

ORIGINAL RESEARCH

A study on role of transabdominal sonography in benign prostatic hyperplasia

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ABSTRACT

Benign Prostatic Hyperplasia is the most common disease that affects elderly men. It is estimated that men aged 40 years or older will have some changes of benign prostatic Hyperplasia. It is so common that 80% of the male population will have prostatic hyperplasia by the age of 80 years. Prospective study of fifty five cases of benign prostatic hyperplasia (BPH) was undertaken. The study included both inpatients and out patients of age group ranging from 40 years to 80 years. Transabdominal sonography of prostate was performed on Real time ultrasound with 3.5 MHz sector probe of RT 3000 (GE) scanner with patient in supine position. Scan films were taken whenever necessary with multiformat camera. Out of 55 cases of with benign prostatic enlargement examined showed Grade I enlargement clinically in 20 cases. Ultrasonically 20 cases and post-operative specimen confirmed. 21 cases as Grade I enlargement. Grade II enlargement was noted clinically in 9 cases, ultrasonically in 12 cases and Postoperative specimen confirmed 11 cases as Grade II enlargement. Grade III enlargement was noted in 12 cases clinically, ultrasonically 9 cases were graded as Grade III and post-operative specimen confirmed 9 cases as Grade III enlargement.

Key words: Transabdominal sonography, benign prostatic hyperplasia, USG

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INTRODUCTION

The likely development of obstruction to the outflow of urine in elderly men is known since the time immemorial and attempts were made to overcome this in the ancient Syrian and Egyptian communities by passing catheters.¹

Benign Prostatic Hyperplasia is the most common disease that affects elderly men. It is estimated that men aged 40 years or older will have some changes of benign prostatic Hyperplasia. It is so common that 80% of the male population will have prostatic hyperplasia by the age of 80 years.²

Being affected so commonly, the prostate is not easily accessible to evaluation because it is located on the musculo-facial diaphragm of the pelvis and beneath the arch of pubic bone. Prostate is accessible only through the urethra and rectum.³

Morgagni of Padua-a fellow of Royal Society for the first time gave a detailed description of a case of prostate enlargement. Diagnosis usually depends on the palpation of a large prostate during a digital rectal

examination. It has been the standard tool for the evaluation of prostate for a long time.⁴

With the discovery of X-rays by Wilhem Conrad Roentgen in 1895, Iodinated organic compounds have been used in the visualization of urinary system. Since, then per rectal examination and Excretory Urography (SWICK 1929) have been used to evaluate prostatic hypertrophy. Both per rectal examination and excretory urography methods are frequently inaccurate in assessing the prostatic size.⁵

Since 1968, ultrasound has been used as an alternative method of prostate evaluation. New diagnostic ultrasound has come to stay in the field of prostate imaging. It is not only growing at most rapid rate among the imaging sciences, but basic physics and biology suggest that it will grow at an ever increasing rate among imaging sciences. Development of advances like gray scale images, stored and real time scanning have resulted in the visualisation of internal consistency of soft tissues.⁶

There are 3 access routes Transabdominal, urethral and Rectal used to create good ultrasonic images of

the prostate. Urethral and rectal routes are inconvenient to patient and require special probes. Rectal and urethral techniques are very accurate in the evaluation of the prostate. But their non-availability and to avoid patients' discomfort, Transabdominal routes has gained importance in the evaluation of prostate and bladder.

An important step in the evaluation of patients with obstructive voiding symptoms is to determine whether the prostate gland is enlarged. Other conditions like Neurogenic bladder, bladder neck contracture, urethral stricture and Carcinoma prostate and bladder can also produce symptoms similar to those of benign prostatic hyperplasia.^{7,8}

So, size of the prostate is not only important for diagnosis but also important for the surgeon to choose the best operative procedure. Accurate assessment of the size of the prostate is important to avoid difficulties during suprapubic or retropubic prostatectomy, when the gland is smaller than expected and on the other hand to minimise the risk of complications during prolonged transurethral resection, when the gland is larger than expected. Serial measurements of prostatic size also are important in following the response to non-operative therapy of prostatic disease.

METHODOLOGY

Fifty five male patients with clinical features of lower urinary tract obstruction were referred to the Department of Radio-Diagnosis, for transabdominal sonographic evaluation of prostate and bladder by departments of Urology and General Surgery.

Prospective study of fifty five cases of benign prostatic hyperplasia (BPH) was undertaken. The study included both inpatients and out patients of age group ranging from 40 years to 80 years.

Transabdominal sonography of prostate was performed on Real time ultrasound with 3.5 MHz sector probe of RT 3000 (GE) scanner with patient in supine position. Scan films were taken whenever necessary with multiformat camera.

METHODS OF STUDY

1. Through clinical examination of case with particular reference to act of urination and per rectal examination and grading.

2. INVESTIGATIVE PROCEDURES

- Transabdominal ultrasonic evaluation of prostate and bladder.
- Plain X-ray abdomen.
- Intravenous urography (IVU)-Whenever necessary.

3. LABORATORY INVESTIGATIONS

- Haemogram.
- Examination of Urine Analysis.
- Blood urea and serum creatinine.
- Urine C/S for pyogenic group of organism.

CRITERIA FOR SELECTION OF PATIENTS

- All the patients with frequency of Micturition (especially nocturia).
- All the patients with dribbling of urine and urgency to micturate.
- All patients with Acute retention of urine.

On per rectal examination the prostatic enlargement is graded according to Barner's classification.

Grade I: Median groove felt and upper border is easily reached.

Grade II: Median groove illdefined and upper border of prostate reached with difficulty.

Grade III: Median groove not felt and upper border of prostate is not reached.

TRANSABDOMINAL SONOGRAPHIC PROCEDURE

The patients were asked to hold urine for 2 to 4 hours and advised to drink plenty of fluids. In patients with indwelling catheter, the catheter was clamped for 2 to 4 hours prior to ultrasonography. Usually 100 ml of urine is sufficient to scan prostate except in obese patients.

RESULTS

Fifty five male cases of obstructive voiding symptoms were investigated both clinically and sonographically and enlarged prostate was graded. The postoperative prostatic specimen weight is correlated with clinical and sonographic grading. The age of patients ranged from 45 to 80 years. The study included both outpatients and inpatients.

Highest case incidence (28) was noted in 45-55 years age group. Much of Grade I cases (20) fell in 45-55 years age Group. Highest Grade II (6) cases noted in 56-65 age group. Highest Grade III cases also noted in 45-55 years age group.

Table I: Age Incidence

Ultrasound Grading	45-55 years	56-65 years	66-75 years	76-85 years
Grade I	20	10	-	-
Grade II	3	6	4	2
Grade III	5	2	2	1

Out of 55 patients 26 presented as frequency of urine. Among 30 patients of Grade I 23 presented with frequency of urine. All Grade III patients presented

with acute retention of urine. In 15 Grade II cases 11 presented with acute retention. In Grade II and Grade III prostate enlargement main clinical presentation

was acute retention of urine, where as in Grade I frequency of urine. Pyuria was present in 3 cases.

Table II: Clinical Presentation

Clinical presentation	No. of cases		
	Grade I	Grade II	Grade III
Frequency of urine	23	3	-
Acute Retention of urine	5	11	10
Pyuria/Burning micturition	2	1	-

Out of 55 patients spherical shape of enlarged prostate observed in 47 patients.(85%) and ovoid/pear shape in 8 patients (15%).All patients except one patient of Grade I enlargement showed spherical appearance and one patient showed ovoid appearance.In most of the Grade II (24), cases prostate was spherical in appearance and in 2 cases it is avoid in appearance.In

Grade III enlargement half cases showed spherical and half showed ovoid appearance.All the patients with ovoid appearance showed median lobe and lateral lobes enlargement.All the spherical prostates showed mainly lateral lobes enlargement.

Table III:Shape of the Prostate

Grading	Spherical	Ovoid
Grade I	28	1
Grade II	14	2
Grade III	5	5

Out of 55 cases studied Adenoma echo pattern was noted in 49 cases (89%) and homogenous echo pattern was noted in only 6 cases (11%).All 6 cases of homogenous echo pattern were seen in Grade I

patients.This homogenous pattern showed fibromuscular hypertrophy in pathological study and Adenoma echopattern cases showed diffuse glandular hyperplasia.

Table IV: Echo Pattern

Grading	Adenoma echoPattern	HomogenousEchopattern
Grade I	24	6
Grade II	15	--
Grade III	10	--

In a study of 55 cases of benign prostatic enlargement 27 cases showed Grade I enlargement, 13 cases

showed Grade II enlargement and 15 cases showed Grade III enlargement.

Table V: Clinical Grading

Grading	No. of cases
Grade I	21
Grade II	11
Grade III	9

Out of 55 cases examined with obstructive voiding symptoms were graded as Grade I in 27 cases clinically whereas by ultrasound 29 were graded as Grade I, 13 were graded as Grade II clinically where

as 16 ultrasonically and 15 cases were graded as Grade III clinically where as 10 were graded as Grade III ultrasonically.

Table VI: Clinical vs Ultrasound

Grading	Clinical	Ultrasound
Grade I	27	29
Grade II	13	16
Grade III	15	10

Out of 55 cases of with benign prostatic enlargement examined showed Grade I enlargement clinically in 20 cases.Ultrasonically 20 cases and post-operative specimen confirmed 21 cases as Grade I enlargement.Grade II enlargement was noted clinically in 9 cases, ultrasonically in 12 cases and

Postoperative specimen confirmed 11 cases as Grade II enlargement.Grade III enlargement was noted in 12 cases clinically, ultrasonically 9 cases were graded as Grade III and post-operative specimen confirmed 9 cases as Grade III enlargement.

Table VII: Correlations Between Clinical, Ultrasound and Surgical Gradings

Grading	Clinical	Ultrasound	Surgical
Grade I	20	20	21
Grade II	9	12	11
Grade III	12	9	9

DISCUSSION

Determination of prostatic size in patients with infra-vesical obstruction is an important factor in planning surgical approach. Accurate assessment of the size of the prostate is important to avoid difficulties during suprapubic or retropubic prostatectomy and transurethral resection.

Digital rectal examination and urethro-cystoscopy can provide erroneous results in predicting the size of the prostate. Measurement of weight by means of retrograde urethrography has an error of 20 per cent.

All the above methods were in vogue till Watanabe introduced ultrasonography for measurement of prostate size in 1971, using transrectal route. Though transrectal sonography is preferable to transabdominal sonography for evaluation of prostate, needs special transducer which is not available at all centres. But transabdominal approach using full bladder as an acoustic window can be done on any ultrasound equipment.

As early as 1973 S.S. Miller *et al.* using transabdominal approach evaluated the prostatic size and correlated with the Post operative size of the prostate.

In the present study also enlarged Grade I prostates correlating Clinically as well as sonographically than Grade II and Grade III enlargement of prostates as in the study of Bhargava *et al.* ⁹In the previous study of Bhargava *et al.* there is 2% of difference between clinical and sonographic grading. In the present study 3% of difference between clinical and sonographic grading observed which is almost correlating with Bhargava *et al.*

In Grade II prostate enlargement a difference of 7% noted between clinical and sonographic evaluation in Bhargava *et al.* where as in the present study difference of 5.4% noted which is nearly correlating with Bhargava *et al.*

In Grade III prostate enlargement a difference of 9% recorded between clinical and sonographic reading in Bhargava *et al.* where as in the present study difference

of 9% recorded which is exactly coinciding with the previous study of Dr. S. Bhargava *et al.*

In the view of above facts, Grade I prostates correlating clinically and sonographically in both studies. Moderate disparity between two approaches noted in Grade II enlargement. Whereas gross disparity noted in Grade III enlargement of clinical and sonographic grading.

The discrepancy in assessment of size increases with increase in size of the gland with digital examination versus ultrasonic assessment. Thus, confirming the viewpoints of Miller and Garvie that rectal

examination is a reliable means for determining the size if the gland is small or minimally enlarged (less than 30 gms in weight).

A difference of 6% between clinical and surgical grading noted according to Bhargava *et al.* but only 2% difference is noted between sonographic and surgical Grading in Grade-I. The present study shows no difference between clinical and ultrasound grading in Grade I where as a difference 2.5% between sonographic and surgical measurement noted which is correlating with the 3% of difference in previous study. In Grade II surgical and ultrasound grading difference is only 3% and clinical surgical is 5% in the present study.

In Grade III prostatic enlargement a difference of 7.5% noted between clinical and surgical evaluation whereas 1.5% difference noted between ultrasound and surgical grading in the Bhargava *et al.* The present study shows disparity of 7% between clinical and surgical evaluation where as no difference between ultrasonic and surgical evaluation. This finding is almost correlating with previous study of Bhargava *et al.* The clinical grading showed good correlation in Grade I enlargement than in Grade III enlargement. Similar observation was also made by Miller *et al.* in 1973. Ultrasonic grading showed good correlation with surgical grading irrespective of the size of the prostate gland¹⁰.

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