A comparative ultrasonic study of prostate gland

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Abstract
Background: *BPH is a common disorder among elderly males. There is a strong suspicion that the prevalence of BPH is higher than has been reported in clinical retrospective and necroscopy studies. For its deep topographic position in the pelvic cavity the prostate is inaccessible for diagnostic evaluation other than through urethra   or rectum more precisely. In the present days ultrasonic technique is suitable for the precise measurement of the size of various organs.*
Aim: *To assess prostatic size in relation to some clinical conditions by Abdominal Contact Scanning (PAUS) or Transrectal Ultrasound (TRUS).*
Materials and Methods: *this retrospective study comprises of 154 cases of which 60 cases without any urinary symptoms were taken as controls in contrast to 94 cases showing urinary symptoms. All the cases were subjected through either Abdominal Contact Scanning (PAUS) or Transrectal Ultrasound (TRUS). Various dimensions of prostate were applied to the study.*
Result: *All the prostatic dimension are increased in obstructive and irritative urinary symptoms. The Transverse diameter plays a greater role than Antero-Posterior diameter in obstruction.*
Keywords: *prostate, prostatic weight, C-C diameter, AP diameter, Tr diameter.*

Introduction

BPH is a common condition among elderly males. It has been reported in 50% of all males by the 6th decade and over 90 % males above 70 years; Garaway, W (1994)[1], thus a common cause of morbidity among older men. The commonest age group of presentation for both carcinoma and BPH is seventh decade and obstructive urinary symptoms are its most common mode of presentation; Chandanwale S (2013)[2].

There is a strong suspicion that the prevalence of BPH is higher than has been reported in clinical retrospective and necroscopy studies. For its deep topographic position in the pelvic cavity the prostate is inaccessible for diagnostic evaluation other than through urethra or rectum more precisely. Though the digital rectal examination is convenient and it does not require adequate exposure and any specific set up; it is unreliable in determining the size of prostate gland, Meyhoff H (1978)[3]. In the present days ultrasonic technique is suitable for the precise measurement of the size of various organs, Breslow N (1975)[4]. Watanbe et al (1975)[5], showed that there is a good correlation between the volume determined by trans-rectal ultrasound and the actual volume

obtained from specimens removed after" subcapsular prostatectomy".

Suprapubic ultrasonic scanning appears to be an accurate method for determining the size of the prostate gland irrespective of the amount of enlargement; Miller S.S (1973)[6]. However, ultrasonic beam was normally interrupted by pubic bone. Only enlarged prostate could be measured by trans-abdominal scan. Trans-perineal contact scanning may be better than trans-abdominal method; Watanbe (1973)[7]. Eri LM (2002)[8] also suggests that the simple formula based methods of prostate volume determination, based on prostate diameters, provide results that are only marginally inferior to planimetry, and are preferable in the clinic because they are simpler to perform and are associated with less patient discomfort.

The shape of prostate is nearly circular in hypertrophy and irregular or deformed in cancer. The antero-posterio r (height), cephalo-caudal (length) and transverse (width) diameters are enlarged in both groups but in case of cancer asymmetry is the characteristic feature[5].

Kaye and Ritcher (1990)[9], measured prostate size in normal subjects. Out of the total volume, the transitional and periurethral zone form about 5% and 1% respectively. When BPH is small, the transitional zones are bilaterally separated on either side of urethra. On increasing volume the transitional zones appeared to be fused together in the mid portion of the prostate and eventually appeared to be round. Masumori and Tsukamoto (1997)[10].

Aim and Objectives

To study ultrasonic dimensions of prostate in a sample population of Southern Coastal Odisha irrespective of age, socio-economic status, using TRUS and TAUS as investigation procedures.

Materials and Methods

The present study was carried out in the department of anatomy, MKCG Medical College, Berhampur. Total 154 cases were selected from population of Southern Coastal Odisha. 60 number of controls were selected in contrast to 47 cases of obstructive uropathy and 47 cases of irritative uropahty. Their height, weight, family size, diet, economic status, educational status, addiction and habituation, culture and associated diseases were thoroughly assessed and kept in document to study them as disease modifying factors.

The patients were categorised into two groups

   a. Patients with urinary symptoms: Those seeking medical advice for lower urinary symptoms.

   b. Controls: Those seeking medical advice for other physical ailments.

Group 'a' were further divided into two groups:

   i. Obstructive lower urinary symptoms: who came with urinary retention or with indwelling catheters.

   ii. Irritative lower urinary symptoms who showed pre-voiding symptoms like precipitancy, unable to control urination, frequency, nocturia; voiding symptoms like hesitancy, poor stream, delayed bladder evacuation and strangury or Post voiding symptoms like dribbling, incomplete evacuation and intermittency.

   Patients with temporary urinary infections were temporarily excluded till their recovery.

All the patients with urinary symptoms and controls were subjected through either Abdominal Contact Scanning (PAUS) or Transrectal Ultrasound (TRUS).

The study was approved by the institutional ehical committee.

Parameters: various dimensions of prostate, e.g. weight, craniocaudal diameter, antero-posterior diameter and transverse diameter were applied to the study.

Statistics: All the calculations and data processings were done by discriminant analysis method and passed through LSD test.

Observation

Table I: weight distribution of prostate in gm.

group	Max.	Min.	Mean	Sd	se	LSD test		
						group	t value	P
Control	30	5.3	14.71	8.29	1.07	CTL vs OBS	10.61	<0.001
Obstructive	301	19.2	81.58	55.58	8.11	CTL vs IRT	3.32	<0.001
irritative	99.1	10.1	35.65	17.66	2.58	OBS vs IRT	6.88	<0.001

Table II: diameters of prostate in cm.

diameters	group	max	min	mean	sd	Se	LSD test		
							group	t value	P
C-C	Control	4.6	2.0	2.7	0.57	0.07	CTL vs OBS	6.36	<0.001
	Obstructive	9.7	2.6	5.11	1.41	0.21	CTL vs IRT	5.32	<0.001
	irritative	6.2	2.0	3.9	0.89	0.13	OBS vs IRT	4.2	<0.001
Tr.	Control	4.5	2.2	3.27	0.64	0.08	CTL vs OBS	8.46	<0.001
	Obstructive	8.2	3.0	5.42	1.23	0.18	CTL vs IRT	6.32	<0.001
	irritative	6.0	2.7	4.06	0.83	0.12	OBS vs IRT	7.68	<0.001
A-P	Control	4.0	1.7	2.64	0.55	0.07	CTL vs OBS	8.36	<0.001
	Obstructive	7.2	2.8	4.89	1.12	0.16	CTL vs IRT	6.32	<0.001
	irritative	5.8	1.0	3.90	0.93	0.14	OBS vs IRT	4.68	<0.001

Discussion

Table I: In the present study the prostatic weight in controls (14.71±1.07gm) is less in comparision to that in symptomatic groups like obstructive (81.58 ±8.11gm) and irritative (35.65±2.58gm) groups. Weight in obstructive being the greatest. These values are comparable with Watanabe (1974)[11]. From LSD test t value shows the significance of the tests while comparing between the groups. Berry et al (1984)[12] are of opinion that presence of BPH with histological evidence was responsible in change of prostatic weight not the age. Castro et al (1969)[13] have opined a direct relation between prostatic size and degree of urodynamic obstruction

Table II: The study shows that all the diameters in controls (CC-2.7±0.07, Tr- 3.27 ±0.08 and AP-2.64±0.07) cm are less in comparision to symptomatic groups. The diameters in obstructive are CC-5.11±0.21cm, Tr-5.42± 0.18cm and AP-4.89±0.16cm. In irritative group the values are CC-3.9±0.13cm, Tr- 4.06±0.12cm and AP-3.92±0.14cm. All the dimensions are greatest in obstructive group. These findings coincide with the studies of Watanabe (1974)[11]. The p value was found less than 0.001 in LSD tests while comparing between the groups, which shows the significance of the study. According to Kaye (1990)[9] the normal diameters were: c-c dm: 2.8±0.5cm, A-P dm:2.7±0.3cm and Tr dm: 4.8± 0.4cm corroborative to our present study.

However Zhang SJ (2013)[16] observed that the mean length (C-C dm) of prostate increased faster than the height (A-P dm) and width (transverse dm), in prostatic hyperplasia.

Conclusion

i. All the diameters of prostate have significant role in development of obstructive urinary symptoms. The Transverse diameter plays the greatest role in obstruction.

ii. The increased prostatic weight and volume is brought about by increase in diameters may be positive reasons for development of symptoms.

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