Chapter (6)

Results And Discussion

(I) Radiographic findings :

Radiological changes correlated with prostatic enlargment:

Abnormality	Retention group	Prostatism group	Incidental discovery group
Total No of cases	16	21	3
(1)Upper urinary tract.			
(A)Kidney changes .			
1.Impaired.function	---	1 case	---
2.Non function	---	1 case	---
3.Hydronephrosis	one case	4 cases	3 cases
4.Stones	---	1 case	1 case
5.Normal	15 cases	14 cases	---
(B)Ureteric changes.			
1.Fish hook	3 cases	1 cases	---
2.Hydroureters	2 cases	3 cases	2 cases
3.Stone	---	1 case	---
4.Normal	11 cases	16 cases	1 case

Contd.

Abnormality	Retention group	Prostatism group	Incidental discovery group
(II) Lower Urinary tract.			
(A) Bladder changes.			
1. Associated stones	2 cases	2 cases	---
2. Bladder changes due to obstruction:			
a-oblong bladder	4 cases	4 cases	2 cases
b-diverticulae and sacculations	5 cases	4 cases	2 cases
3. Smooth outline	9 cases	14 cases	3 cases
4. Serrated outline	7 cases	7 cases	----
5. Elevated base	13 cases	13 cases	----
6. Bladder tumour	---	---	----
7. Changes due to cancer prostate	3 cases	---	----
(B) Prostatic concretions	----	1 case	----
(C) Size of prostatic basal indentation			
1. Small	3 cases	9 cases	1 case
2. Moderate	7 cases	7 cases	1 case
3. Huge	5 cases	4 cases	1 case

(II) Cases of malignant Prostate:

Case	Age	Clinical presentation	Laboratory findings	Other investigations done
(1) M.I.S.	59 years	1.Low back pain radiating to both L.Ls. 2.Before he had comp. sudden anuria. P.R.Big hard fixd prostatic mass.	Acid.F.=K.A.U.% Alk.P.=200 K.A.U% Bl.urea=45 mg% S.creatinine=1.4 mg%	x-ray dorso-lumbar spine xUltrasonography
(2) S.M.A.	57 years	1.Inability to move both L.Ls. 2.Retention of urine 3.Total haematuria for one day . P.R. Big hard fixed prostatic mass.	Acid.P.=14 K.A.U% Alk.P.=426 K.A.U% Bl.urea=50 mg % S.creatinine=1.6 mg %	x ray dorso-lumbar spine x Chest P.A. x Abdominal & pelvic C.T. Scanning
(3) S.M.A.	72 years	1.Severe difficulty of micturition 2.Burningmictrurition & weak stream P.R.enlarged prostate,hard, obliteration of median sulcus, small nodule at apex of prostate. Prost.++	Acid.P.=3 K.A.U.% Alk.P.=12 K.A.U.% Bl.urea=26 mg % S.creatinine=1.4 mg %	x Needle biopsy x Ultrasonography.

(III) Sonorgraphic findings :

Four cases have been examined by ultrasonography , using the full bladder supra pubic approach. Results of examination could be summarized as follows .

1st case : A.Z.H.M. 60 years

A large densely echogenic structure is noted inside the U.B. , it casts an acoustic shadow . This is compatable with a large stone .

2nd case: M.T. 60 years

Fig. 2A.

Transverse cross section of an enlarged prostate , 3 cms. above symphysis pubis. It shows an enlarged prostate with solid consistency .

Fig. 2B.

Longitudinal echo tomographic cut showes the enlarged prostate, with a stone inside the most dependant part of the U.B., which casts acoustic shadow .

3rd case : M.I.S. 58 years

(From Cancer Institute hospital) .

4th case

Fig 4

Ultrasonography revieled a large mass, at level of bladder neck (lower posterior aspect). It shows solid echo texture. It measures 4.8 X 4 cms. Possibility of an enlarged prostate can be considered .

4th case : S.M.A. 72 years

Ultrasonography revieled a large mass, at level of bladder neck (lower posterior aspect). It shows solid echo texture. It measures 5 X 4.2 cms. Possibility of an enlarged prostate can be considered.

IV. C.T. results :

Seven cases have been examined by the computed tomography techique (C.T.). Results of these examinations are briefly reviewed. Their ages ranged between 42 & 71 years. Two cases were examined while a Folley's catheter was fiexed inside their urinary bladders. The were all examined with contrast injection.

(1) One case revieled that the clinically felt prostatic tumour is still within the confines of the prostate , without visible extraprostatic extention into the pelvis .

(2) Three cases of benign prostatic enlargment revealed the following : -

(A) Two cases showed enlargment mainly of both lateral lobes.

(B) One case showed hypertrophied median (middle) lobe .

(3) The 5th case : Its cystogram revealed a small smooth basal prostatic indentation. These was also a radio-opaque stone inside U.B. By C.T. examination , there was a normal appearance of U.B. with normal appearance of soft tissue shadow of prostate . At operation, the bladder neck was found to be wide, with no prostatic enlargment. The stone inside was removed.

(4) The 6th case :

Case of cancer prostate T4 which received courses of chemotherapy and radiotherapy .

(5) The 7th case :

Normal C.T. findings (control case) .

Discussion :

Forty adult male patients above the age of forty years have been the subject of this study.

(I) Excretory Urography :

After taking a straight film (K.U.B), an excretory urography examination was performed, for assesment of kidney function and appearance of the pelvicalyceal systems and the coarse & calibre of the ureters. Finally a complete cystographic examination and a post-voiding film was taken for assesment of amount of residual urine.

In this study of 40 cases of prostatic enlargment 3 cases were malignant, whereas 37 cases were benign

Intravenous examination may show obstructive changes in the urinary tract. Hydronephrotic changes were found in one case from the retention group of patients, four cases from the prostatism group, and the three cases of the incidental discovery group. Also two cases from the retention group , three cases from the prostatism group, and two cases from the incidental discovery group had hydroureters. Accordingly eight cases of hydronephrosis, and seven cases of hydroureters were encountered in this study.

With marked enlargment of the prostate, the lower ureters may be elevated to give the "fish hook" sign.

the incidental discovery group, revieled oblong bladder; suggestive of bladder outlet obstruction, most probably by the enlarged prostate compressing the reigon of the bladder neck and reigon of the posterior urethra .

A vertical appearing bladder may be seen also with diffuse pelvic masses, for example lymphocoeles (43) pelvic lymphadenopathy (2), pelvic lipomatosis (15,23), prominant ilio-psoas musculature (8) and finally in cases of acute inferior vena caval obstruction (2) Each of these possibilities should be considered in light of patients history, physical examination and laboratory studies including roentgenography results.

Computed tomography can provide immediate helpful information in assesing questionable pelvic masses. Massive prostatic enlargment should be considered in the differential diagnosis of a perivesical mass and a vertical bladder

Accordingly in our own limited experience we have come out with a fact that the pre-operative excretory urography in patients with prostatic enlargment, is not only justifiable, but a necessity, since some of our cases inspite of the negative clinical signs, and postitive symptoms of prostatism showed radiological features of prostatic enlargment either directly or indirectly. This confirms with suggestions and findings of Pink et al., 1980 and Pang et al., 1979 , but does not confirm with suggestions of Ochsner et al., 1965, Abrams et al., 1976,Morrison 1980, and Marshal, Singh and Blandy, 1975 .

(II) Ultrasonography:

Ultrasonography proved to be a valuable, non-invasive technique in evaluating enlargment of the prostate, both by suprapubic compound scanning, and by transrectal method.

In this series, four cases of prostatic enlargment, 2 bening, and 2 malignant have been examined by the suprapubic approach because the trans-rectal transducer approach is not available. They were all readily displayed with the full bladder suprapubic technique. Two cases previously diagnosed as cancer prostate, were found on songoraphy to be equivocal. Accordingly, this technique in our limited experience did not prove to be superior to the conventional radiographic techniques, particularly in diagnosing cases of cancer prostate.

In the remaining 2 cases of benign prostatic enlargment, examined by ultrasonography, the results were satisfactory . The associated bladder stones were readily displayed; together with the enlarged prostate .

The ultrasonic study for the prostate via the transrectal, and transurethral avenues was not resorted to because the necessary equipments were not available . Moreover this

approach proved to be cumbersome and was not welcomed by the patients in other centres. (18 , 21 , & 36)

Although the results from investigations using the recent transrectal scanners appear promising, the information obtained from them cannot reliably differentiate between malignant and benign conditions. Both prostatic tumours and hyperplastic nodules appear as nodular masses of decreased echogenicity. Benign masses tend to be circumscribed, with a definable capsule around them . (14)

Patient acceptance of the transrectal scanning method has also been a rather fromidable problem. With further technical development, images of the prostate obtained from an anterior approach may become practical , therby incrasing the value of the procedure . (14, 45 , & 52)

(III) Computed Tomography:

C.T. scanning has got only a limited role in evaluating prostatic enlargment resulting from benign prostatic hypertorphy. This enlargment may appear as an intra luminal bladder base mass. (16)

As regards prostatic enlargment resulting from carcinoma, the C.T. appearance would be different. It arises in the subcapsular reigon of the posterior lobe in 75% of cases,. It is not possible to differentiate both conditions of enlargment on the basis of attenuation value of the prostate gland. Accordingly prostatic corcinoma is identifiable by its extention beyond the confines of the normal prostate. The tumour extends throughout the entire gland and then spreads to involve the seminal vesicles., and 80% of those patients will have extention of disease to the pelvic lymph nodes. The fat plane surrounding the converging ends of the seminal vesicles (seminal vesical angle) may be obliterated, by tumour extention, and its loss is a sign of tumour extention.(38) The tumour also may spread through the regional lymph nodes, to involve the vesical, sacral, external iliac and lumbar L.N. This nodal metastasis can be detected by C.T. scanning . (16)

Thomas Sherwood et al., 1980 in assesing the value of C.T. examination of the pelvis have noted that nodular prostatic contours occur only in prostatic carcinoma., and not in benign prostatic hypertrophy. With further extention of tumour, masses in the pelvic fat and along the lateral side walls develop. The use of C.T. examination is valuable in this area, since the hypogastric obturator chain of lymph nodes is usually bypassed or incompletely filled by pedal lymphography. (40)

David M. Witten et al in 1977 , have assesed the role of C.T. evaluation of pelvic, vesical, and prostatic masses. They have noted that C.T. permits a cross-sectional display of the bladder base, and the prostate which is not possible on the excretory urogram. The prostate may be visualized as a filling defect in the contrast medium that fills the dependant portion of the bladder in the supine position . Potentially, C.T. may be useful in providing an accurate assesment of prostatic size, extent of prostatic cancer , invasion of the prostatic cancer through the capsule, and further spread into the pelvic soft tissue and lymph nodes . C.T. may also be valuable in selected patients to evaluate possible prostatic metastasis to the spine, pelvis, and sacrum .

Ultimately the computed tomography produces a cross sectional anatomic representations with exquisite accuracy. Cost and availability of the equipment are important additionel factors. Many of these considerations are yet to be determined in assesing the overall application of computed tomorgraphy to uroradiological problems. (40)

In our study of forty patients, complaining of symptoms and signs of prostatic enlargment, seven cases have been examined by computed tomorgraphy. two case were those of cancer prostate. C.T. examination revealed symetrical enlargment of the prostate, without any infiltration in the reigon of the pelvis, and the seminal vesicles. The U.B. appeared normal. The conclusion is that the clinicaly felt prostatic tumour is still within the confines of the prostate, without visible extraprostatic extention into the pelvis.

The remaining four cases were provisionally diagnosed as enlarged prostate. After C.T. examination., this provisional diagnosis of enlarged prostate was confirmed only in three cases., whereas the remaining case, by cystography revealed a false + ve prostatic indentation, however its C.T. findings were those of a normal bladder base, and normal prostate appearance. It should be noted that the operative findings in the last case confirmed the C.T. result and disproved the cystogram result . The patient had a wide

bladder neck, with no significant prostatic enlargment , and only the U.B. stone was removed.

The $7^{\underline{th}}$ case was that of a normal subject to whom we performed C.T. examination, to demonstrate the C.T. findings in a normal prostate.

However Price and Davidson in 1979, in their assesment of the value of computed tomography in the Evaluation of the Suspected Corcinomatous Prostate, have reached out a totally different opinion.

Twenty six patients with suspected prostatic carcinoma were examined. Twelve had benign prostatic hypertrophy and forteen had adenocarcinoma of the prostate as proved by biopsy or resection.

C.T. specifically evaluated prostatic contour,density, seminal vesical "angle" , extraprosatic soft tissue "mass" and pelvic fat planes. A nodular contour was present in cases of prostatic adenocarcinoma. The smooth contour, which is considered a characterestic feature of benign hypertrophy, was also present in three cases of malignancy.

Accordingly focal alteration of the normal smooth contour of the prostate, strongly suggests malignant disease, but a smooth contour does not discriminate between benign and malignant disease. (34)

Also they consider the relationship of the seminal vesicles to the posterior bladder wall, which was reported as an indicator of carcinomatous invasion beyond the gland , was found in both benign and malignant diseases. Also extraprostatic soft tissue "masses" were also seen in two patients having benign diseases, and were identical to those seen in six patients with adenocarcinoma . (34)

Their results suggest a limited use of a C.T. as a primary modality in staging patients with known tumour, but it could be an adjunct to lymphangiography.

Morgan et al 1981, have assesed the role of computed tomography in the evaluation, staging, and therapy of carcinoma of the bladder and prostate. They noted that most of the earlier work was performed with relatively slow scanners (i.e., 18 seconds to 4.5 minutes), which limited image quality and resolution. They suggested special C.T. techniques to imporve efficiency or quality of the examination.

The prostate carcinoma can be staged into 4 stages, stages A,B,C, and D. C.T. was not able to differentiate between a normal prostate, and a prostate with stage A or B tumours. Palpable nodules were not identifiable by C.T., nor was there any apparent variation in C.T. numbers between a normal gland, and one with carcinoma . (28)

Also they suggested that the principal methods of evaluating the pelvic lymph nodes are lymphangrography, C.T, and lymphadenectomy. The chief limitations in evaluating lymph node metastasis are the presence of microscopic involvment in normal sized or minimally enlarged nodes , the inability to identify internal architectural distortion, and, not uncommonly, lack of sufficient fat to delineate the nodes . (28)

On the other hand, Levine et al 1981, in assesing the superiority of C.T in detecting lymphatic metastesis from prostatic carcinoma, have noted that the overall accuracy of C.T. was 93% in contrast to the pedal lymphangiograaphy technique whose overall accuracy was just 55% . (23)

It is well documented that the earliest lymphatic spread of prostatic carcinoma occurs via the obturator and

hypogastric nodes in the pelvis. These may be the only nodes involved in 30% of patients with nodal metastasis. Yet these nodes are rarely opacified by lymphangiography. In contrast, deep pelvic nodes (particularly hypogastric nodes) are readily visualized by C.T. It is therfore not surprising to find that C.T. was superior to lymphangiography in detecting early nodal metastasis in the pelvis. They believe that C.T. (complemented by percutaneous needle biopsy if positive, or pelvic lymphadenectomy if negative) constitutes an excellent screening technique for early lymphatic metastasis, and probably should replace lymphangiography in the initial staging evaluation of prostatic carcinoma. (23)

Milton Elkin 1980 have noted that the normal pelvic lymph nodes and vessels are usually not identified unless they have been opacified . (12)

Helen . C. Redman 1977 has noted that C.T. is particularly useful in evaluating the pelvic side walls , stagging of bladder tumours and evaluation of the prostate. The prostate is a symmetrical organ surrounding the urethra, and has a uniform attenuation values. It may be distinguished from the bladder by its lower position, and by the use of intravenous contrast material to opacify the bladder .

Fine calcifications within the prostate that are not definable on routine radiography are often seen. Enlargment of the prostate due to either benign prostatic hypertrophy or carcinoma can be shown. Also extension of prostatic tumour to the hypogastic nodes can be seen. (35)

Van Engelshoven and Kreel, have studied the value of computed tomography of the prostate, and attempted to evaluate prostatic size. They noted that inspite of having high quality, high resolution scans, it was impossible to identify the different prostatic lobes, and to seperate prostatic capsule from the prostatic parenchyma itself. It is also very often difficult to distinguish the prostate gland from the levator ani muscles. On the more cranial sections through the prostate, the division between rectum and prostate can be seen because of air in the rectum .

Towards the apex of the prostate, its A.P. and lateral diameters may be overestimated due to inclusion of the surrounding structures. In assessing the cranio-caudal diameter, continuous cuts should be taken untill the prostate is no longer visible. In practice, it may be sufficient to make a single cut 1 cm. cranial to the symphsis pubis . If the prostate is not seen on this cut then it can be inferred that the prostate is not enlarged. If the prostate is seen

at this level, further cuts at higher levels must be done to delineate the prostate fully. (49)

Accordingly on enlarged prostate can be seen 2-3 cms. above the pubis, or even more cranial, and appears to be largely surrounded by the bladder. Assesment of prostatic enlargment and bladder impression is easily a chieved by using the C.T. technique . (49)

Collectively, the various opinions and suggestions concerning the role of C.T. modality in cases of enlarged prostate can be briefly reviewed .

J. Haaga and N.E. Reiche believe that C.T. has got only a limited role in evaluating prostatic enlargment resulting from benign prostatic hypertrophy. However David M. Witten et al., consider C.T. useful in determination of prostatic size. Price and Davidson noted that cases of benign enlargment are characterized by a smooth contour . They also have noted that extra prostatic soft tissue mass may occur in benign cases.

Concerning cases of malignant prostate, J. Haaga and N.E. Reiche believe that C.T. is a valuable modality for assesment of extention of tumour, beyond the confines of the prostate, assesment of nodal metastasis, and seminal vesical angle. Also T. Sherwood noted that nodular, contour occurs only cases of malignant prostate, and that C.T. is valuable in detecting nodal metastasis in cases of malignant prostate especially hypogastric and obturator L.N., which are bypassed on pedal lymphangiography . Levine et al consider that C.T. was superior to lymphangiography in detecting early nodal metastasis in the pelvis . The overall accuracy of C.T. was 93% in contrast to lymphangiography

benign and malignant cases. They suggested a limited use of C.T. as a primary nodality in staging of patients with known tumour, C.T. should be adjunct to lymphography.

In our limited experience, from the few cases of benign and malignant prostates we have come across in this study, our findings are of the opinion that C.T. produces a cross sectional anatomic represenations of the bladder base , and the prostate with exquisite accuracy that was not possible on the excretory urograms. C.T. is specifically beneficial in evaluation of the prostatic contour, seminal vesical angle, extraprostatic soft tissue masses, pelvic fat planes and finally extent of nodal metastasis .

Our finding are in accord with the opinions of Haaga and Reiche, T.Sherwood, Witten, Morgan et al, Levine et al, Redmann, Engelshoven and Kreel, and discordant with the opinions of Price and Davidson, and of Elkin.