below	6	17	1.00
61-70	24	15	4.53
71 and above	11	9	3.46

Gland Size	Bladder wall changes		Total	P value 0.002
	Present	Absent		
50 ml and above	28 (66.7%)	14 (33.3%)	42 (100.0%)	
<50 ml	13 (32.5%)	27 (67.5%)	40 (100.0%)	
Total	41 (50.0%)	41 (50.0%)	82 (100.0%)	

Chi square for Linear trend	3.316
P value	0.068

Pearson Chi square = 9.567  
OR = 4.154 (95% CI: 1.653 – 10.440)

Gland Size	Bladder stone		Total	P value 0.026
	Present	Absent		
50 ml and above	6 (14.3%)	36 (85.7%)	42	
<50 ml	0	40 (100.0%)	40	
Total	6	76	82 (100.0%)	

Gland size	Hematuria		Bladder Stone	
	Present	Absent		P value
50 ml and above	10 (23.8%)	32 (76.2%)	UTI	0.112
< 50 ml	9 (22.5%)	31 (77.5%)	AUR	0.148
			PVR	0.614

Hematuria & Prostate volume				Renal Failure & Prostate Volume			
Gland size	Hematuria		P value	Gland size	Upper tract changes with Renal Failure		P value
	Present	Absent			Present	Absent	
50 ml and above	10 (23.8%)	32 (76.2%)	0.888	50 ml & above	1 (2.4%)	41 (97.6%)	0.079
< 50 ml	9 (22.5%)	31 (77.5%)		< 50 ml	5 (12.5%)	35 (87.5%)	

Gland size (n=82)	20-40g (34)	40-60g (19)	> 60g (29)	PSA	21-40g	41-60g	>60g	AUR
Acute Urinary Retention (AUR) (49)	12 (35.29%)	13 (68.42%)	24 (82.75%)	< 1	2	1	3	1
Haematuria (20)	10 (29.41%)	2 (10.52%)	8 (27.586%)	1.1 - 2	1	1	3	2
Recurrent UTI (25)	11 (32.35%)	5 (26.316)	9 (31.03%)	2.1 - 3	4	2	2	2
Upper tract changes with altered RFT (5)	2 (5.88%)	2 (10.526%)	1 (3.448%)	3.1 - 4	3	1	1	4
Post Void Residual Urine (24)	13 (38.235%)	6 (31.579%)	5 (17.24%)	>4	9	11	20	29
Bladder stone formation (9)	3 (8.82%)	3 (15.789%)	3 (10.345%)					
Bladder wall changes (40)	9 (26.47%)	10 (52.63%)	21 (72.41%)					

Bladder calculus incidence correlated significantly with Prostate Volume (p = 0.026) rather than recurrent UTI, AUR and PVR. Comparison of hematuria and gland size was insignificant (p =0.888). Comparison of upper tract changes with renal failure and recurrent UTI with prostate volume did not show any significant association ( p =0.079 & p = 0.77 respectively).

#### IV. Discussion

LUTS commonly may be related to bladder outlet obstruction (BOO) as a result of benign prostatic obstruction (BPO), which is often associated with benign prostatic enlargement (BPE) resulting from the histologic condition of BPH. Reducing prostate volume would have a minimal effect on LUTS in men with small prostates and a modest effect in men with enlarged prostates. Men with enlarged prostates should be counseled regarding their risk of BPH progression. Men with higher S.PSA levels Predicts future Prostate growth, the need for Surgery and increased risk of developing AUR . Prostate volume is not totally disassociated from LUTS .The micro-vessel density in prostate in BPH is higher than in controls hence the chance of more microscopic and gross hematuria<sup>5 6</sup>. Twenty three percent of our study population had

hematuria . Large Autopsy study <sup>4</sup> showed that the incidence of bladder stone is 8 times higher in BPH (3.4%) associated with Urinary retention, Stasis & Infection .

7.32% of the study men ( 6/82) had renal impairment .There is no relationship between prostatic enlargement measures and CKD <sup>7</sup>. This should not be used to infer a weak association between these two disease processes. BPH may accelerate the progression of CKD. The mortality increases up to six fold for BPH patients treated surgically if they have renal insufficiency. Roehrborn et al (1986) and Simonsen et al( 1987 ) showed that Prostate size not critical in deciding whether active treatment is required. Also it does not correlate precisely with symptom severity, degree of urodynamic obstruction, or treatment outcomes. A larger gland, and consequently a higher PSA, is associated with a greater risk of BPH progression .There is no convincing evidence that UTI in the aging male population is associated with either residual urine or BOO. It is reasonable to assume that renal insufficiency occurs secondary to urinary retention if renal failure is reversed after catheter drainage. Hematuria may be associated with prostatic vascularity and may sometimes respond to medical therapy with a 5 $\alpha$ -reductase inhibitor.

The limitations of our study includes observer variation while doing TAUS , smaller sample size and descriptive nature of study. Recurrent UTI , hematuria and upper tract changes with renal failure have not shown any association with prostate size in this study. We conclude that men with BPE having gland size >50ml measured using TAUS are at increased risk for spontaneous AUR, bladder stone formation and bladder wall changes .

### References

- [1]. Jacobsen SJ, Jacobson DJ, Girman CJ, et al. Natural history of prostatism: risk factors for acute urinary retention. *J Urol*.1997;158:481-487
- [2]. Bautista OM, Kusek JW, Nyberg LM, et al. Study design of the Medical Therapy of Prostatic Symptoms (MTOPS) trial. *Control Clin Trials*. 2003;24:224–243.
- [3]. Michael Marberger ,The MTOPS Study: New Findings, New Insights, and Clinical Implications for the Management of BPH. *European urology supplement* ,5 :2006
- [4]. Grosse, H. (1990). Frequency, localization and associated disorders in urinary calculi. Analysis of 1671 autopsies in urolithiasis. *Z Urol Nephrol*83(9): 469-474.
- [5]. Faubert, P. F., Porush, J.G., Ed. (1998). *Renal disease in the elderly* New York Marcel Dekker
- [6]. Wein, A. J., Kavoussi, L.R., Novick, A.C., Partin, A.W., Peters, C.A., Ed. (2007). *Campbell-Walsh Urology*, Saunders Elsevier
- [7]. Rule, A. D., D. J. Jacobson, et al. (2005). "The association between BPH and CKD in community-dwelling men." *Kidney Int* 67(6): 2376-2382 .