

ORIGINAL RESEARCH

A Clinicoradiological Study With Diagnostic Value Of PSA And Its Management Strategy

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ABSTRACT

Background: Urinary retention is the inability to voluntarily void urine. This condition can be acute or chronic. Causes of urinary retention are numerous and can be classified as obstructive, infectious and inflammatory, pharmacologic, neurologic, or other. The most common cause of urinary retention is benign prostatic hyperplasia. Other common causes include prostatitis, cystitis, urethritis, and vulvovaginitis; receiving medications in the anticholinergic and alpha-adrenergic agonist classes; and cortical, spinal, or peripheral nerve lesions. Obstructive causes in women often involve the pelvic organs. Benign prostatic hyperplasia (BPH) and associated lower urinary tract symptoms (LUTS) commonly affect older men. Age-related changes associated with metabolic disturbances, changes in hormone balance, and chronic inflammation may cause BPH development. The diagnosis of BPH hinges on a thorough medical history and focused physical examination, with attention to other conditions that may be causing LUTS. Digital rectal examination and urinalysis should be performed. Other testing may be considered depending on presentation of symptoms, including prostate-specific antigen, serum creatinine, urine cytology, imaging, cystourethroscopy, post-void residual, and pressure-flow studies. Serum prostate-specific antigen (PSA) is used for the screening and early detection of prostate cancer. We are, however, confronted with the dilemma that a significant number of unnecessary biopsies are unavoidable especially in the serum PSA range of 4 to 10ng/ml. It has been reported that age-specific PSA reference ranges, PSA velocity, PSA molecular forms and volume-adjusted PSA are valuable tools to improve specificity for early diagnosis of prostate cancer. **Results:** In our study as per diagnosis by clinical findings Out of 100 patients, 56 patients were diagnosed as BPH, 4 as carcinoma prostate, 18 as stricture urethra, 6 as UTI, 8 as calculus disease of lower urinary tract, 2 as phimosis, 4 as neurogenic bladder and 2 patients as bladder neck hypertrophy. On USG, Out of 100 cases, 56 patient's findings had enlarged prostate, 8 had calculus disease (out of which 6 were vesical and 2 were urethral calculus), 3 had cystitis (bladder wall thickened) and in rest 33 patients there were no abnormalities. Out of 100 patient 28 had PSA levels between 4.1-8 ng/ml, 4 had PSA levels greater than 8 ng/ml. **Conclusion:** Urinary retention is more common in men than in women and more commonly severe in age group more than 40 years. In men BPH is the most common cause of urinary retention followed by stricture urethra and calculus disease. In children, common causes are UTI and phimosis. In women, common causes are UTI and calculus disease. Ultrasonography is a very important investigation to rule out the definitive causes of urinary retention, whereas other radiological investigations like Xray KUB and MCU/RGU are helpful in diagnosing calculus diseases and stricture urethra. In BPH patients PSA level also increases but in lower range and in case of CA prostate PSA level increases in the higher range. Catheter trial should be given on the 3rd/5th day after initial treatment. Surgical intervention is the method to treat the failed catheter trial in cases of retention of urine, conservative medical management can be imposed in the patients where catheter trial is successful.

Keywords: Diabetes mellitus, macroscopic complication, polyuria, polydipsia, polyphagia

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INTRODUCTION

¹Urinary retention can be defined as inability to achieve complete bladder emptying by voluntary micturition. Acute retention of urine is sudden, painful with severe discomfort whereas chronic retention is troublesome, painless and can cause complication like infections, bladder damage and chronic renal disease. It is a significant public health issue and a surgical emergency which requires prompt initial treatment followed by definitive management. ²Out of the

numerous causes of urinary retention most common cause in males is BPH followed by stricture urethra, prostatitis, calculus and carcinoma prostate. Whereas in females, cystitis, retroverted gravid uterus, carcinoma cervix and pelvic growth contribute to the cause. The initial and immediate management of urinary retention includes bladder catheterization either transurethral or suprapubic with prompt and complete decompression. Transurethral catheterization is easier and quick while the later one

requires trained personnel but decreases the risk of UTI and urethral stricture formation and additionally permits a trail of micturition without removing the catheter.³The definitive management of urinary retention depends on the etiology and may include surgical and medical treatment. Out of several strong risk factors that have been identified for acute urinary retention, the most important is elevated serum PSA levels. Prostate specific antigen is a serine prostate that serve to liquefy semen after ejaculation and as a marker unique to the prostate, has a diagnostic role as well as a role in following the response to treatment. PSA levels usually increases in prostatic inflammation and prostatic enlargement, be it BPH or carcinoma prostate, immediately after surgery or biopsy but not with DRE as commonly believed. Conventional and special radiological investigations like ultrasonography and CT scan, cystoscopy and urodynamics and serum PSA levels helps in determining the etiology of urinary retention.

AIMS AND OBJECTIVES

This study aims to correlate clinical findings with radiological diagnosis of cases of retention of urine and to rule out the diagnostic value of PSA in case of retention of urine.

METHODOLOGY

⁴This hospital based prospective observational and analytical study was conducted between JULY2018-JULY2019on about 100 cases including patients of both genders, between 2 years and 82 years of age with urinary retention, excluding known cases of chronic renal failure. After taking well informed consent, the patients underwent drainage of urine by

various methods like urethral catheterization or surgical interventions like suprapubic cystostomy. After relief from acute symptoms, digital rectal examination and physical examination along with routine blood and urine investigations were performed. Xray KUB and abdominal ultrasound were done and radiological findings were recorded. Other special investigations like IVP, MCU/RGU and Sr.PSA estimation was done when required. Once the diagnosis is established, various management strategies were performed either conservative or surgical (open or laparoscopic).

STATISTICAL ANALYSIS

The data observed was collected in an excel sheet for every patient and the master chart was analyzed using Statistical software SPSS IBM version 22. Tests of significance applied were chi square test, student t test, Fischer exact test and p value <0.05 was considered to be significant.

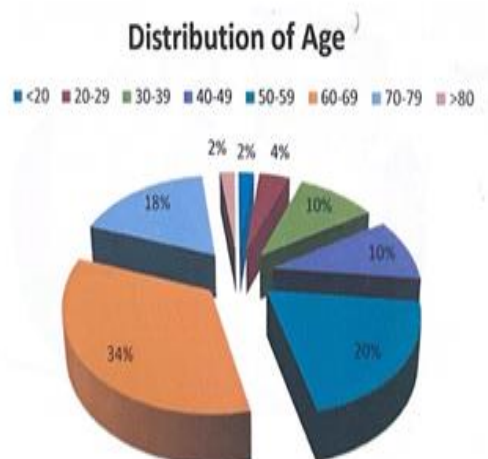
OBSERVATIONS& RESULTS

The present study titled “Retention of urine – A clinicoradiological study with diagnostic value of PSA and its management strategy” carried out from July 2018-July 2019 in R.D. Gardi Medical College and CRGH Hospital, Ujjain includes clinical and radiological status of 100 patients who presented with retention of urine from different etiology. Out of the 100 patients 14 were female and rest were male (86%).

11.7% patients out of total no. of admitted patients in Dept. of Surgery were diagnosed with retention of urine.

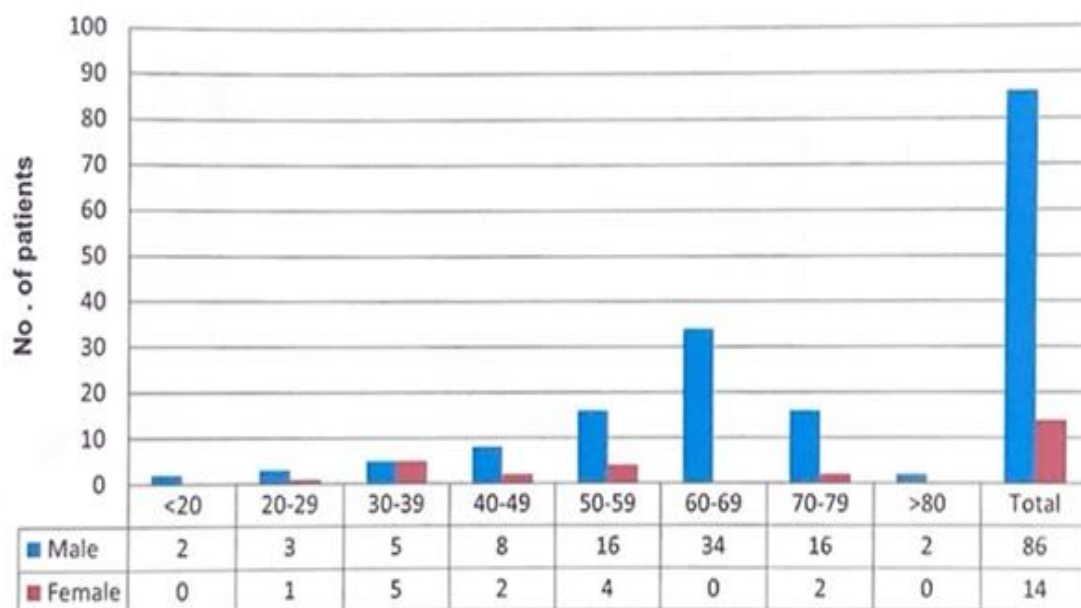
DISTRIBUTION OF CASES ACCORDING TO AGE

Age in years	No. of Patients	Percentage (%)
<20	2	2
20-29	4	4
30-39	10	10
40-49	10	10
50-59	20	20
60-69	34	34
70-79	18	18
>80	2	2
Total	100	100



Maximum number of cases were in the age group of 60-69 years (34%) followed by 50-59 years (20%) age group. The youngest patient was of age 2 years and oldest was 82 years old.

SEX DISTRIBUTION AS PER AGE GROUP OF PATIENTS



A total of 100 patients were included in the study, which comprised of 86 males (86%) and 14 females (14%). Male: Female ratio is 6:1. Maximum number of males were in the age group of 60-69 years and maximum number of females were in the age group of 30-39 years.

DISTRIBUTION OF CASES ACCORDING TO CLINICAL PRESENTATION

Clinical Presentation		Number of patients
Retention of urine	<12 hours	36
	>12 hours	64
Nocturia		43
Narrowing of urinary stream		78
Urgency		56
Hesitancy		49
Burning micturation		52
Haematuria		24
Strangury		26
Precipitating factor		32

A total of 43 patients clinically presented with nocturia diagnosed with BPH, narrowing urinary stream was presented by 78 patients diagnosed with BPH and stricture urethra, patients presented with urgency of urine were 56 in number diagnosed with BPH and hesitancy were 49 with BPH. Burning micturition was presented by 52 patients diagnosed with BPH and urinary tract infection. Hematuria was presented by 24 patients diagnosed with BPH and UTI and 26 patients presented with strangury diagnosed with stricture urethra and calculus disease.

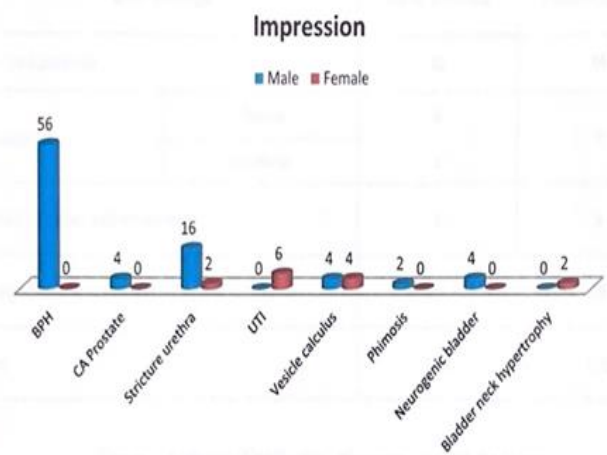
DIGITAL RECTAL EXAMINATION FINDINGS

DRE			No of patients
Prostate	Size	Normal	26
		Enlarged	60
	Median sulcus	Felt	56
		Obliterated	4
	Surface	Smooth	56
		Nodular	4
	Consistency	Firm	52
		Hard	8
Faecal impaction			0
Haemroids			2
NAD			12

In the current study DRE was done in 86 cases and prostate was found enlarged in 60 patients. In 26 patients prostate was normal. In 14 female patients DRE was not done. Out of 60% of enlarged prostate, in most of the cases both lateral lobes were enlarged and in 56 patients median sulcus felt and in 4 patients median sulcus was obliterated. In 4 cases prostatic surface was nodular and rest 56% was smooth. Out of 60 patients of enlarged prostate, 8 were hard in consistency and 52 were firm.

DISTRIBUTION OF CASE AS PER DIAGNOSIS (CLINICAL IMPRESSION) BY CLINICAL FINDINGS

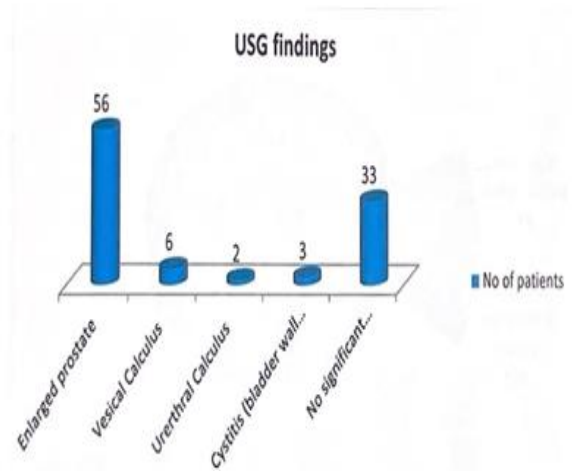
Impression	Male	Female	Total
BPH	56	0	56
CA Prostate	4	0	4
Stricture urethra	16	2	18
UTI	0	6	6
Calculus disease of lower urinary tract	4	4	8
Phimosis	2	0	2
Neurogenic bladder	4	0	4
Bladder neck hypertrophy	0	2	2
Total	86	14	100



Out of 100 patients, 56 patients were diagnosed as BPH, 4 as carcinoma prostate, 18 as stricture urethra, 6 as UTI, 8 as calculus disease of lower urinary tract, 2 as phimosis, 4 as neurogenic bladder and 2 patients as bladder neck hypertrophy.

DISTRIBUTION OF CASES ON USG FINDINGS

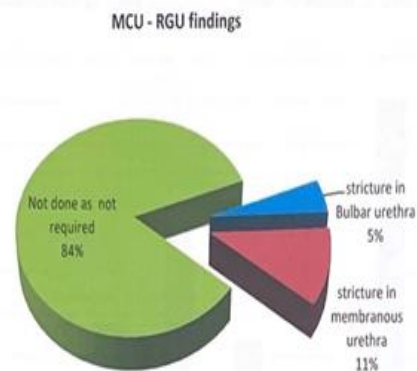
USG findings	No of patients	Percentage (%)
Enlarged prostate	56	56
Calculus	Vesical	6
	Urethral	2
Cystitic (bladder wall thickened)	3	3
No significant abnormality	33	33
Total	100	100



Out of 100 cases, 56 patient’s findings were enlarged prostate, 8 were calculus disease (out of which 6 were vesical and 2 were urethral calculus), 3 were cystitic (bladder wall thickened) and in rest 33 patients there were no abnormalities.

DISTRIBUTION OF CASES ACCORDING TO MCU-RGU RADIOLOGICAL FINDING

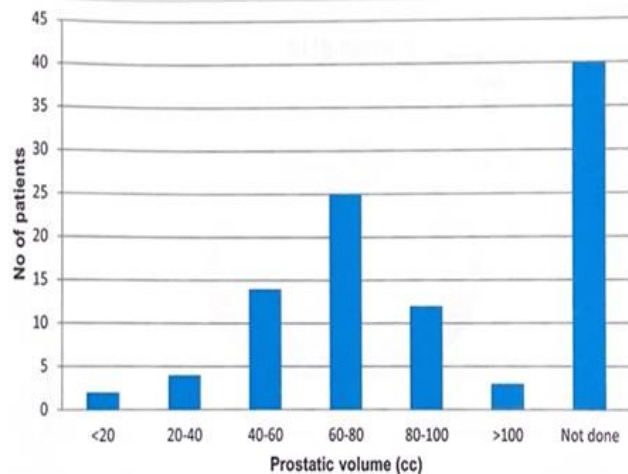
MCU- RGU	Number of patients	Percentage (%)
Stricture in Bulbar urethra	5	5
Stricture in membranous urethra	11	11
Not done as not required	84	84
Total	100	100



Out of 100 patients, 5 patients had stricture in bulbar urethra, 11 had stricture in membranous urethra and rest 84 didn’t undergo since, as it wasn’t required.

DISTRIBUTION OF CASES ACCORDING TO PROSTATIC VOLUME ON USG FINDINGS

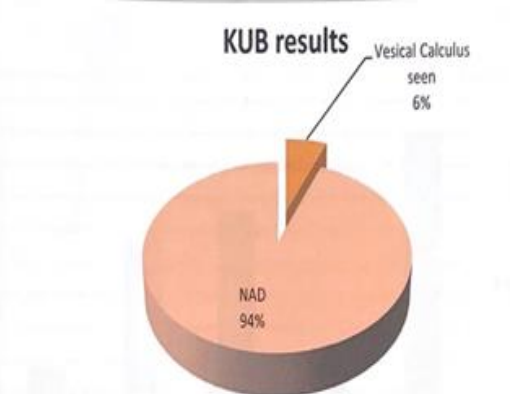
Prostatic volume (cc)	No of patients	Percentage (%)
<20	2	2
20-40	4	4
40-60	14	14
60-80	25	23
80-100	12	19
>100	3	3
Not done	40	40
Total	100	100



5 Out of 100 patients, 2 patients were found to have prostatic volume less than 20cc, 4 had between 20-40cc, 14 had between 40-60cc, 25 had between 60-80cc, 19 had between 80-100cc, 3 had greater than 100cc and in rest of 40 patients, the findings were not performed.

DISTRIBUTION OF CASES ACCORDING TO KUB XRAY RADIOLOGICAL FINDINGS

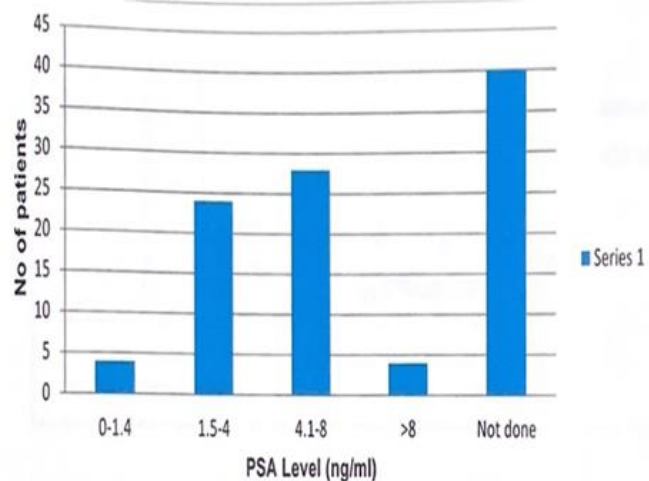
KUB results	No of patients		Percentage (%)
	Male	Female	
Vesical Calculus seen	2	4	6
NAD	94		94
Total	100		100



Out of 100 patients, 6 patients were found to have vesical calculus, out of which 4 were female and 2 were male and in rest 94 patients, the findings were normal.

DISTRIBUTION OF CASES ACCORDING TO PSA LEVELS

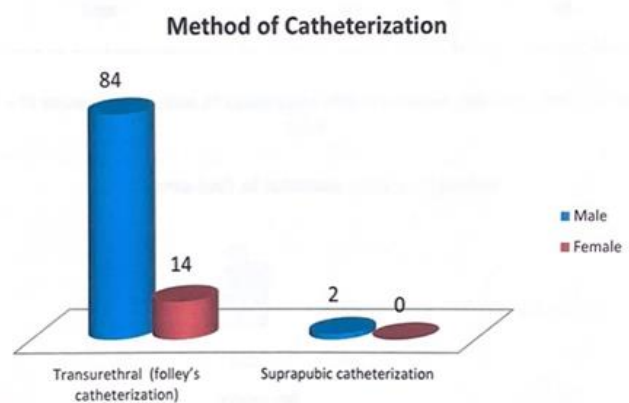
PSA level (ng/ml)	No of patients	Percentage (%)
0-1.4	4	4
1.5-4	24	24
4.1-8	28	28
>8	4	4
Not done	40	40
Total	100	100



6 Out of 100 patients, 4 patients were found to have PSA levels between 0-1.4 ng/ml, 24 had PSA levels between 1.5-4 ng/ml, 28 had PSA levels between 4.1-8 ng/ml, 4 had PSA levels greater than 8 ng/ml and in rest of 40 patients PSA estimation was not done.

DISTRIBUTION OF CASES ACCORDING TO MODE OF CATHETERISATION

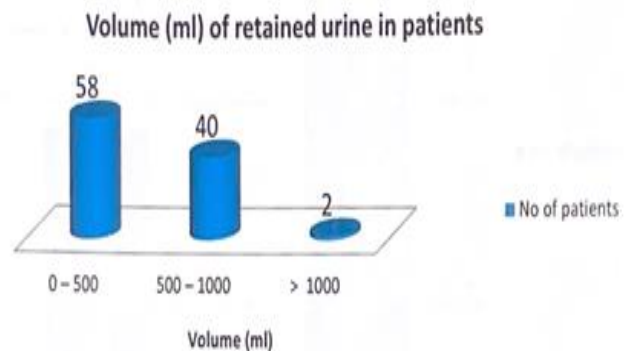
Method of Catheterization	Male	Female	Percentage (%)
Transurethral (folley's) catheterization	84	14	98
Suprapubic catheterization	2	0	2
Total	86	14	100



7 Out of 100 patients, 98 underwent transurethral (Foley’s) catheterization and 2 patients underwent suprapubic catheterization. 84 males underwent transurethral (Foley’s) catheterization, 2 underwent suprapubic catheterization. While 14 females underwent transurethral (Foley’s) catheterization.

DISTRIBUTION OF CASES ACCORDING TO VOLUME (RETAINED URINE) OF VOIDED URINE

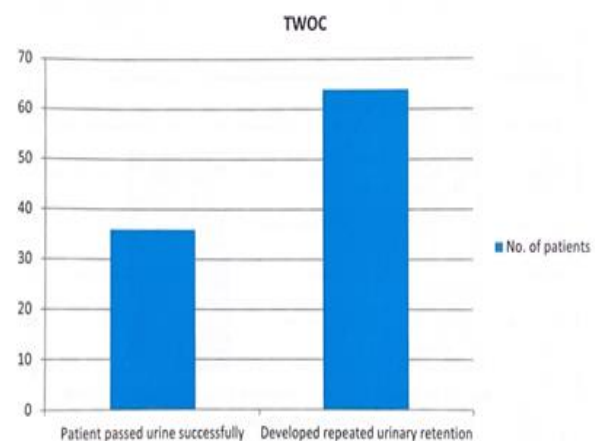
Volume (ml)	No of patients	Percentage (%)
0 - 500	58	58
500 - 1000	40	40
> 1000	2	2
Total	100	100



Out of 100 patients, residual volume of urine in 58 was between 0-500 ml, 40 were between 500-1000 ml and rest 2 were more than 1000 ml.

DISTRIBUTION OF CASES OF TRIAL WITHOUT CATHETER

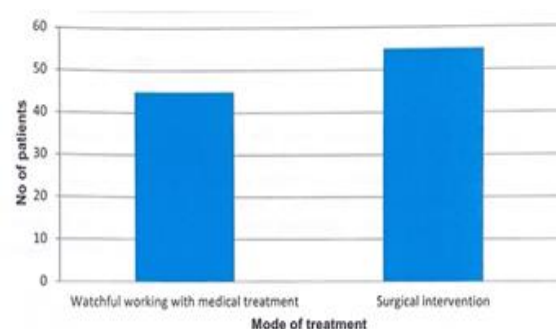
TWOC	No of patients	Percentage (%)
Patient passes urine successfully	36	36
Developed repeat urinary retention	64	64
Total	100	100



Out of 100 patients, 36 patients passed urine successfully and rest 64 patients developed repeated urinary retention.

DISTRIBUTION OF CASES ACCORDING TO WATCHFUL WAITING WITH MEDICAL TREATMENT AND SURGICAL INTERVENTION

Mode of treatment	No of cases	Percentage (%)
Watchful working with medical treatment	45	45
Surgical intervention	55	55
Total	100	100



Out of 100 patients 45 went through watchful working with medical treatment and rest 55 patients went through surgical intervention.

DISTRIBUTION OF CASES WHO WERE MANAGED WITH SURGICAL INTERVENTION

Surgical Procedure	No of patients
Freyer's (Open prostatectomy)	25
TURP	15
Suprapubic cystolithotomy	6
Litholapexy	2
Circumcision	2
Suprapubic cystostomy	8
Conservative management	42
Total	100

825 patients had underwent open prostatectomy (Freyer's), 15 patients who were diagnosed with BPH, underwent TURP, 6 patients of vesical calculus underwent suprapubic cystolithotomy, 2 patients with urethral calculus underwent litholapaxy, 2 patients of phimosis underwent circumcision, 8 patients of stricture urethra underwent suprapubic cystostomy and rest 38 patients were managed conservatively. than 40 years of age.

Studies	Year	Commonest age affected
Carlos et al	2012	40-79 years
Francois et al	2006	40-99 years
Jeng Sheng Chen et al	2012	50-94 years
Nadir et al	2014	40+ years
Ugare et al	2014	61-80 years
Present study	2015	40+ years

SEX

It is shown in various studies that AUR is more common in males, the same was found in our study. Similar findings were observed in several other studies as well.

Studies	Year	Male : Female ratio
Carlos et al	2012	8.2 : 1
Francois et al	2006	11.0 : 1
Jeng Sheng Chen et al	2012	11.0:1
Nadir et al	2014	13.0: 1
Ugare et al	2014	39.0 : 1
Present study	2015	6.1 : 1

SYMPTOMS

12Common symptoms are retention of urine,found in all the patients. Followed by narrow stream [78%] and urgency [56%]. These findings were compared with other studies, as shown in the table below.

Studies	Year	Nocturia	Narrow stream	Urgency	Burning Micturition	Retention of Urine
Carlos et al	2012	33	63	62	51	100
Francois et al	2006	54	71	41	47	98
Jeng Sheng Chen et al	2012	49	48	32	33	100
Nadir et al	2014	32	57	59	64	99
Ugare et al	2014	27	62	47	48	100
Present study	2015	43	78	56	52	100

In our study digital rectal examination (DRE) was done in 86 cases and prostate was enlarged in 60 cases. In 26 patients, prostate was normal while in female patients(14%)DRE was not done.Outof 60% of enlarged prostate in most of the cases both lateral lobes were enlarged and in 56 patients median sulcus felt and in 4 patients median sulcus was obliterated. In 4 cases prostatic surface was nodular and rest 56%

was smooth. Out of 60 patients of enlarged prostate 8 were hard in consistency and 52 were firm. Internal haemorrhoids are same on proctoscopy.

Urinary retention based on clinical impression14The causes of urinary retention were investigated by several modalities like USG, MCU etc. Themost common cause of retention was BPH in 56% cases followed by stricture in 18 % cases.

Studies	Year	BPH (%)	Ca prostate(%)	Stricture Urethra(%)	UTI(%)	Calculus disease of LUT(%)
Carlos et al	2012	58	8.2	15	12.3	5
Francois et al	2006	48	6.1	25	11.4	10
Jeng Sheng Chen et al	2012	52	3.5	21	5	4
Nadir et al	2014	71	11	13	3.1	7
Ugare et al	2014	64	7.2	25	1	6
Present study	2015	56	4	18	6	8

USG FINDINGS

Ultrasonography is the chief investigating modality. It was done in all the cases to confirm the exact diagnosis. Prostatic enlargement was the commonest USG finding our study. Howeverin 33 % of cases the ultrasound investigation was normal. Ultrasound finding of rest 67 cases was compared with other studies as follows:

Studies	Year	Prostatic enlargement	Calculus	Cystitis	Normal
Carlos et al	2012	61	10	8	27
Francois et al	2006	52	13	7	24
Jeng Sheng Chen et al	2012	55	9	5	35
Nadir et al	2014	70	5	6	22
Ugare et al	2014	62	7	4	25
Present study	2015	56	8	3	31

Our study is compatible with Carlos et al, Francois et al, Jeng Sheng Chen et al.

MCU/RGU

In our study MCU and RGU was done in 16 cases out of 18 of suspected stricture urethra. Stricture in bulbar urethra was found in 5 cases whereas in rest 11 cases stricture was in membranous urethra. USG (Prostatic volume) In our study prostatic volume was calculated in 60 patients by USG (ultrasonography) of suspected enlarged prostate. In 37 patients prostatic volume was found more than 100cc. On consideration of previous studies, acute retention of urine was found in the patients where prostatic volume is more than 60cc.

X-ray KUB

Xray KUB was done in all 100 cases but vesicle calculus was seen as a radio opaque shadow in bladder region in 2 males and 4 females. Xray KUB is a reliable tool for calculus disease in patients of acute retention of urine.

PROSTATE SPECIFIC ANTIGEN (PSA)

15 It is a serum protease that serves to liquify semen after ejaculation and as a marker unique to the prostate. 16 It has a diagnostic role as well as a role in following response to treatment. It is a glycoprotein produced by the cells of the prostatic ductal epithelium and present in the serum of all men. It is absent in the serum of women.

In our study, serum PSA was done for 60 cases. out of these 4 patients had serum PSA levels more than 8ng/ml in suspected cases of CA prostate. In the rest of the cases PSA levels were found below 8ng/ml.

CATHETERIZATION

The initial and immediate management of urinary retention includes bladder catheterization either transurethral or suprapubic with prompt and complete decompression. Transurethral catheterization is easy, quick whereas suprapubic catheterization requires trained personnel and decreases risk of UTI and urethral stricture formation and on consideration permits a trial of micturition without removing the catheter. In our study most of the patients, 98% bladder catheterization was done by transurethral route with Foley's catheter no. 16 and 18.

Most previous authors agree that transurethral bladder catheterization is easy and economic procedure for the initial and immediate management of urinary retention. Catheter Trial 17 All patients have been given a catheter trial on the 3rd day after initial management of acute urinary retention. 36 patients passed urine on catheter removal and 64 patients developed retention for which re catheterization was done. We found those who have passed urine on catheter trial are patients of UTI, stricture urethra, bladder neck obstruction, bladder neck hypertrophy and phimosis. 18 Most of the patients of neurogenic bladder, BPH and CA prostate developed retention on catheter trial on 3rd day. Those who passed urine on catheter trial were discharged with medical treatment (either antibiotic or medical management of BPH). Rest of the patients

were indicated for surgical intervention. Surgeries 19 In our study most of the BPH patients surgically treated by open prostatectomy (Freyer's) i.e. 25 cases, rest are done with TURP i.e. 15 cases. In 6 cases of calculus disease of bladder and urethra suprapubic cystolithotomy was done and in rest 2 cases endoscopic litholapaxy was done. In 8 cases of stricture urethra suprapubic cystostomy was done while 2 cases of phimosis were treated by circumcision.

DISCUSSION

9 Causes of urinary retention can be classified as obstructive, infectious, inflammatory, pharmacologic, neurologic and others. Most common and frequent cause in males is BPH, stricture urethra, prostatitis, calculus disease in bladder and urethra and CA prostate. In children, common causes include posterior urethral valve, impacted stones, phimosis and paraphimosis. In women, common causes are cystitis, retroverted gravid uterus, carcinoma cervix and pelvic growth. 10 Most common obstructive cause is BPH (in males). In our study, 56% patients of BPH were in acute urinary retention. Choong et al. 2000 mention urinary retention caused by BPH is 53% and other obstructive causes are 23%. 11 Common presentation or urinary retention is bladder outlet obstruction, caused by BPH. Patients have multiple lower urinary tract voiding symptoms including frequency, urgency, nocturia, hesitancy, weak urinary stream, straining at voiding, sensation of incomplete bladder emptying, stopping and starting of stream. Different studies have been compared to ours. 96, 97, 98, 99, 100 Age & sex distribution A total of 100 patients were included in the study, which comprised of 86 males and 14 females. The prevalence of retention of urine was highest (86 %) in the 40+ years age group Only 14 patients were less

CONCLUSION

- Urinary retention is more common in men than in women and more commonly severe in age group more than 40 years.
- In men BPH is the most common cause of urinary retention followed by stricture urethra and calculus disease. In children, common causes are UTI and phimosis. In women, common causes are UTI and calculus disease.
- In most cases, history of lower urinary tract voiding symptoms are prominent.
- Transurethral catheterization (Foley's) is the most easy method to decompress the bladder.
- Ultrasonography is a very important investigation to rule out the definitive causes of urinary retention, whereas other radiological investigations like Xray KUB and MCU/RGU are helpful in diagnosing calculus diseases and stricture urethra.

- Acute urinary retention is more frequently seen when prostatic volume is more than 60cc on USG findings.
- In BPH patients PSA level also increases but in lower range and in case of malignancy CA prostate PSA level increases in the higher range.
- Catheter trial should be given on the 3rd/5th day after initial treatment
- Surgical intervention is the method to treat the failed catheter trial in cases of retention of urine, conservative medical management can be imposed in the patients where catheter trial is successful.

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